



**NDC+**  
Release 6.02  
NDC+ Programmer's Reference Manual

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This publication supports Release 6.02 of the NCR Direct Connect Plus (NDC+) software system.

NDC+ 6.02 is Year 2000 "Qualified with Comment". That is, it meets the conditions of the NCR Year 2000 Qualification Requirements Definition (Rev. 2.1), with the following comments for clarification:

1. NDC+ uses a convention technique to convert two-digit numbers for the year into four-digit numbers. If the last two digits have a value less than 90, the assumption is 21st century, otherwise the 20th century is assumed.
2. Days of the week have no significance.
3. No database access and storage operations are performed.
4. No time interval calculations involving century transition are performed.

It is the policy of NCR Corporation (NCR) to improve products as new technology, components, software, and firmware become available. NCR, therefore, reserves the right to change specifications without prior notice.

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To maintain the quality of our publications, we need your comments on the accuracy, clarity, organization, and value of this book.

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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.**

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## 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 Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.**

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## 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.



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## Revision Record

Date	Page	Description Of Change
Apr 99	2.1-4 2.1-63 2.1-82 2.6-12 3.2-12 3.2-13 Chap 3.4 3.5-6 4.2-2 4.2-16 4.2-23 Chap 4.5 4.6-1 & 3 D-2, 11, 19 & 20 G-2 & 5 H-2	Modified Card Read State 'A', to support non-magnetic smart card transactions. Added note that Card Read PIN Entry Initiation State 'T' supports non-magnetic smart card transactions. Addition of Smart FIT Check State 'k'. Addition of Non-magnetic Card Accept to Enhanced Configuration Parameters. Addition of smart card variants to hardware configuration information. Addition of Angel Spray dispenser to hardware configuration information. New chapter, 'Upload EJ Data Message'. Addition of notes presented field to Cash Handler Device Status for Angel Spray dispenser. Added Smart FIT Check state 'k' to list of state tables. Add note : EJ timers are set in EJ Options and Timers command, not in Enhanced Configuration Parameters Load message. Added Non-magnetic Card Accept to Enhanced Configuration Parameters Load message. New chapter, 'EJ Commands'. Addition of message class '6': Electronic Journal. Added Upload EJ Data message and EJ Commands to quick reference guide. Added EJ Upload Data message and EJ Commands to list of NDC+ message types. Addition of Smart FIT Check State 'k' to list of supported states in Native mode.

Date	Page	Description Of Change
	I-2	Addition of non-magnetic smart card support to list of Native mode features.
	N-2	Addition of smart card variants to device identifiers.
	App U	New appendix, 'Smart Card Handling'.
Mar 98	Title	Addition of Year 2000 information
	2.2-6	Additional information on K screens 11,12,13 and addition of K14
	2.2-10	Screen K 11- information on rotation values of document image
	2.4-2	Comment on dual mode journal printing & logo printing on thermal statement printer
	2.4-15	Screen K11 - information on rotational value of document image
	2.4-16	Download logo and print logo added to enhanced printer control codes
	2.5-10	New screens I64 and I65
	2.6-7	Additional information in journal printer backup log tamper indicator
	2.6-11	Additional information on back-up hours and back-up records. Addition of new parameters for dual mode journal printing and for extending MCN range.
	2.6-12	Addition of Enhanced EJ Backup option to enhanced configuration parameters
	3.1-2	Optional extension of MCN range
	3.2-5	New returned value C15
	3.2-13	Three new values for dual mode journal printing and one for enhanced thermal statement printer
	3.4-10	Two new status codes for dual mode journal printing
	3.5-2	Only physical journal status messages reported in Diebold emulation, when in dual mode
	4.2-19	Data commands for new/modified enhanced configuration parameters
	4.2-37	New functionality in encryption key load section
	4.5-7	Message exception handling for encryption keys

Date	Page	Description Of Change
	5.1-22 App A App N App P	Hardcopy backup mode as a security feature when dual mode journal printing New reserved and error screens Four new device configuration values Screen K11 - information on rotation values of document image
Nov 97	2.2-24	Addition of blinking code 11
Mar 97	See Below  xliii 1.1-5 1.1-6 2.1-1 2.1-8 2.1-17 2.1-19 2.1-22 2.1-28 2.1-34 2.1-36 2.1-39	<b>Release 6.00</b> Exits, Digital Camera System (DCS), Digital Audio Service (DAS), DPM document image printing, VGA Enhanced Rear Operator Panel (VEROP), new state of health option. 'NCR' replaces 'AT&T', <i>personas</i> added throughout  Added new related publications: Exits, Security Camera and Digital Audio manuals to list Creating An NDC+ System - Added note and reference on Digital Audio Service (DAS) files Creating An NDC+ System - Added note on Exit State and Exit Supervisor DLL files State Tables - Introduction - Added comment on Exit States and Audio Control State and note on behaviour of DAS B - PIN Entry State - Added comment on DAS F - Amount Entry State - Added comment on DAS H - Information Entry State - Added comment on DAS I - Transaction Request State - Added comment on DAS J - Close State - Added comment on DAS volume L - Card Write State - Corrected note on Transaction Reply message fields M - Enhanced PIN Entry State - Added comment on DAS N - Camera Control State - Updated description to include details of Digital Camera Service (DCS) Picture command format

Date	Page	Description Of Change
	2.1-43	P - Courtesy Amount Verification State - Added comment on DAS audibly echoing key presses
	2.1-59	R - Enhanced Amount Entry State - Added comment on DAS audibly echoing key presses
	2.1-61	S - Language Code Switch State - Added comment on DAS and language selection
	2.1-63	T - Card Read - PIN Entry Initiation State - Added comment on DAS
	2.1-67	V - Language Select from Card - Added comment on language selection in Digital Audio Service (DAS)
	2.1-72	Y - Eight FDK Selection Function state - Added detail of language selection and FDKs
	2.1-76	b - Customer Selectable PIN state - Added comment on DAS
	2.1-79	Added d..g - Exit States
	2.1-80	Added i - Audio Control State
	2.1-84	Time-Out state - Added Multi Language Digital Audio Service (DAS)
	2.2-7	K- Extended Screen Controls - Added details of screens K11 to K13
	2.2-10	Added screens K11 to K13
	2.2-15	Operator Interface Display Characters - Added VGA Enhanced Rear Operator Panel (VEROP) to list
	2.2-20	Graphics Services: Amended to refer to releases later than 5.00
	2.2-22	Special features - Added warning that long audio messages may time out
	2.2-28	Corrected explanation of colour text display (addresses TAR 000000055725)
	2.2-35	Multi language screens - added details of implementing the DAS in multi-language screens
	2.3-8	States and Keyboards - added Audio Control State and Exit States to list of states that use keyboards
	2.3-8	States and Keyboards - added comment that Exits must validate their own keyboards

Date	Page	Description Of Change
	2.3-9	States and Keyboards - added Audio Control State to L/R Swap list
	2.3-12	States and Keyboards - added Keyboard layout in Audio Control State
	2.3-14	Touch Screen FDK Emulation - added Exit States, Audio Control State to list of states that can use touch screen
	2.4-1	Added Sideways Printing On Receipt to list
	2.4-5	Default Prints For PPD and DPM - added new date formats
	2.4-6	Twelve Character Amount Buffer - added new date formats
	2.4-7	DPM Default Print - added new date formats
	2.4-15	Print Graphics - added details of DPM document images
	2.5	Supervisor Messages - added VEROP as appropriate to titles throughout
	2.5-9	Automatic Screen Editing - added Volumes and Default Volumes for speaker and audio jack to table
	2.6-3	Timer Number - added DCS Camera Delay Timer and DCS File Expiry Timer To list of timers
	2.6-5	Enhanced Configuration Parameters Load Message - added new date formats
	2.6-9	Enhanced Configuration Parameters Load Message - added Include PAN in DCS Data option
	2.6-9	Enhanced Configuration Parameters Load Message - added Enable Audio Echo of Keyboard option
	2.6-9	Enhanced Configuration Parameters Load Message - added Report Digital Audio Service (DAS) Errors option
	2.6-9	Enhanced Configuration Parameters Load Message - Added new State of Health/Fitness option

Date	Page	Description Of Change
	2.6-12	Enhanced Configuration Parameters Load Message -Timer Number - added DCS Camera Delay Period and File Expiry Mechanism to list of timers
	3-i	Terminal to Central Messages - added messages from exits to list of messages
	3.1-12	Transaction Request Message - added new fields for Exit data and accompanying note
	3.2-1	Solicited Status Messages - added note that Exits can send Solicited Status Messages
	3.2-9	Send Configuration Information - added new device fields
	3.2-11	Solicited Status Message Format - amended to refer to release later than 5.00
	3.2-12	Hardware Configuration - Sub-field 'g4' - added <i>personaJ</i> terminals
	3.2-16	Hardware Configuration - Sub-field 'g4' - added new device fields
	3.2-18	Send Supply Counters - added Camera Film Remaining field, g10
	3.2-26	Hardware Configuration - Sub-field 'g3' - added <i>personaJ</i> terminals
	3.2-31	Software ID and Release Number Data - Release number in example updated to release 6.00
	3.2-39	Unsolicited Status Messages - added note to explain Exits can send Unsolicited Status Messages
	3.3-1	Added Chapter 3.3, "Exit To Host Messages"
	3.4-16	Camera (Unsolicited) - added reference to DCS
	3.4-20	Supervisor Keys (Unsolicited) - Extended field e2 and added values 7 and 8 for Exit menus, Host Menu and Host Function reporting
	3.4-35	Added DAS (Unsolicited)
	4.2-2	State Tables Load - added new legal state type letters
	4.2-10	Configuration Parameters Load - added Digital Camera Service Camera Delay Period and File Expiry Mechanism timers

Date	Page	Description Of Change
	4.2-13	Added description of DCS Camera Delay period timer
	4.2-13	Added description of DCS File Expiry Mechanism timer
	4.2-17	Enhanced Configuration Parameters Load - added new date formats
	4.2-21	Enhanced Configuration Parameters Load - added details of Include PAN in DCS data option, Enable Audio Echo of Keyboard option, Report DAS Errors option, SOH/Fitness option, DCS timer, File Expiry timer
	4.2-26	FIT Data Load - Max. number of FITs raised to 1000
	4.2-30	Message Authentication Field Selection Load - extended Transaction Request Field
	4.2-33	Message Authentication Field Selection Load - added data fields for Exits
	4.2-33	Message Authentication Field Selection Load - extended Transaction Reply Field
	4.2-35	Message Authentication Field Selection Load - added exit data fields in Transaction Reply
	4.3	Added new section: "Host to Exit Messages"
	4.4-6	Transaction Reply - added printer flag '>' - send to DAS, and modified sideways printing detail
	4.4-8	Transaction Reply - updated Printer Data Field description to include DAS data and DPM images
	4.4-17	Transaction Reply - added Transaction Reply fields for use by Exits (am - ar)
	4.4-22	Deposit and Print - added annunciation to Transaction Reply Operation
	4.4-23	Dispense and Print - added annunciation to Transaction Reply Operation
	4.4-24	Display and Print - added annunciation to Transaction Reply Operation
	4.4-24	Print Immediate - added annunciation to Transaction Reply Operation
	4.4-25	Set Next State and Print - added annunciation to Transaction Reply Operation

Date	Page	Description Of Change
	4.4-25	Night Safe Deposit and Print - added annunciation to Transaction Reply Operation
	4.4-26	Card Before Cash - added annunciation to Transaction Reply Operation
	4.4-27	Parallel Eject/Dispense and Print - added annunciation to Transaction Reply Operation
	4.4-28	Card Before Parallel Dispense and Print - added annunciation to Transaction Reply Operation
	4.4-29	Print Statement and Wait - added a note that annunciation was not available
	4.4-29	Print Statement and Set Next State - added annunciation to Transaction Reply Operation
	4.4-30	Process Document With Cash - added annunciation to Transaction Reply Operation
	4.4-31	DP-ATM Deposit Envelope - added annunciation to Transaction Reply Operation
	4.5-1	Changed illegal message classes
	4.5-2	Added DLL not found or Exit not found errors
	4.5-3	Changed illegal message classes
	4.5-5	Max number of FITs raised to 1000
	5.1-11	Selective Message Authentication - added new fields (ax-bc) in Transaction Request
	5.1-13	Selective Message Authentication - Added new fields (am-ar) in Transaction Reply
	A-7	New screen E0039: Front feature only
	A-7	New screen E0040: DCS failure
	A-7	New screen E0041: DAS error
	A-7	New screen E0042: Load error
	A-7	New screen E0047: Call error
	A-13	Changed Configuration Data screen I44
	A-13	New screen I61: Set DAS default vol SST
	A-13	New screen I62: Set DAS default vol jack
	A-15	Changed Configure menu
	A-16	Native Mode Select Menu renumbered M12

Date	Page	Description Of Change
	A-19	New screens P40, P41: Enter Vol SST, Vol Jack
	A-30	New screen T92: Account not known
	A-30	New screens T93 and T94: DLL load or call error
	D-2	Quick Reference to Message Types - added Exit to Host message
	D-2	Quick Reference to Message Types - Added Host to Exit message
	D-6	Transaction Request - updated fields
	D-7	Unsolicited Status Messages - updated fields
	D-9	Solicited Status Messages - updated fields
	D-11	Added Exit to Host Message
	D-17	Transaction Reply Messages - updated printer flag to include annunciation
	D-18	Transaction Reply Messages - updated fields to include Exit Data fields
	D-19	Added Host to Exit message
	G-3	Function Command Message - Added notes on DPM document image printing and DAS messages
	G-7	Unsolicited Status Message (Device Faults) - added DAS to list of devices
	H-3	Differences Between NDC+ and Diebold State Tables - added Digital Audio Service (DAS) to list
	H-4	Differences Between NDC+ and Diebold State Tables - added new section Exit States
	I-2	Summary of Differences Between NCR and Diebold SSTs - added DAS echo of keyboard, DCS, DAS messages in Transaction Reply, audio jack, audio volume adjustment, DPM image printing, Exits
	K-2	The Files You Need For Diskbuild/2 - added warning on interrupt allocation
	K-3	The Files You Need For Diskbuild/2 - added Exit rule files and Exit support DLL files throughout section, added NDCIA.EXE, updated release levels

Date	Page	Description Of Change
	K-6 K-7 L-2 N-3 N-7 N-13 O-4 P-2 P-13 R-1 S-1 T-1 Glossary	New Section - NDCIA.EXE New Section - Added Audio Files Rear Supervisor/Settlement Transaction Files Description - added note: DAS not available in Supervisor Added DCS Hardware Configuration Data - added DAS Fitness Data - added DAS Dog Ear Document Error Data - changed minimum dog ear detected to 3/8 inch Introduction - added note on allocation of interrupts New section - Printing Document Images New Appendix R: "Understanding the Digital Audio Service" New Appendix S: "Understanding the Digital Camera System" New Appendix T: "Understanding Monitor Burn-In" Glossary - added the following new terms to the glossary: Exits, Hooks, MISCONT, Rule File, STCONT, SUPCTR, VCCONT and VEROP.
Aug 95	2.1-2 2.1-25 2.1-26 2.1-33 2.1-38 2.1-73 2.2-6 2.3-8 2.3-14	Added Customer Selectable PIN State Increase range for Send Optional Data Fields Added statement on Timers to Close State J New track data - Card Write State L Update to data formats - Camera Control State N New section - Customer Selectable PIN State b Added 'K07' - 'K10' to K - Extended Screen Controls Added Customer Selectable PIN keyboard to section Screens and keyboards - added Customer Selectable PIN Entry

Date	Page	Description Of Change
	2.4-2	Added statement to include sideways printing in list of supported printers
	2.4-2	Printer Types Supported By NDC+ - Updated receipt length details
	2.4-7	Printer Control Characters - included sideways printing
	2.4-8	Enhanced Printer Control Characters - updated to include thermal printer control sequences
	2.4-18	Character sets - Updated with new character set data.
	2.4-19	Character sets - added note for sideways printing
	2.4-23	Screens - Sideways printing data added
	2.4-27	New section - Sideways Printing on Receipt
	2.5-6	Printer Layout - added sideways printing
	2.5-11	Added T45 to Supervisor Messages
	2.6-3	Logical Unit Number - Added reference to 6 digit security feature
	2.6-5	Roll Width, Left Column - added note for sideways printing mode
	2.6-9	Added - TPA Informed of SM Activity Option
	3-i	Overview - Added Software Management Installation Status Messages
	3.1-12	Transaction Request Messages - added 'av' and 'aw' fields
	3.2-6	Status Messages - added note for sideways printing
	3.2-11	Hardware Configuration - added track 3 data
	3.2-12	Hardware Configuration - added sideways printing
	3.2-30	Added sideways printing detail to Device Faults
	3.2-33	Sub -Field g1 - Added new details for Device ID 2
	3.2-38	Status Messages - Added Software Management Messages

Date	Page	Description Of Change
	3.3-3	Device Status Information - Added new track data
	3.3-9	Receipt Printer - Included 'Solicited' and sideways printing
	3.4-2	Journal and Acknowledgement Printers - added text for sideways printing
	3.4-14	Card Writer (Unsolicited) - added tracks 1 and 2 to description
	4.2-9	Track Write Error Threshold - updated for all tracks
	4.2-17	Enhanced Configuration Parameters Load - added statement for normal print mode
	4.2-28	Field h - Updated number of characters
	4.2-30	Customisation Data Commands - added fields 'AV' and 'AW'
	4.2-31	Field i - Added data for 23 to 28
	4.3-4	Transaction Reply - added note for Function Identifiers 'P' and 'Q'
	4.3-6	Transaction Reply - added sideways printing to Field q
	4.3-6	Transaction Reply - added sideways printing to Field r
	4.3-16	Transaction Reply - added fields AK to AL and updated note 2
	4.3-28	Added sideways printing to Print Statement and Wait and to Print Statement and Set Next State
	4.4-7	Value E - Added sideways printing details
	5i	Overview - Added checksum feature
	5.1-8	Added MAC verification to Time Variant Number
	5.1-15	Transaction Request Field - added data for offsets 37 to 39.
	5.1-12	Transaction Reply Field - added data for offsets 23 to 28
	5.1-15	Using Selective Message Authentication - Added data for Tracks 1, 2 and 3

Date	Page	Description Of Change
	5.1-17 A-1 A-4 A-8 A-17 A-27 A-30 A-32 A-46 A-68 A-77 A-91 B-1 B-2 B-3 B-4 B-5 B-21 D-2 D-6 D-11 D-11 D-18 D-19	Added checksum feature to Journal Printer Backup section Overview - added sideways printing Reserved Screens - added EJ LOG RECOPIED OK A52 E - Reserved Screens - added E0035 to E0037 M - Reserved Screens - M07 added option 50 S - Reserved Screens - added S86 and S87 Reserved Screen T45 - added xxxxxxxx T - Reserved Screens - added T83, T84 and T89 to T91 X - Reserved Screens - updated X0775 and X0777 X - Reserved Screens - added screens X1451 to X1470 Z - Reserved Screens - updated screen Z0775, added screen Z0777 Z - Reserved Screens - added screens Z1450 to Z1470 Overview - added code pages are now supported Character Sets - Updated section Statement Code Sets - Updated section Added sideways printing to character sets Character sets - updated section with use of designators New Section - Code Pages Quick Reference to Message Types - added Class 4 - SM Installation Activity Added fields av1, av2, aw1 and aw2 Added section - TM Alert Messages Added section - Software Management Installation Status Messages Added sideways printing detail Added fields ak1, ak2, al1 and al2

Date	Page	Description Of Change
	H-2 H-3 I-2 J-2 K-2 K-2 K-5 K-6 K-7 L-2 M-3 N-2 N-8 N-10 Glossary	New State Tables - added Customer Selectable PIN Changes To Existing Diebold State Tables - Added State D data Added printer control characters to list of differences Features Requiring Other Central Software Change - Added sideways printing detail New section - Logo, Graphics and Code Page Definitions For The Thermal Printer NDC+ Diskbuild/2 Requirements - added Software Management File Types to table and added Coldstart file Updated to NN050100.EXE and ND050100.EXE Added Software Management description Added SM File Types section Added detail on sideways printing not supported for Rear Supervisor/Settlement Transactions File Updated 'reset attributes' Device Identifiers - added D - '07', G - '03' and G - '04' Device Identifiers - G and H, added reference to note Device Identifiers - added thermal printer detail Descriptions of technical terms added
Feb 95	All iii xli xliv xliv xliv xliv xlv	New format New section - Revision Record Release number included Description of Appendix N added Description of Appendix O added Description of Appendix P added Description of Appendix Q added References to more publications added

Date	Page	Description Of Change
	1.1-5	Creating The Customisation Data - keyboard information added
	2-i	Overview - keyboard data added to list of customisation data
	2.1-1	States - references to keyboard layouts added
	2.1-2	States added to state table list: - Expanded FIT Switch state - Courtesy Amount Verification state - DPM Document Accept state - Enhanced Amount Entry state
	2.1-19	Amount Check state - buffer information added
	2.1-22	Transaction Request state - reference to extension state added
	2.1-25	New section - Extension To State I
	2.1-27	Close state - DPM information added
	2.1-30	New section - Extension To State J
	2.1-32	New section - Expanded FIT Switch State
	2.1-43	New section - Extension To State _
	2.1-43	New section - Courtesy Amount Verification State
	2.1-46	New section - DPM Document Accept State
	2.1-55	New section - Extension 1 To State Q
	2.1-57	New section - Extension 2 To State Q
	2.1-58	New section - Extension 3 To State Q
	2.1-59	New section - Enhanced Amount Entry State
	2.1-60	New section - Extension to State R
	2.1-84	Time-Out state - reference to timer 94 added
	2.2-2	Types Of Reserved Screen - DPM information added
	2.2-4	New section - D - DPM
	2.2-12	New section - M - Supervisor Menus
	2.2-13	New section - Editing The Contents Of Reserved Screens
	2.2-20	New section - Graphics Services

Date	Page	Description Of Change
	2.2-30	New sub-section - Set Display Mode Control
	2.2-32	New sub-section - Display Image Files Control
	2.2-32	New sub-section - Animation
	2.3-1	New chapter - Keyboard Data
	2.4-2	Printer Types Supported By NDC+ - DPM information added
	2.4-3	New section - 5665 Statement Printer
	2.4-6	New section - DPM Default Print
	2.5-1	Supervisor Messages - Check CDM report added to list
	2.5-2	Screen Size Limitations - DPM reserved screens information added
	2.5-4	New section - CRT/Enhanced Operator Interface SOH Screen Layout
	2.5-5	New section -Basic Operator Interface SOH Screen Layout
	2.5-7	Automatic Screen Editing - new screen numbers added
	2.5-14	New section - Check CDM Report
	2.6-3	Timer Number - timer 87 added
	2.6-7	New section - Envelope Dispenser Status Option
	2.6-8	New section - Send Enhanced TI/Sensor Status Unsolicited Message Option
	2.6-8	New section - Media Entry Indicators Flash Rate Option
	2.6-8	New section - Touch Screen Error Reporting Option
	2.6-8	New section - Remote Relay Option
	2.6-12	Timer Number - timer 87 added
	2.7-3	FIT Data - artwork added to show fields and offsets
	2.7-13	PLNDX - language select information added
	3.1-1	Transaction Request Message Format - CDM and DPM information added

Date	Page	Description Of Change
	3.2-3	Specific Command Reject - CDM and DPM information added
	3.2-7	Terminal State - CDM and DPM information added to table of terminal commands
	3.2-7	CDM and DPM information added to Send Configuration Information message
	3.2-12	New section - Hardware Configuration - Sub-Field 'g4'
	3.2-16	CDM and DPM information added to Send Supply Counters message
	3.2-25	New sub-section - Hardware Configuration Data
	3.2-27	New sub-section - Supplies Data
	3.2-28	New sub-section - Fitness Data
	3.2-30	New sub-section - Tamper And Sensor Status Data
	3.2-31	New sub-section - Software ID And Release Number Data
	3.2-32	New sub-section - Local Configuration Option Digits
	3.2-33	Transaction Reply Commands With Associated Device Fault Status Messages - CDM and DPM information added
	3.3-7	Depository (Solicited/Unsolicited) - DPM information added
	3.3-8	New section - DP-ATM Envelope Depository (Solicited/Unsolicited)
	3.3-16	Sensors (Unsolicited) - CDM and DPM information added
	3.3-18	New section - Touch Screen Keyboard (Unsolicited)
	3.3-22	New section - Coin Dispenser (Solicited/Unsolicited)
	3.3-25	New section - Envelope Dispenser (Unsolicited)
	3.3-26	New section - Document Processing Module (Solicited/Unsolicited)
	3.3-28	New sub-section - DPM Transaction/Device Status - Field 'e2/g2'

Date	Page	Description Of Change
	3.3-33	New sub-section - DPM Error Data - Sub-Field 'e203/g203'
	3.4-3	Acknowledgement And Journal Printers (Solicited/Unsolicited) - correction made to status codes sent
	3.4-4	Acknowledgement And Journal Printers (Solicited/Unsolicited) - correction made to recommended actions
	4.1-4	Terminal Commands - Configuration Information command modifiers added
	4.1-5	Terminal Commands - Enable Image Dumping command modifiers added
	4.2-4	Screen Data Load - keyboard information added
	4.2-6	New section - Control Of Associations And Keyboard Data
	4.2-10	Configuration Parameters Load - timers 86-90 added
	4.2-14	Configuration Parameters Load - timers 86 and 87 added
	4.2-15	Configuration Parameters Load - DPM information added to timers 94 and 95
	4.2-20	Enhanced Configuration Parameters Load - Options 23, 24 and 26 added
	4.2-24	Enhanced Configuration Parameters Load - timers 86-90 added
	4.2-31	Message Authentication Field Selection Load - CDM and DPM information added
	4.2-43	Override Reserved Screen Configuration Command - DPM information added
	4.3-2	Transaction Reply - CDM and DPM information added
	4.3-20	Functions The Terminal Can Perform To Complete A Transaction - DPM information added
	4.3-29	New sub-section - Process Document With Cash
	4.3-30	New sub-section - DP-ATM Deposit Envelope
	4.4-1	Message Exception Handling - CDM and DPM information added

Date	Page	Description Of Change
	4.4-10	Terminal Commands - Enable Image Dumping added to list
	5.1-10	Selective Message Authentication - DPM information added
	A-1	Reserved Screens updated
	D-1	Quick Reference To Message Types updated
	E-3	New section - Standard Keyboard Layouts
	G-2	Override Reserved Screen Configuration Command added
	G-3	Function Command Message - DPM information added
	G-4	Operational Command Message - Enable Image Dumping added
	G-4	New section - Write Command II Message
	G-4	Write Command III Message - new options added
	G-5	New section - Write Command IV Message
	G-5	Solicited Status Message (Device Faults) - CDM and DPM information added
	G-6	Unsolicited Status Message (Device Faults) - CDM, DPM and touch screen information added
	H-2	New states added
	I-2	CDM and DPM features added
	I-3	Set Display Mode Control, Display Image Files Control and Animation screen control features added
	K-4	- RESRVD and KEYTAB added to list - INIPTR, RESVD0 and RESVD1 removed
	K-3	Library file NDCUTILS.DLL added
	K-6	Data Files - KEYTAB added - INIPTR, RESVD0 and RESVD1 replaced with RESRVD - RESRVD information added
	K-6	New section - NDCUTILS.DLL
	K-7	Other Files You Need For Diskbuild/2 - details about CONFIG.DEF removed

Date	Page	Description Of Change
	M-4	New section - Touch Screen Reset Considerations
	N-1	New appendix - Device Identifiers
	O-1	New appendix - DPM Error Data
	P-1	New appendix - Document Processing
	Q-1	New appendix - Calculating Touch Screen Positions
	Glossary	Descriptions of technical terms added

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# Contents

---

Preface .....	xli
Why Should I Read This Publication? .....	xli
What Is In This	
Publication ?.....	xli
How Should I Use This Publication ? .....	xliv
What Else Should I Read?.....	xliv

---

**Chapter 1**  
**Introduction To The NDC+ System**

Overview	
<b>Introduction To The NDC+ System</b>	

---

**Chapter 1.1**  
**Introduction To The NDC+ System**

What Is NDC+ ?.....	1.1-1
Types of NDC+ .....	1.1-2
Native Mode .....	1.1-2
Diebold Emulation Mode .....	1.1-2
The NDC+ Software System .....	1.1-3
Terminal Application .....	1.1-3
Central Application .....	1.1-3
How The Terminal Operates .....	1.1-4
Creating An NDC+ System.....	1.1-5
Creating The Customisation Data .....	1.1-5
Creating The Central Control Application.....	1.1-6
Exits.....	1.1-6

---

## **Chapter 2**

### **Customisation Data**

#### **Overview**

#### **Customisation Data**

---

#### **Chapter 2.1**

#### **State Tables**

Introduction.....	2.1-1
A - Card Read State .....	2.1-4
Read Condition Values .....	2.1-7
B - PIN Entry State.....	2.1-8
C - Envelope Dispenser State.....	2.1-11
D - Pre-Set Operation Code Buffer State .....	2.1-11
Extension To State D.....	2.1-13
E - Four FDK Selection Function State .....	2.1-15
F - Amount Entry State .....	2.1-17
G - Amount Check State .....	2.1-19
H - Information Entry State.....	2.1-19
I - Transaction Request State.....	2.1-22
Extension To State I .....	2.1-25
J - Close State .....	2.1-27
Extension To State J .....	2.1-30
K - FIT Switch State .....	2.1-31
_ - Expanded FIT Switch State .....	2.1-32
Extension To State _ .....	2.1-33
L - Card Write State.....	2.1-34
M - Enhanced PIN Entry State.....	2.1-36
N - Camera Control State .....	2.1-39
P - Courtesy Amount Verification State .....	2.1-43
Q - DPM Document Accept State.....	2.1-46
Operational Description.....	2.1-46
Exception Handling .....	2.1-50
Main State Table .....	2.1-52
Extension 1 To State Q.....	2.1-55
Extension 2 To State Q.....	2.1-57
Extension 3 To State Q.....	2.1-58
R - Enhanced Amount Entry State .....	2.1-59
Extension To State R .....	2.1-60
S - Language Code Switch State .....	2.1-61

Extension To State S.....	2.1-62
T - Card Read - PIN Entry Initiation State .....	2.1-63
Extension To State T .....	2.1-66
V - Language Select From Card State .....	2.1-67
W - FDK Switch State.....	2.1-68
X - FDK Information Entry State .....	2.1-69
Extension To State X.....	2.1-71
Y - Eight FDK Selection Function State .....	2.1-72
Extension To State Y .....	2.1-74
Multi-Language Extension To State Y.....	2.1-75
b - Customer Selectable PIN State.....	2.1-76
Extension To State b .....	2.1-78
d ... g - Exit States.....	2.1-79
i - Audio Control State .....	2.1-80
k - Smart FIT Check State .....	2.1-82
Time-Out State .....	2.1-84

## Chapter 2.2 Screen Data

Introduction.....	2.2-1
What Is A Screen ? .....	2.2-1
Customised Screens.....	2.2-1
Reserved Screens.....	2.2-1
Types Of Reserved Screen.....	2.2-2
C - Cardholder Display.....	2.2-3
D - DPM.....	2.2-4
G - Graphic Pictures .....	2.2-6
K - Extended Screen Controls .....	2.2-6
L - Logos.....	2.2-12
M - Supervisor Menus.....	2.2-12
Editing The Contents Of Reserved Screens.....	2.2-13
Formatting Rules For Cardholder Display Screens.....	2.2-14
CRT Display Characters.....	2.2-14
Operator Interface Display Characters .....	2.2-15
Control Characters.....	2.2-16
Track 1 Name Display.....	2.2-18
Graphics Services .....	2.2-20
Special Features.....	2.2-21
International Currency Display Format .....	2.2-33
Multi-Language Screens.....	2.2-35
Re-Defining Reserved Screens .....	2.2-37

---

## **Chapter 2.3 Keyboard Data**

Introduction.....	2.3-1
What Is A Keyboard ? .....	2.3-1
Traditional Keyboard Layouts.....	2.3-2
Transaction Processing.....	2.3-2
Supervisor Mode .....	2.3-3
Encryption Key Entry.....	2.3-4
Defining A Keyboard.....	2.3-5
Physical Keyboard .....	2.3-5
Touch Screen Keyboard .....	2.3-5
Nested Keyboards.....	2.3-6
States And Keyboards.....	2.3-8
Screens And Keyboards.....	2.3-14
Associating Screens And Keyboards .....	2.3-14
Touch Screen FDK Emulation.....	2.3-14

---

## **Chapter 2.4 Printer Data**

Introduction.....	2.4-1
Printer Types Supported By NDC+ .....	2.4-2
5665 Statement Printer .....	2.4-3
Default Prints For PPD And DPM .....	2.4-5
PPD Default Print.....	2.4-5
DPM Default Print .....	2.4-6
Printer Control Characters .....	2.4-8
Enhanced Printer Control Codes.....	2.4-10
Character Sets.....	2.4-21
Statement Printer Controls.....	2.4-24
Left Margin Control.....	2.4-24
Right Margin Control .....	2.4-24
Margin Control Use .....	2.4-25
Lines Per Inch Control.....	2.4-25
Download Logo.....	2.4-26
Print Logo.....	2.4-26
Graphic Files For Logo Printing On The Statement Printer.....	2.4-27
Simulated Pre-Printed Receipt Messages.....	2.4-29
Sideways Printing On Receipt .....	2.4-33

---

## **Chapter 2.5 Supervisor Messages**

Supervisor Messages.....	2.5-1
Character Sets.....	2.5-1
Control Codes.....	2.5-1
Screen Size Limitations .....	2.5-1
CRT/VEROP/Enhanced Operator Interface Layout .....	2.5-2
CRT/VEROP/Enhanced Operator Interface	
SOH Screen Layout.....	2.5-4
Basic Operator Interface SOH Screen Layout.....	2.5-5
Printer Layout.....	2.5-7
Automatic Screen Editing.....	2.5-7
Media Status Messages .....	2.5-13
Test Cash Report .....	2.5-14
Check CDM Report.....	2.5-14

---

## **Chapter 2.6 Configuration Parameters**

Introduction.....	2.6-1
Configuration Parameters Load Message.....	2.6-2
Camera Control.....	2.6-2
Card Read Error Threshold.....	2.6-2
Card Write Error Threshold .....	2.6-2
Supply Mode, Ready Status And Amount Buffer Length Options.....	2.6-2
Logical Unit Number - LUNO .....	2.6-3
Timer Number.....	2.6-3
Number Of 800 Millisecond Ticks Per Timer Field .....	2.6-4
Enhanced Configuration Parameters Load Message .....	2.6-5
Camera Control Option .....	2.6-5
Supply Mode, Ready Status And Amount Buffer Length Options.....	2.6-5
Auto Voice .....	2.6-5
Date Format .....	2.6-5
Roll Width .....	2.6-5
Left Column.....	2.6-5
Track 1 Format.....	2.6-6
Diebold Status Reporting For Vandal Guard .....	2.6-6
Tamper Indicating Control Option .....	2.6-6

Extended Status Control Option.....	2.6-6
Specific Command Reject Option .....	2.6-6
Card Read Error Threshold Option.....	2.6-6
Card Write Error Threshold Option.....	2.6-6
Transaction Status Information Option .....	2.6-6
Journal Printer Backup Time Option .....	2.6-7
Journal Printer Backup Print Operations Option .....	2.6-7
Optical Sensor Option .....	2.6-7
Journal Printer Backup Log Tamper Option.....	2.6-7
Envelope Dispenser Status Option.....	2.6-7
Send Enhanced/TI Sensor Status	
Unsolicited Message Option.....	2.6-8
Media Entry Indicators Flash Rate Option.....	2.6-8
Touch Screen Error Reporting Option .....	2.6-8
Remote Relay Option .....	2.6-8
TPA Informed of SM Activity Option.....	2.6-8
Include PAN in DCS Data .....	2.6-9
Enable Audible Echo of Keyboard .....	2.6-9
Report DAS Errors .....	2.6-9
SOH/Fitness Option.....	2.6-9
MCN Range .....	2.6-11
Enhanced EJ Backup.....	2.6-11
Report Dual Mode EJ and Hardcopy	
Backup Unsolicited Messages .....	2.6-11
Print Track 2 to Journal .....	2.6-11
Non-Magnetic Card Accept.....	2.6-11
Timer Number .....	2.6-12
Number Of Seconds Per Timer Field .....	2.6-13
Further Configuration.....	2.6-14

## **Chapter 2.7**

### **Financial Institution Tables**

Introduction.....	2.7-1
What Is A Financial Institution Table ? .....	2.7-1
FIT Data.....	2.7-2
FIT Fields.....	2.7-5
Linked FITs .....	2.7-15
FITs On Terminals With Door Access Control .....	2.7-16
Diebold PIN Information Without FITs .....	2.7-17
Performing Diebold PIN Verification Without FITs.....	2.7-17
Algorithm Locator/ Identifier Field.....	2.7-17

Offset Index Data Field .....	2.7-18
Using The Offset Index Data.....	2.7-18

---

## **Chapter 3** **Terminal To Central Messages**

### **Overview** **Terminal To Central Messages**

---

### **Chapter 3.1** **Transaction Request Messages**

Transaction Request Messages .....	3.1-1
Introduction .....	3.1-1
Message Format .....	3.1-1

---

### **Chapter 3.2** **Status Messages**

Solicited Status Messages .....	3.2-1
Introduction .....	3.2-1
Message Format .....	3.2-1
Status Information .....	3.2-3
Unsolicited Status Messages .....	3.2-39
Introduction .....	3.2-39
Message Format .....	3.2-40
Software Management Installation Status Messages .....	3.2-40

---

### **Chapter 3.3** **Exit to Host Messages**

Exit To Host Messages .....	3.3-1
Introduction .....	3.3-1
Message Format .....	3.3-2

---

### **Chapter 3.4** **EJ Upload Message**

SST Upload EJ Data Message.....	3.4-1
Introduction .....	3.4-1
Message Format .....	3.4-1

---

**Chapter 3.5****Device Fault Status Information - Native Mode**

Introduction.....	3.5-1
Device Status Information.....	3.5-2
Time-Of-Day Clock (Unsolicited) .....	3.5-2
Power Failure (Unsolicited) .....	3.5-2
Card Reader/Writer (Solicited/Unsolicited).....	3.5-3
Cash Handler (Solicited/Unsolicited) .....	3.5-5
Depository (Solicited/Unsolicited) .....	3.5-8
DP-ATM Envelope Depository (Solicited/Unsolicited) .....	3.5-9
Receipt Printer (Solicited/Unsolicited) .....	3.5-10
Journal Printer (Unsolicited) .....	3.5-11
Electronic Journal Printer (Unsolicited).....	3.5-13
Night Safe Depository (Solicited/Unsolicited) .....	3.5-14
Encryptor (Unsolicited).....	3.5-15
Camera (Unsolicited).....	3.5-16
Door Access (Unsolicited).....	3.5-16
Sensors (Unsolicited) .....	3.5-17
Touch Screen Keyboard (Unsolicited) .....	3.5-19
Supervisor Keys (Unsolicited).....	3.5-20
Statement Printer (Solicited/Unsolicited) .....	3.5-21
Coin Dispenser (Solicited/ Unsolicited).....	3.5-23
Envelope Dispenser (Unsolicited) .....	3.5-26
Document Processing Module (Solicited/ Unsolicited) .....	3.5-27
Digital Audio Service (Unsolicited) .....	3.5-35

---

**Chapter 3.6****Device Fault Status Information - Diebold Emulation Mode**

Introduction.....	3.6-1
Device Status Information.....	3.6-2
Journal and Acknowledgement Printers (Sol/Unsol) .....	3.6-2
Cash Handler - 910/920 Emulation (Solicited) .....	3.6-4
Cash Handler - 911/921 Emulation (Solicited).....	3.6-8
Depository - 910/920 Emulation (Solicited).....	3.6-11
Depository - 911/921 Emulation (Solicited).....	3.6-13
Card Reader (Unsolicited) .....	3.6-14
Card Writer (Unsolicited) .....	3.6-15
Alarm (Unsolicited) .....	3.6-16
Supervisor And Supply Switch (Unsolicited).....	3.6-17

Configuration ID (Solicited) .....	3.6-18
Tamper Indication (Unsolicited).....	3.6-19
Night Safe Depository (Solicited) .....	3.6-19
Door Access (Unsolicited) .....	3.6-20
Time-of-Day Clock/ Encryptor/Camera (Unsolicited) .....	3.6-21
Statement Printer (Solicited/Unsolicited).....	3.6-22
911 Hardware Configuration (Solicited) .....	3.6-25
Emulated Vandal Guard (Unsolicited) .....	3.6-25

---

## **Chapter 4**

### **Central To Terminal Messages**

#### **Overview**

#### **Central To Terminal Messages**

---

#### **Chapter 4.1**

#### **Terminal Commands**

Terminal Commands .....	4.1-1
-------------------------	-------

---

#### **Chapter 4.2**

#### **Customisation Data Commands**

Introduction.....	4.2-1
State Tables Load.....	4.2-2
Screen/Keyboard Data Load .....	4.2-4
Control Of Associations And Keyboard Data .....	4.2-6
Configuration Parameters Load .....	4.2-8
Timer Descriptions .....	4.2-11
Enhanced Configuration Parameters Load .....	4.2-16
FIT Data Load .....	4.2-26
Configuration ID Number Load .....	4.2-29
Diebold PIN Information Load .....	4.2-30
Message Authentication Field Selection Load .....	4.2-31
Date And Time Load.....	4.2-37
Encryption Key Load .....	4.2-38
Initialise EKC.....	4.2-41
Override Reserved Screens Command .....	4.2-43

---

**Chapter 4.3****Host to Exit Messages**

Host to Exit Messages .....	4.3-1
Introduction .....	4.3-1
Message Format .....	4.3-2

---

**Chapter 4.4****Transaction Reply Commands**

Introduction.....	4.4-1
Transaction Reply.....	4.4-2
Message Format .....	4.4-2
Notes .....	4.4-18
Functions The Terminal Can Perform	
To Complete A Transaction.....	4.4-21
Interactive Transaction Response.....	4.4-33

---

**Chapter 4.5****EJ Commands**

Introduction.....	4.5-1
EJ Options And Timers.....	4.5-2
Message Format .....	4.5-2
Acknowledge EJ Upload Block.....	4.5-4
Message Format .....	4.5-4
Acknowledge and Stop EJ.....	4.5-6
Message Format .....	4.5-6
Continuous and Batch Upload Methods.....	4.5-7

---

**Chapter 4.6****Other Messages**

Message Exception Handling .....	4.6-1
Messages Received In Wrong Operational Mode.....	4.6-9
Customisation Data Commands.....	4.6-9
Transaction Reply Command .....	4.6-10
Terminal Commands.....	4.6-10
IBM 3600 Loop Messages .....	4.6-13
All Messages .....	4.6-13

All Terminal To Central Messages .....	4.6-13
Transaction Request Messages .....	4.6-13
Central To Terminal Messages.....	4.6-14
Error Logs And Tallies .....	4.6-14

---

## **Chapter 5**

### **Security Features**

#### **Overview**

#### **Security Features**

---

#### **Chapter 5.1**

#### **Security Features**

Providing Security With PIN Block Encryption .....	5.1-1
Diebold PIN Block .....	5.1-1
ANSI PIN Block.....	5.1-3
BANKSYS PIN Block.....	5.1-4
Providing Security With EKC .....	5.1-5
Providing Security With Message Authentication .....	5.1-6
Message Authentication Code .....	5.1-7
Full Message Authentication.....	5.1-8
Selective Message Authentication.....	5.1-10
Using Selective Message Authentication .....	5.1-16
Providing Security With CIM86 .....	5.1-17
Providing Security With Journal Printer Backup .....	5.1-18

---

#### **Appendix A**

#### **Reserved Screens**

Overview .....	A-1
Reserved Screens .....	A-2
‘A’ Supervisor Reserved Screens.....	A-2
‘D’ DPM Reserved Screens .....	A-4
‘E’ Reserved Screens .....	A-5
‘H’ Supervisor Reserved Screens.....	A-7
‘T’ Supervisor Reserved Screens.....	A-8
‘M’ Supervisor Reserved Screens .....	A-14
‘P’ Supervisor Reserved Screens.....	A-18
‘Q’ Supervisor Reserved Screens.....	A-20
‘S’ Supervisor Reserved Screens .....	A-23
‘T’ Reserved Screens .....	A-26

'X' State Of Health And TM-Alert Reserved Screens .....	A-30
'Z' State Of Health And TM-Alert Reserved Screens .....	A-67

---

**Appendix B  
Character Sets**

Overview .....	B-1
Character Sets.....	B-2
Statement Code Sets .....	B-3
Code Pages .....	B-21

---

**Appendix C  
Graphics Pictures**

Overview .....	C-1
Graphics Pictures.....	C-2

---

**Appendix D  
Quick Reference To Message Types**

Overview .....	D-1
Quick Reference To Message Types .....	D-2
Transaction Request.....	D-2
Unsolicited Status Messages .....	D-7
Solicited Status Messages.....	D-9
TM-Alert Messages.....	D-10
Software Management Installation Status Messages.....	D-11
Exit To Host Message .....	D-11
Upload EJ Data Message.....	D-11
Terminal Commands.....	D-11
Customisation Data Commands.....	D-13
Transaction Reply .....	D-15
Host To Exit Message .....	D-19
Acknowledge EJ Upload Block Command .....	D-19
Acknowledge and Stop Command .....	D-19
EJ Options and Timers Command.....	D-20

---

**Appendix E  
Screen And Keyboard Layouts**

Overview .....	E-1
----------------	-----

CRT Screen Layout.....	E-2
Standard Keyboard Layouts .....	E-3
Position Codes.....	E-3
Transaction Processing Standard Keyboard Layout .....	E-4
Transaction Processing Alternative Keyboard Layout.....	E-4
Supervisor Mode Standard Keyboard Layout.....	E-5
Supervisor Mode Alternative Keyboard Layout.....	E-5
Encryption Key Entry Keyboard Layout.....	E-5

---

## **Appendix F Code Conversion And Cross-Reference Table**

Overview .....	F-1
Code Conversion And Cross-Reference Table.....	F-2

---

## **Appendix G Differences Between NDC+ And Diebold Message Formats**

Overview .....	G-1
Differences Between NDC+ And Diebold Message Formats .....	G-2
Function Command Message.....	G-3
Operational Command Message .....	G-3
Write Command II Message.....	G-4
Write Command III Message .....	G-4
Write Command IV Message .....	G-5
Write Command V Message .....	G-5
Date And Time Load Message.....	G-5
Upload EJ Data Message and EJ Commands.....	G-5
Tamper Indication Unsolicited Status Message .....	G-5
Transaction Request Message .....	G-5
Solicited Status Message (Device Faults).....	G-5
Unsolicited Status Message (Device Faults) .....	G-6

---

## **Appendix H Differences Between NDC+ And Diebold State Tables**

Overview .....	H-1
Differences Between NDC+ And Diebold State Tables.....	H-2
New State Tables.....	H-2
Exit States .....	H-4
Changes To Existing Diebold State Tables.....	H-4

---

**Appendix I**  
**Summary Of Differences Between NCR And Diebold SSTs**

Overview .....	I-1
Summary Of Differences Between NCR And Diebold SSTs.....	I-2

---

**Appendix J**  
**Summary Of Diebold Emulation Features And Network Impact**

Overview .....	J-1
Summary Of Diebold Emulation Features And Network Impact .	J-2
Features Requiring No Central Software Change.....	J-2
Features Requiring Minimal Central Software Change .....	J-2
Features Requiring Other Central Software Change.....	J-2

---

**Appendix K**  
**NDC+ Diskbuild/2 Requirements**

Overview .....	K-1
NDC+ Diskbuild/2 Requirements.....	K-2
Logo, Graphics and Code Page Definitions	
For The Thermal Printer.....	K-2
The Files You Need For Diskbuild/2 .....	K-3
APPDEFS.FCS.....	K-5
NDC.FCS .....	K-5
NN060200.EXE .....	K-5
ND060200.EXE.....	K-5
NDCIA.EXE .....	K-6
Data Files .....	K-6
S4NDCADI.DLL.....	K-6
NDCUTILS.DLL.....	K-6
EXUTIL.DLL .....	K-6
NDCDATA.DLL .....	K-6
Audio Files .....	K-7
Other Files You Need For Diskbuild/2 .....	K-7
S4_START.RUN .....	K-7
Running Electronic Journal Automatically .....	K-7
Running NDC+ Without ‘Fast-Clearing SOH’ .....	K-8
Software Management (SM) Application.....	K-8
SM File Types .....	K-9

---

**Appendix L  
Supervisor/Settlement Transactions File Description**

Overview .....	L-1
Supervisor/Settlement Transactions File Description.....	L-2
Supervisor Transactions Parameter Screen ('C09' - 'C19').....	L-2
Data File Format (STDATA, STDAT0 - STDAT9) .....	L-4

---

**Appendix M  
Screen Display Considerations**

Overview .....	M-1
Screen Display Considerations.....	M-2
Palette And Resolution Information .....	M-2
Touch Screen Reset Considerations.....	M-4

---

**Appendix N  
Device Identifiers**

Overview .....	N-1
Device Identifiers.....	N-2
Hardware Configuration Data.....	N-2
Supplies Data.....	N-7
Fitness Data.....	N-10

---

**Appendix O  
DPM Error Data**

Overview .....	O-1
DPM Error Data.....	O-2
DPM Parameter Error Data .....	O-2
DPM Dog-Eared Document Error Data.....	O-3
DPM Error During Position 'W' .....	O-4
DPM Error Data During Archive .....	O-7
DPM Error Data During Read .....	O-8

---

**Appendix P  
Document Processing**

Overview .....	P-1
Document Processing.....	P-2
Introduction .....	P-2
A Typical DPM Transaction .....	P-2
Document Definition File .....	P-4
Identify Feature File.....	P-8
Lifting Document Images .....	P-8
Archiving Document Images .....	P-9
Displaying Document Images.....	P-13
Printing Document Images.....	P-13

---

**Appendix Q  
Calculating Touch Screen Positions**

Overview .....	Q-1
Calculating Touch Screen Positions.....	Q-2
The Unary Co-Ordinate System.....	Q-2
Co-Ordinate Format .....	Q-3
Example .....	Q-4

---

**Appendix R  
Understanding the Digital Audio Service**

Overview .....	R-1
Understanding the Digital Audio Service .....	R-2
What the Digital Audio Service Is .....	R-2
How to send messages for annunciation.....	R-2
Privacy Features .....	R-4
Volume levels .....	R-4
Files and Directories .....	R-6
Multiple language services.....	R-7
How to prepare your own audio files.....	R-8

---

**Appendix S  
Understanding the Digital Camera System**

Overview .....	S-1
Understanding the Digital Camera System.....	S-2
What The Security Camera Is.....	S-2
Film Cameras.....	S-3
The Digital Camera System.....	S-3
Data Stored With Picture .....	S-4
Swapping cameras .....	S-4

---

**Appendix T  
Understanding Monitor Burn-In**

Grey Scale Monitor Burn-In .....	T-1
What is Monitor Burn-In ? .....	T-1
Example of Monitor Burn-In .....	T-1
How Do I Prevent Monitor Burn-In ? .....	T-2
Implementation .....	T-2

---

**Appendix U  
Smart Card Handling**

Smart Card Handling.....	U-1
Smart FIT Checks .....	U-1
Example Chip Data Read State .....	U-4
Some Possible Transaction Sequences Involving Smart Cards .....	U-4

---

**Glossary**

## Table of Contents

# Preface

## Release Number

This publication applies to Release 6.02 of the NDC+ software.

## Why Should I Read This Publication?

This publication is aimed at programmers who create the terminal configuration that customises the NDC+ software, and programmers who write or modify Central control applications to support NDC+ terminals. We provide 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.

From Release 6.00, NDC+ supports the addition of an Exits feature. If you do not make use of this feature, then you can continue to use NDC+ as before, there will be no impact on NDC+. If you do intend to use the Exits feature, then there is a new publication which gives you the introductory and implementation information you will need. This publication is referenced later in the ‘What Else Should I Read?’ section of this preface.

## What Is In This Publication ?

The publication contains the following information:

### **Section 1, “Introduction To The NDC+ System”**

Provides an overview of the NDC+ system software.

### **Section 2, “Customisation Data”**

Provides details of the function and format of standard state tables, screen, keyboard and printer data, supervisor messages, configuration parameters and FITs. With this information, you can create the terminal configuration that customises the NDC+ software.

### **Section 3, “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.

### **Section 4, “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.

## **Section 5, “Security Features”**

Provides details of the features that NDC+ software 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.

## **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 CRTs and printers.

## **Appendix C, “Graphics Pictures”**

Shows the graphics pictures currently available with 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 quickly the messages that pass to and from Central.

## **Appendix E, “Screen And Keyboard Layouts”**

Provides worksheets for the CRT screen layout, including FDK alignment, and the keyboard position codes.

## **Appendix F, “Code Conversion And Cross-Reference Table”**

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

## **Appendix G, “Differences Between NDC+ And Diebold Message Formats”**

Contains information on the differences between NDC+ and Diebold message formats.

## **Appendix H, “Differences Between NDC+ And Diebold State Tables”**

Contains information on the differences between NDC+ and Diebold state tables.

**Appendix I, “Summary Of Differences Between NCR And Diebold SSTs”**

Contains a summary of the main differences between NCR and Diebold TABS terminals (910, 911, 920 and 921).

**Appendix J, “Summary Of Diebold Emulation Features And Network Impact”**

Provides a summary of Diebold Emulation features and their network impact.

**Appendix K, “NDC+ Diskbuild/2 Requirements”**

Tells you what files you need for Diskbuild/2.

**Appendix L, “Supervisor/Settlement Transactions File Description”**

Describes the format of the file or reserved screen containing the transaction description data.

**Appendix M, “Screen Display Considerations”**

Provides some points to consider when you are preparing screens for display on the terminal.

**Appendix N, “Device Identifiers”**

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

**Appendix O, “DPM Error Data”**

Gives details of the DPM error data when DPM error status message contains the error code '?', 'parameter error' .

**Appendix P, “Document Processing”**

Gives information about the document processing capability of NDC+ with a DPM.

**Appendix Q, “Calculating Touch Screen Positions”**

Explains how to calculate the co-ordinates that are used to define touch areas on the screen.

**Appendix R, “Understanding the Digital Audio Service”**

Gives information about the Digital Audio Service. This feature provides spoken messages for cardholders with visual difficulties.

## **Appendix S, “Understanding the Digital Camera System”**

Explains the Digital Camera System. This is a security feature which takes a picture of the cardholder as he uses the terminal.

## **Appendix T, “Understanding Monitor Burn-In”**

This appendix tells you how to write idle loops that wear the screen evenly. This avoids the screen becoming marked with a pattern.

## **Appendix U, “Smart Card Handling”**

Gives guidance on using standard NDC+ states and user-defined C-Exit States to handle smart card transactions.

## **How Should I Use This Publication ?**

We recommend that you read Chapter 1 first for an overview of NDC+.

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

If you are a programmer creating a Central control application, refer to Chapters 3 and 4 for information on any of the message types sent between the terminal and Central.

If you are a programmer creating customised routines ('Exits') for the terminal, refer to Chapter 2 for information about the creation of Exit States, to Chapters 3 and 4 for information about message types which can pass between Central and Exits, and to Chapter 5 for information on message security features which you can use.

## **What Else Should I Read?**

For a general introduction to NDC+ software, you should read the NCR publication, B006-0000-2485, *NDC+ Programmer's Overview*.

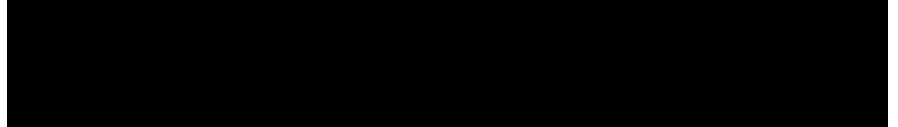
Other NCR publications which you may find useful include:

- B006-0000-1797, S4 Building A Load Disk \*
- D1-2197, NCR Self Service Terminals Band 1 Comms Manual
- D1-2198, NCR Self Service Terminals Band 2 Comms Manual
- D1-2199, NCR Self Service Terminals Band 3 Comms Manual
- D1-4808, Template Generator User's Guide
- B006-0000-2485, NDC Programmer's Overview Manual
- B006-0000-2487, NDC+ Supervisor's Reference Manual
- B006-0000-5102, Using NDC+ Exits
- B006-0000-4201, NDC+ Message Formats for Host Application Developers
- B006-0000-2561, Trouble Shooting On A Development Terminal

- D1-2751, TM-Alert Reference Manual
- D1-4169, NCR Font Editor User Guide
- D1-4205, D-Scribe User Guide
- D1-4206, 56xx Document Processing Application Development Guidelines
- D1-4263, SM/Services User's Guide
- D1-4548, EGA/VGA Configuration Toolset Guide
- B006-0000-0355, Self Service Platform Software Programmer's Bookset \*
  - B006-0000-4591, Programmer's Manual For The Cardholder Display Translator
  - D1-4593, Programmer's Manual For The VGA Service
  - D1-4602, Programmer's Reference Manual for Security Cameras
  - D1-4612, Programmer's Manual for the 40 Column Printer
  - D1-4614, Programmer's Manual for Digital Audio
  - B006-0000-4600, Progammer's Manual for Encryption Keyboard Controller
- D1-4804, NDC+ Keyboard Tool, User's Guide

\* If you have access to the NCR intranet, more information on the appropriate manual for your communications and platform can be found on the Information Solutions website at:  
<http://www.dundee.ncr.com/INFOPROD/IPHOME.HTM>.





Section 1

## Introduction To The NDC+ System

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Chapter 1.1

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Introduction To The NDC+ System

## Table of Contents

## Overview

# Introduction To The NDC+ System

In this section we give you an overview of the NDC+ system. We describe the following topics:

- What is NDC+?
- Types of NDC+
- The NDC+ software system
- How the terminal operates
- Creating an NDC+ system

For further information, refer to the *NDC Programmer's Overview*.

## Introduction To The NDC+ System

**Chapter 1.1**

# Introduction To The NDC+ System

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What Is NDC+ ?	1.1-1
----------------	-------

Types of NDC+	1.1-2
Native Mode	1.1-2
Diebold Emulation Mode	1.1-2

---

The NDC+ Software System	1.1-3
Terminal Application	1.1-3
Central Application	1.1-3

---

How The Terminal Operates	1.1-4
---------------------------	-------

---

Creating An NDC+ System	1.1-5
Creating The Customisation Data	1.1-5
State Tables	1.1-5
Financial Institution Tables (FITS)	1.1-5
Screens	1.1-5
Keyboards	1.1-5
Configuration Parameters	1.1-5
Creating The Central Control Application	1.1-6
Terminal Commands	1.1-6
Transaction Reply Commands	1.1-6
Customisation Data Commands	1.1-6
Interactive Transaction Response	1.1-6
Exits	1.1-6

Table of Contents

**Introduction To The NDC+ System**

## What Is NDC+ ?

NDC+ is a terminal control application from NCR. It is table-driven and can be customised to meet your own requirements.

NDC+ is the 4th generation version of NDC, and has been developed for NCR's 4th generation SSTs and Account Services terminals. It allows you to run 4th generation and *personas* terminals in your network, in either Diebold Emulation or Native mode.

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## Types of NDC+

There are currently two variations of NDC+:

- Native mode
- Diebold Emulation mode.

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### Native Mode

Native mode supports all NDC features available with 4th generation terminals.

Native mode also supports Native mode status reporting. See Section 3, “Terminal To Central Messages”, for details. *NDC+ Supervisor’s Reference Manual* contains details of Native mode options.

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### Diebold Emulation Mode

The NDC Self-Service Terminal (SST) is compatible with a standard Diebold TABS 900 series terminal, operating in direct connect mode. This means that when running in Diebold Emulation mode, the NCR terminal can emulate Diebold TABS 910/911 and 920/921 terminals, without modification to either the Central application or the Diebold terminal configuration data. An NCR 4th generation or *personalS* terminal can therefore fit into a Diebold network without any modification to the Central application. See Appendixes G - J for information on the differences between NDC+ and Diebold.

Diebold Emulation mode supports Diebold emulation status reporting. See Section 3, “Terminal To Central Messages”, for details. *NDC+ Supervisor’s Reference Manual* contains details of Diebold mode options.

# The NDC+ Software System

The NDC+ software system is made up of two parts:

- Terminal application
- Central application. Although we do not supply you with the Central application, we describe it briefly in this passage to give you a clearer picture of the 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. See Chapter 3.1, “Transaction Request Messages”, for details.

When the terminal receives a Transaction Reply command from Central, it completes the transaction. See Chapter 4.4, “Transaction Reply Commands”, for details.

The terminal application responds to Terminal commands from Central, such as Go-In-Service or Go-Out-Of-Service, and requests for information, such as tallies, by sending Solicited Status messages to Central. See Chapter 3, “Solicited Status Messages” passage, for details.

An unexpected event can be reported to Central using an Unsolicited Status message. See Chapter 3, “Unsolicited Status Messages” passage, for details.

## 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. See Section 3, “Terminal To Central Messages”, for details.

The Central application must also be able to code messages in the form that the NDC+ software in the terminal understands. See Section 4, “Central To Terminal Messages”, for details.

## How The Terminal Operates

When you switch the terminal on, after loading it with the NDC+ terminal software, it sends a power-up message 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.

# Creating An NDC+ System

When you create an NDC+ system you will find that there are two distinct tasks involved:

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

**Note:** 1. If you have a DPM, you will also need to create the Document Definition File (DDF) and the Identify Feature File (IFF). See *D-Scribe User Guide* for details.

**Note:** 2. If you have installed the Digital Audio Service you may need to create speech files. See Appendix R, “Understanding the Digital Audio Service,” in this manual for details.

## 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. See Chapter 2, “State Tables”, for details.

### 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. See Chapter 2.7, “Financial Institution Tables”, for details.

### Screens

These are displayed while the cardholder is using the terminal. See Chapter 2.2, “Screen Data”, for details.

### Keyboards

These define the type of keyboard which is used. This may be a fixed physical keyboard layout or a touch screen keyboard which is displayed on the screen. See Chapter 2.3, “Keyboard Data”, for details.

### Configuration Parameters

These are local configuration parameters, such as camera control, Amount Buffer size, card reader/writer error thresholds, and timers. See Chapter 2.6, “Configuration Parameters” passage, for details.

## 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.

See Section 3, “Terminal To Central Messages” and Section 4, “Central To Terminal Messages”, for details.

## Exits

If you are defining Exits, you will need to create rule files and DLL files. These are added when you run Diskbuild/2.

For details of Exits, see *Using NDC+ Exits*, B006-0000-5102.

Section 2

## Customisation Data

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Chapter 2.1

State Tables

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Chapter 2.2

Screen Data

---

Chapter 2.3

Keyboard Data

---

Chapter 2.4

Printer Data

---

Chapter 2.5

Supervisor Messages

---

Chapter 2.6

Configuration Parameters

---

Chapter 2.7

Financial Institution Tables

## Table of Contents

## Overview

# Customisation Data

In this section we give you details of how to create and download data from Central to the terminal, in order to customise the NDC+ terminal software into your own NDC+ terminal application. The customisation data consists of the following:

- States
- Screen data
- Keyboard data
- Printer data
- Configuration parameters
- FITs.

We discuss the function and format of each type of customisation data in its own chapter. We recommend that if you are a programmer creating the terminal application, you refer to the relevant chapter while building your application.



Chapter 2.1  
**State Tables**

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Introduction	2.1-1
A - Card Read State	2.1-4
Read Condition Values	2.1-7
B - PIN Entry State	2.1-8
C - Envelope Dispenser State	2.1-11
D - Pre-Set Operation Code Buffer State	2.1-11
Extension To State D	2.1-13
E - Four FDK Selection Function State	2.1-15
F - Amount Entry State	2.1-17
G - Amount Check State	2.1-19
H - Information Entry State	2.1-19
I - Transaction Request State	2.1-22
Extension To State I	2.1-25
J - Close State	2.1-27
Extension To State J	2.1-30
K - FIT Switch State	2.1-31

Table of Contents  
State Tables

---

_ - Expanded FIT Switch State	2.1-32
Example	2.1-32
Extension To State _	2.1-33
L - Card Write State	2.1-34
M - Enhanced PIN Entry State	2.1-36
N - Camera Control State	2.1-39
P - Courtesy Amount Verification State	2.1-43
Q - DPM Document Accept State	2.1-46
Operational Description	2.1-46
Notes To Operational Diagram	2.1-48
Exception Handling	2.1-50
Main State Table	2.1-52
Example	2.1-54
Extension 1 To State Q	2.1-55
Extension 2 To State Q	2.1-57
Extension 3 To State Q	2.1-58
R - Enhanced Amount Entry State	2.1-59
Extension To State R	2.1-60
S - Language Code Switch State	2.1-61
Extension To State S	2.1-62
T - Card Read - PIN Entry Initiation State	2.1-63
Extension To State T	2.1-66
Example:	2.1-66
V - Language Select From Card State	2.1-67
W - FDK Switch State	2.1-68

---

---

X - FDK Information Entry State	2.1-69
Extension To State X	2.1-71
Y - Eight FDK Selection Function State	2.1-72
Extension To State Y	2.1-74
Multi-Language Extension To State Y	2.1-75
b - Customer Selectable PIN State	2.1-76
Extension To State b	2.1-78
d ... g - Exit States	2.1-79
i - Audio Control State	2.1-80
k - Smart FIT Check State	2.1-82
Time-Out State	2.1-84

---

Table of Contents  
**State Tables**

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## Introduction

States control the information-gathering part of cardholder transactions. NDC+ includes a set of standard states. NDC+ also provides mechanisms which enable you to replace standard states or add new ones. States which you write yourself are called *Exit States*. In this chapter we describe the function of each of the standard state table types and its format.

The 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. 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. These screens can also reference associated keyboard layouts. See Chapter 2.3, “Keyboard Data”, for details.

During transaction processing, before entry to each state, NDC+ checks the keyboard layout to be used. If the screen that is about to be used references a keyboard number but the keyboard layout does not provide definitions of all the required keys, the transaction flow proceeds to the default close state.

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.

If the Digital Audio Service is configured, then in certain states the cardholder keyboard will be audibly echoed as the cardholder uses it. This is turned off in sensitive states — those concerned with PIN Entry and those in which the echo on the cardholder display is shown by asterisks. The Digital Audio Service can also make various announcements during transaction processing.

When the default close state is executed, it will complete 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 CRT 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.

You customise the 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. We describe the format of these commands in Section 4, “Central To Terminal Messages”.

In the following table we list each of the standard state table types that control transaction processing:

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
N	Camera Control
P	Courtesy Amount Verification
Q	DPM Document Accept
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

State Table Type	Description
b	Customer Selectable PIN State
d ... g	Available as identifiers for Exit States
i	Audio Control State
k	Smart FIT check state

---

## A - Card Read State

When you use the Card Read State table, we recommend that it is the first table you use during transaction processing. To ensure that it is, assign state number 000 to it. The terminal automatically enters state 000 when put In-Service.

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

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
CIM86 buffer	zero filled
DPM document data buffers	space 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, it 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
- Clears all document data and non-archived DPM image files from the system.

It also sets the following information:

- Contains the next state number the terminal goes to if the card is read successfully
- Defines which track(s) and / or chip data on the card will be read
- Defines 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

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

If an MM sensor with CIM86 MCRW is present and configured, a CIM86 verify operation is performed if all the following conditions are met:

- A successful FIT match has been obtained
- The field PMMSR indicates that a CIM86 verification should be performed
- CIM86 has not been disabled by an Enhanced Configuration Parameters load.

If the CIM86 verify code is good and/or digit 2 of PMMSR is F, the Good Read Next State Number exit (table entry 3) is taken. Otherwise, the Error Screen Number exit (table entry 4) is taken.

The following CIM86 verify codes may be returned in a Transaction Request message:

- 30 hex - Good CIM86 verify
- 31 hex - Not returned
- 32 hex - Not returned
- 33 hex - Device inoperative
- 34 hex - CIM86 malfunction
- 35 hex - Error in Track 3 Data.

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. See Chapter 2.2, "C - Cardholder Display" passage, for details of reserved screens. See Chapter 4.2, "Configuration Parameters Load" passage, for details of timers.

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 or capture.

If one or more of the state's read conditions has the chip connect bit set, but the configured card reader is not a smart card reader, the magnetic only conditions will be picked out and a FIT check operation will be carried out on them. If there are no magnetic only read conditions, the terminal will go to the No FIT Match Next State.

## State Tables

## A - Card Read State

If the chip connect bit is set in one or more read conditions, and the card reader is a smart card reader, the magnetic tracks required to meet the read condition will be read, the card staged in the smart card position and then the terminal will go to the No FIT Match Next State. See Appendix U, 'Smart Card Handling', for details.

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 (Range 000-254 or 256-750)	State number to which the terminal goes: 1. Following a good read of the card if FITs are not used (Table entry 9 = 000) <b>or</b> 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 (Range 000-254 or 256-750)	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 which bit is set in the read condition.

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 (i.e. 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, if it is satisfied, the Good Read Next State Number (table entry 3) exit is taken. Otherwise, read condition 3 is attempted, 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 operation where the chip connect bit is set in one or more read conditions, see Appendix U, ‘Smart Card Handling’.

**Note:** If you are in Diebold Emulation mode, you can set a configuration option to ignore read conditions and read all three tracks. See Chapter 3.6, “Device Status Information” passage, for details.

---

## 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, or Diebold PIN verification without FITs is used. See Chapter 2.7, “Financial Institution Tables”, for details. 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.

You cannot use this state for remote PIN verification if the terminal is configured with the No-PIN message mode, because the PIN buffer cannot be transmitted to Central. If you use the No-PIN option, you should use an Information Entry state to collect the PIN for remote verification.

Diebold Proprietary PIN verification is always performed at the terminal, either with or without FITs.

If an MM sensor with CIM86 MCRW is present and configured, this state remains unaltered, apart from the extra data manipulation that is required to perform local GBP PIN verification. 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. See Chapter 4.2, “FIT Data Load” passage, for details of these conditions. See *NDC Programmer’s Overview* for an explanation of GBP PIN verification.

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’, if the option which enables the keys to the left of the CRT is set) or the Enter key after the last digit has been entered. Pressing the Clear key clears all digits.

On a terminal with digital audio capability and auto voice enabled, message 7 is played on entry to this state. See Chapter 2.2, “Special Features” passage, for details.

The Digital Audio Service does not echo the keyboard in this 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. See Chapter 2.3, “Touch Screen FDK Emulation” passage, for details.

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. See Chapter 2.3, “Keyboard Data”, for details.

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 CRT cursor at the start of the PIN Entry display area. An '*' is displayed for each key pressed.
3	3	Time-Out Next State Number (Range 000-254 or 256-750)	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 (Range 000-254 or 256-750)	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 (Range 000-254 or 256-750)	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 (Range 000-254 or 256-750)	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. See Note 2.  This exit is also taken if cardholder tampering is detected by the Encryptor Keyboard Controller (EKC). See Section 5, “Security Features”, for details of the EKC.

## State Tables

## B - PIN Entry State

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 '*' 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 Note 2.
8	3	Remote PIN Check Next State Number (Range 000-254 or 256-750)	State number to which the terminal goes when local PIN verification is not performed. See Note 1.
9	3	Local PIN Check Maximum PIN retries (Range 001-009)	Maximum number of incorrect PIN entries allowed before the terminal enters the state determined by table entry 6. See Note 2.

**Note:** 1. When Diebold PIN verification is used without FITs, the meaning of this field is PIN Mode Word. This value defines the location of the PAN and offset fields on the card. See Chapter 2.7, "Diebold PIN Information Without FITs" passage, for details.

**Note:** 2. 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. See Chapter 2.7, "Financial Institution Tables", for details.

---

## 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 not taken by the cardholder, it is retracted when the terminal enters the Close state. This state is equivalent to the Diebold Unlock Depository Vandal Guard state.

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Table Entry	Number of Characters	Contents	Description
1	1	State Type	'C'
2	3	Next State Number (Range 000-254 or 256-750)	State number that the terminal enters immediately or after an envelope is presented.
3-9	21	Must be 000.	Reserved

**Note:** In Native mode, an envelope is only dispensed during this state. In Diebold Emulation mode, an envelope can be dispensed either during this state or if the terminal subsequently receives a Transaction Reply message containing a function code of 1 or 7 (deposit and print). See Chapter 4.4, “Transaction Reply Commands”, for details of the deposit and print sequence.

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## 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 ‘T’. These characters correspond to the eight Function Display Keys.

Table Entry	Number of Characters	Contents	Description
1	1	State Type	'D'
2	3	Next State Number (Range 000-254 or 256-750)	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 example.
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 example.
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 example.
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 example.
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 example.
8	3	Must be 000 for each entry.	Reserved
9	3	Extension State Number (Range 000-254 or 256-750)	State number of the Extension state containing information on how the other operation codes are pre-set.

## 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 example.
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 example.
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 example.
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 example.
6-9	12	Must be 000.	Reserved

**Example:** 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 CRT ('A', 'B', 'C' or 'D') has been selected by the cardholder.

You can enable the four FDKs to the left of the CRT ('I', 'H', 'G' and 'F'), instead of the four to the right, by setting option digit 15a in Diebold Emulation Mode or option digit 7a in Native mode. See *NDC+ Supervisor's Reference Manual* for information on option digits.

Enabling the four keys to the left of the CRT 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. See Chapter 2.3, "Touch Screen FDK Emulation" passage, for details.

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. See Chapter 2.3, "Keyboard Data", for details.

## State Tables

## 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. See Chapter 2.2, "C - Cardholder Display" passage, for details.																		
3	3	Time-Out Next State Number (Range 000-254 or 256-750)	State number to which the terminal goes if the cardholder does not respond to the CRT message within the permitted time limit. Enter 255 if the time-out function is not required.																		
4	3	Cancel Next State Number (Range 000-254 or 256-750)	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. Enter 255 to deactivate any FDK or touch area.																		
6	3	FDK 'B' (or 'H') Next State Number	(Range 000-254 or 256-750)																		
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.																		
			<table> <thead> <tr> <th>Entry Value</th> <th>Position in Buffer</th> </tr> </thead> <tbody> <tr> <td>'000'</td> <td>1st byte</td> </tr> <tr> <td>'001'</td> <td>2nd byte</td> </tr> <tr> <td>'002'</td> <td>.</td> </tr> <tr> <td>'003'</td> <td>.</td> </tr> <tr> <td>'004'</td> <td>.</td> </tr> <tr> <td>'005'</td> <td>.</td> </tr> <tr> <td>'006'</td> <td>.</td> </tr> <tr> <td>'007'</td> <td>8th byte</td> </tr> </tbody> </table>	Entry Value	Position in Buffer	'000'	1st byte	'001'	2nd byte	'002'	.	'003'	.	'004'	.	'005'	.	'006'	.	'007'	8th byte
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 CRT, 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. See Chapter 4.2, “Configuration Parameters Load” passage, for details.

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. See Chapter 4.2, “Configuration Parameters Load” passage, for details of timers. If the cardholder presses the Enter key, it has the same effect as pressing FDK ‘A’ (or FDK ‘I’ if option digit 7a in Native mode or 15a in Diebold Emulation mode is set). See “E - Four FDK Selection Function State” for more details. If the cardholder presses the Clear key, which is always active, the amount buffer and the CRT echo field are cleared. 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. See Chapter 2.3, “Touch Screen FDK Emulation” passage, for details.

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. See Chapter 2.3, “Keyboard Data”, for details.

The Digital Audio Service can echo the keyboard in this state.

## State Tables

## 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 (Range 000-254 or 256-750)	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 (Range 000-254 or 256-750)	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. Enter 255 to deactivate an FDK or touch area.
6	3	FDK 'B' (or 'H') Next State Number	(Range 000-254 or 256-750)
7	3	FDK 'C' (or 'G') Next State Number	(Range 000-254 or 256-750)
8	3	FDK 'D' (or 'F') Next State Number	
9	3	Amount Display Screen Number (Range 000-999)	Overlay screen for setting the CRT 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 CRT. This is space filled until the required start position for the currency character is reached. See "International Currency Display Format" later in this passage for details.  The default echo field for eight digits is: bbbbbb\$b0.00 where b = space.
			The default echo field for twelve digits is: aaaaaaaa\$b0.00 where b = space.

## G - Amount Check State

This state checks to see whether the cardholder has entered a whole amount, for example dollars only, or a non-whole amount, for example dollars and cents. This state should follow an amount entry state if the cardholder has selected a withdrawal transaction.

Table Entry	Number of Characters	Contents	Description
1	1	State Type	'G'
2	3	Whole Currency Unit Entry Next State Number (Range 000-254 or 256-750)	State number to which the terminal goes when a value of zero to the right of the decimal point position is present in the specified buffer.
3	3	Non-Whole Currency Unit Entry Next State Number (Range 000-254 or 256-750)	State number to which the terminal goes when a non-zero value to the right of the decimal point position is present in the specified buffer.
4	3	Buffer to be checked	This field specifies which buffer is to be checked: 000 - Amount buffer 001 - Buffer B 002 - Buffer C
5-9	15	Must be 000 for each table entry.	Reserved

## 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 '\*' is displayed for each key pressed. For example, you would specify '\*' to be displayed when the cardholder enters a PIN.

The Digital Audio Service can echo the keyboard in this state unless the keys are being displayed as '\*'.

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 in Native mode or 15a

in Diebold Emulation mode is set). See “E - Four FDK Selection Function State” passage in this chapter for more details.

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. See Chapter 2.3, “Touch Screen FDK Emulation” passage, for details.

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. See Chapter 2.3, “Keyboard Data”, for details.

The Clear function key is always active. If the cardholder presses this State’s key, the general purpose buffer and the echo field displayed on the CRT 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 you have 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.

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

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 (Range 000-254 or 256-750)	State number to which the terminal goes if the cardholder does not respond to the CRT message within the permitted time limit. Enter 255 if the time-out function is not required.
4	3	Cancel Next State Number (Range 000-254 or 256-750)	State number to which the terminal goes if the Cancel key is pressed.

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 an FDK or touch area. Enter 255 to make an FDK or touch area inactive while the terminal is in the Information Entry state. (Range 000-254 or 256-750)
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)	<p>A general purpose buffer (B or C) is designated for storage. The actual data entered (or '*' ) to be displayed on the CRT is also defined. The display begins from the current cursor position. Buffer and display parameters are as follows:</p> <p>000 - Display '*' for each numeric key pressed. Store data in general purpose buffer C.</p> <p>001 - Display data as keyed in. Store data in general purpose buffer C.</p> <p>002 - Display '*' for each numeric key pressed. Store data in general purpose buffer B.</p> <p>003 - Display data as keyed in. Store data in general purpose buffer B.</p>

## 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. See Chapter 3.1, “Transaction Request Messages”, for more details.

On a terminal with digital audio capability and auto voice enabled, message 1 is played when a Transaction Request message is sent to Central. A Transaction Reply can also include messages for the Digital Audio Service to speak. See Chapter 2.2, “Special Features” passage, for details.

Table Entry	Number of Characters	Contents	Description
1	1	State Type	'T'
2	3	Screen Number (Range 000-999)	Display screen shown on the CRT 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 Time-Out Next State Number (Range 000-254 or 256-750)	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 Note 1
5	3	Send Track 1 and/or Track 3 Data and/or CIM verify data	See Note 2
6	3	Send Operation Code Data	See Note 1
7	3	Send Amount Data	See Note 1
8	3	Send PIN Buffer (Buffer A) Data/ Select Extended format	See Notes 1, 3 and 4
9	3	Send General Purpose Buffer B and/or C <b>or</b> Extension State Number (Range 000-003 or 000-254, 256-750)	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 also Note 3.

**Note:** 1. The following values determine whether or not the specified data is included in the corresponding Transaction Request message field sent to Central:

Value	Send Data
000	No
001	Yes

**Note:** 2. The following values only apply to table entry 5, and determine whether or not Track 1 and Track 3 data and the CIM86 verify code and data are included in the Transaction Request message sent to Central:

Value	CIM86 Verify Code and Data	Track 1 Data	Track 3 Data
000	No	No	No
001	No	No	Yes
002	No	Yes	No
003	No	Yes	Yes
004	Yes	No	No
005	Yes	No	Yes
006	Yes	Yes	No
007	Yes	Yes	Yes

If entry 5 indicates that CIM86 information is required, the stored CIM86 verify code and data is built into the Transaction Request message sent to Central. If no CIM86 verify operation has been performed, but the field is required, it is set to 0s (nine zeros set).

**Note:** 3. 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. See *NDC+ Supervisor's Reference Manual* for details on selecting the message mode option from the Configure menu. The definitions of table entries 8 and 9 are changed to:

## State Tables

### I - Transaction Request State

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

**Note:** 4. 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:

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.

These variations do not apply when using the Diebold No-PIN option.

## 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.																		
			<table> <thead> <tr> <th>Bit</th><th>Field ID</th></tr> </thead> <tbody> <tr><td>1</td><td>'A' (Reserved)</td></tr> <tr><td>2</td><td>'B' (Reserved)</td></tr> <tr><td>3</td><td>'C'</td></tr> <tr><td>4</td><td>'D'</td></tr> <tr><td>5</td><td>'E'</td></tr> <tr><td>6</td><td>'F'</td></tr> <tr><td>7</td><td>'G'</td></tr> <tr><td>8</td><td>'H'</td></tr> </tbody> </table>	Bit	Field ID	1	'A' (Reserved)	2	'B' (Reserved)	3	'C'	4	'D'	5	'E'	6	'F'	7	'G'	8	'H'
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 entry 3 but the data fields are as follows:																		
			<table> <thead> <tr> <th>Bit</th><th>Field ID</th></tr> </thead> <tbody> <tr><td>1</td><td>'I'</td></tr> <tr><td>2</td><td>'J'</td></tr> <tr><td>3</td><td>'K'</td></tr> <tr><td>4</td><td>'L'</td></tr> <tr><td>5</td><td>Reserved for 'M'</td></tr> <tr><td>6</td><td>Reserved for 'N'</td></tr> <tr><td>7</td><td>Reserved for 'O'</td></tr> <tr><td>8</td><td>Reserved for 'P'</td></tr> </tbody> </table>	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'
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'																				

## State Tables

## I - Transaction Request State

Table Entry	Number of Characters	Contents	Description																		
5	3	Send Optional Data Fields 'Q' - 'V' (Range 000-063)	This entry is as for entry 3 but the data fields are as follows:  <table> <thead> <tr> <th>Bit</th><th>Field ID</th></tr> </thead> <tbody> <tr> <td>1</td><td>'Q'</td></tr> <tr> <td>2</td><td>'R'</td></tr> <tr> <td>3</td><td>'S'</td></tr> <tr> <td>4</td><td>Reserved for 'T'</td></tr> <tr> <td>5</td><td>'U'</td></tr> <tr> <td>6</td><td>'V'</td></tr> <tr> <td>7</td><td>Reserved</td></tr> <tr> <td>8</td><td>Reserved</td></tr> </tbody> </table>	Bit	Field ID	1	'Q'	2	'R'	3	'S'	4	Reserved for 'T'	5	'U'	6	'V'	7	Reserved	8	Reserved
Bit	Field ID																				
1	'Q'																				
2	'R'																				
3	'S'																				
4	Reserved for 'T'																				
5	'U'																				
6	'V'																				
7	Reserved																				
8	Reserved																				
6-8	9	Must be 000	Reserved																		
9	3	Must be 000	Reserved for Extension state number																		

## 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 CRT message from those specified in table entries 2, 4, 5 and 6 is displayed.

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 (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 state exit 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. See Chapter 2.2, "C - Cardholder Display" passage, for details of cardholder display screens. See Chapter 4.2, "Configuration Parameters Load" passage, for details of timers.

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 a Message Mode option to inhibit the beeper. For Diebold Emulation mode this option is 12a, and for Native mode it is 4b. See *NDC+ Supervisor's Reference Manual* for details of options.

On entry to the Close state, the terminal detects whether a DPM is configured and whether any recovery action is required. If the terminal detects that the device has a recoverable error condition present and still has a document within it, it attempts to retain or return the document as defined by extension state entry 3 (DPM Document Retain/Return Flag). The document is not returned if it is detected that a Process Document With Cash function (Function Command ID 'S') failed to move the document to a destination.

If the document is to be retained, an attempt is made to move the document into the Reject/Envelope Bin (Bin 1). If the document is to be returned, an attempt is made to return it to the cardholder. If the document successfully reaches the exit, the screen defined by extension table entry 2 (DPM Take Document Screen Number) is displayed until the document is taken or for the period specified by timer 94. The beeper is also sounded unless the Native mode 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 the document to the Reject/Envelope Bin (Bin 1).

If the document is moved successfully to the bin, screen 'T74' is journalled. If it is not successful and the cardholder does not have access, screen 'T75' is journalled. If it is not successful and the cardholder may have access, screen 'T82' is journalled. See Appendix A, "Reserved Screens", for details of security trace messages.

If Read data has been lifted for the document present, the data associated with the first read zone of the document Read List is also journalled. In addition, if the cardholder account number is known, this will also be journalled. The CRT message specified in table entry 8 is displayed for the period defined by timer 87.

If an error occurs, or a replenishable state changes, while the document is moved to Bin 1, an unsolicited message is issued. If the error has a core severity of fatal, any further attempt to use the device yields an error message.

On a terminal with an envelope dispenser, any envelope that is not taken by the cardholder is retracted.

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. The volume level of the Digital Audio Service is reset to its default level. See Chapter 2.2, "Special Features" passage, for details.

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

**Note** You should ensure that the Close state deals appropriately with audio files if a foreign language has been selected in a multiple language environment. For more information see "Understanding the Digital Audio Service," in Appendix R.

Table Entry	Number of Characters	Contents	Description
1	1	State Type	'J'
2	3	Receipt Delivered Screen Number (Range 000-999)	Display screen that is 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 wording of the screen depends on the previous Transaction Reply Command performed:  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 (Range 000-254 or 256-750)	State number to which the terminal goes after the state is completed.
4	3	No Receipt Delivered Screen Number (Range 000-999)	Display screen that is 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 wording of the screen depends on the previous Transaction Reply command performed:  Card Before Cash - 'Take cash' Fast Cash - 'Take cash and card' Other Commands - 'Take card'
5	3	Card Retained Screen Number (Range 000-999)	Display screen that is 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).
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.

Table Entry	Number of Characters	Contents	Description
7	3	Must be 000	Reserved
8	3	DPM Document Captured Screen Number (Range 000-999)	Display screen that is displayed on entry to the Close state, informing the cardholder that the document has been captured.
9	3	Extension State Number (Range 000-254 or 256-750)	State number of the optional Extension state. See Note.

**Note:** If an extension state is not included, the default action for the DPM Document Error recovery is to retain any document found in the Close state.

## Extension To State J

Table Entry	Number Of Characters	Contents	Description
1	1	State Type	'Z'
2	3	DPM Take Document Screen Number (Range 000-999)	This screen is required due to the error recovery actions which may take place in this state if a DPM is present.
3	3	DPM Document Retain/Return Flag (Range 000-001)	This flag controls the error recovery action which may take place in this state if a DPM is present. The following values apply: 000 - Retain 001 - Return  This flag is ignored if a document is present after a Process Document With Cash transaction.
4-9	18	Reserved	Must be 000.

**Note:** 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.

See Chapter 4.4, "Functions The Terminal Can Perform To Complete A Transaction" passage, for details of 'Card Before Cash', 'Fast Cash' and 'Process Document With Cash' transactions.

## 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. See “A - Card Read State” passage in this chapter for more details.

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 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.
3	1	3	Next State Number	(Range 000-254 or 256-750)
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.

### **Example**

If the FIT which was identified during the Card Read state contains a next state index of 3, the next state number is found in table entry 5.

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. (Range 000-254 or 256-750)
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 (Range 000-254 or 256-750)	State number of the mandatory Extension state.

## Extension To State \_

Table Entry	Index	Number of Chars	Contents	Description
1		1	State Type	'Z'
2	7	3	Next State Number	
3	8	3	Next State Number	State to which the terminal goes depending on the next state index stored in the FIT. (Range 000-254 or 256-750)
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 CRT 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 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 (Range 000-254 or 256-750)	State number to which the terminal goes after a satisfactory Track write operation.
4	3	Bad Write Next State (Range 000-254 or 256-750)	State number to which the terminal goes if the Track write is unsuccessful.
5	3	No Write Attempted Next State (Range 000-254 or 256-750)	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. You cannot perform Diebold PIN verification without FITs with this state.

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.

If an MM sensor with CIM86 MCRW is present and configured, this state remains unaltered, apart from the extra data manipulation that is required to perform local GBP PIN verification. 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. See Chapter 4.2, “FIT Data Load” passage, for details of these conditions. See *NDC Programmer’s Overview* for details of GBP PIN verification.

On a terminal with digital audio capability and auto voice enabled, message 7 is played on entry to this state. The Digital Audio Service is turned off in this state, so the keys are not audibly echoed as the cardholder presses them. See Chapter 2.2, “Special Features” passage, for details.

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. See Chapter 2.3, “Touch Screen FDK Emulation” passage, for details.

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. See Chapter 2.3, “Keyboard Data”, for details.

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 CRT cursor at the start of the PIN Entry display area. An '*' is displayed for each key pressed.
3	3	Time-Out Next State Number (Range 000-254 or 256-750)	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 (Range 000-254 or 256-750)	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 (Range 000-254 or 256-750)	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 (Range 000-254 or 256-750)	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 Note). This exit is also taken if cardholder tampering is detected by the Encryptor Keyboard Controller (EKC). See Section 5, “Security Features”, for details of the EKC.

## State Tables

## M - Enhanced PIN Entry State

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 '*' 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 Note.
8	3	Remote PIN Check Next State Number (Range 000-254 or 256-750)	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 Note.

**Note:** 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.

## N - Camera Control State

When the terminal enters this state, the camera takes a picture. Information supplied by the terminal is stored with the picture.

On a terminal without a camera, this state does not perform any action. It takes the next state exit immediately.

There are two types of camera: film cameras and the Digital Camera System (DCS). Film cameras record pictures and data on photographic film; digital cameras use an optical disk. Film cameras may be of fixed or variable format type.

The data stored with the picture depends on:

- The camera type, which may be
  - Fixed format film camera, for example 3M
  - Variable format film camera, for example D/A
  - The Digital Camera System (DCS)
- The picture type

The picture type is set by entry 2 in the state table (below). It may be either **0** or **1**.

- Whether a machine number has been set

The machine number is set locally in supervisor mode. Refer to the *NDC+ Supervisor's Reference Manual* for details. The state assumes that no machine number is set if the rightmost byte of the machine number is an ASCII blank (20H)

- The format of the date set by Enhanced Configuration Option 3. Four date formats can be set for the DCS; film cameras accept only one or two. See *Enhanced Configuration Parameters Load* in section 4.2 of this manual for further information
- Whether the enhanced configuration option 'Include PAN with DCS data' is set. This applies to the DCS only.

If you are using a fixed format film camera, the data stored with each picture is as follows:

Picture type	Information	Format
0	Time	HHMM
	Date	YYMMDD
	Machine Number	Six ASCII characters
1	Time	HHMM
	Date	YYMMDD
	Transaction Serial Number	Four ASCII characters
	Machine Number	Six ASCII characters

If you are using a variable format film camera other than the Digital Camera System, the data stored with each picture is as follows:

Picture type	Information	Format
0	Time	HHMM
	Date	One of the following formats: MMDDYY DDMMYY
1	Time	HHMM
	Date	One of the following formats: MMDDYY DDMMYY
	Transaction Serial Number	Four ASCII characters
	Machine Number	Six ASCII characters

If you are using the Digital Camera System, the data stored with each picture is as follows:

Picture type	Offset	Information	Format
0	0-3	Time	HHMM
	5-10	Date	One of the following formats: MMDDYY DDMMYY YYMMDD YYDDMM

*If a machine number is set:*

13-18 Machine Number Six ASCII characters

*If no machine number is set*

13-15 Logical Unit Number Three ASCII characters

16-18 Blank Three ASCII space characters

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1	0-3	Time	HHMM
	5-10	Date	One of the following formats: MMDDYY DDMMYY YYMMDD YYDDMM
	12-15	Transaction Serial Number	Four ASCII characters

|  | 5-10 | Date | One of the following formats: MMDDYY DDMMYY YYMMDD YYDDMM |
|  | 12-15 | Transaction Serial Number | Four ASCII characters |

*If a machine number is set:*

17-22 Machine number Six ASCII characters

*If no machine number is set:*

17-19 Logical Unit Number Three ASCII characters

20-22 Space characters

*If the Include PAN With DCS Data Option is set and PAN is located*

24-42	Primary Account Number	19 ASCII characters
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*If the Include PAN With DCS Data Option is set but PAN is not located*

24-42	Contents of screen T92	ACCOUNT NOT KNOWN
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If the Primary Account Number (PAN) is unknown, the PAN field is filled with the first nineteen characters from screen T92. If screen T92 contains fewer than nineteen characters then the rest of the field will contain blanks. The text of screen T92 reads 'ACCOUNT NOT KNOWN'.

The type and make of camera you use determines where on the picture the recorded information appears.

Automatic picture-taking is available. You can inhibit this feature by selecting the Camera Control option in the Configuration Parameters Load message. See the section *Configuration Parameters Load* in chapter 4.2 for more details.

Table Entry	Number of Characters	Contents	Description
1	1	State Type	'N'
2	3	Picture Type (Range 000-001)	000 - picture type 0 001 - picture type 1
3	3	Next State Number (Range 000-254 or 256-750)	State number to which the terminal goes after taking the picture.
4-9	18	Must be 000 for each table entry	Reserved

---

## P - Courtesy Amount Verification State

This state is used with SSTs which have a Document Processing Module (DPM) present. The current document definition must have an associated 'Courtesy Amount' zone held within the Courtesy Amount List and the CAV Image Processing Utility must be supported.

You can use the state in two ways:

- To read an amount handwritten or machine-printed on the document
- To verify that an amount entered by a cardholder matches the amount handwritten or machine-printed on the document.

The cardholder enters the amount using the Amount Entry state or the Enhanced Amount Entry state. See "F - Amount Entry State" and "R - Enhanced Amount Entry State" passages in this chapter for more details. The amount can be held in the Amount buffer or general purpose buffers B or C, as specified in table entry 8.

The Digital Audio Service can echo the keys pressed on the keyboard.

If the comparison is requested, it is carried out using the mask specified for the Courtesy Amount zone in the DDF. The '?' character in this mask means that a digit must be validated; the '#' character means that a digit will be ignored.

When this state is entered, all data reportable in the Transaction Request message with respect to CAV is set to null.

When the Courtesy Amount has been read, or read and compared with the cardholder amount, the Good Exit is taken. This does not necessarily mean that the two amounts matched or that there were no misreads. The amount read and the level of verification is returned through the Transaction Request message. See "I - Transaction Request State" passage in this chapter.

The Good Exit is also taken if the Courtesy Amount has been read but a dog-eared document has been detected in the process. This dog-ear need not be in the Courtesy Amount zone, so the CAV data is present in any subsequent Transaction Request message if requested.

If the Courtesy Amount Verification state is entered when the DPM is in an operational condition but no document has been entered or

the document entered has been pocketed or returned to the cardholder, the No Document Present Next State Exit is taken.

If the Courtesy Amount Verification state is entered and a fault occurs during CAV, the document is in a position which makes CAV impossible, or the comparison buffer has not been set up, the Bad Exit is taken.

If this state is executed when a DPM is present but the Image Utility supporting CAV is not present, then the CAV Unavailable Exit is taken.

If this state type is downloaded to a terminal running in Native mode, version 5.00 or higher, which does not have a DPM present, the message is not rejected. However, if a subsequent downloaded state flow attempts to use this state, then the CAV Unavailable Exit is taken.

This state is only supported in Native mode versions 5.00 and higher. If this state type is downloaded to a terminal not running a suitable version of NDC+, the message is not rejected. However, if a subsequent downloaded state flow attempts to use this state, the state flow is directed to the default Close state.

Table Entry	Number of Characters	Contents	Description
1	1	State Type	'P'
2	3	Screen Number (Range 000-999)	This is the screen which is displayed while CAV is carried out.
3	3	Good Next State Exit (Range 000-254 or 256-750)	State number to which the terminal goes after the amount has been read or read and compared with the cardholder amount.
4	3	CAV Unavailable Next State Exit (Range 000-254 or 256-750)	State number to which the terminal goes if: <ol style="list-style-type: none"> <li>1. CAV is not supported.</li> <li>2. CAV cannot be performed because at least one part of the device essential for performing CAV is unusable.</li> <li>3. No DPM is present in the terminal.</li> </ol>

Table Entry	Number of Characters	Contents	Description
5	3	Bad Next State Exit (Range 000-254 or 256-750)	<p>State number to which the terminal goes if CAV is supported but:</p> <ol style="list-style-type: none"> <li>1. A fault occurred with the DPM during this state.</li> <li>2. The device is usable and there is a document inside the DPM but the document is not in a position where CAV can be performed.</li> <li>3. The comparison buffer has not been set up.</li> </ol>
6	3	No Document Present Next State Exit (Range 000-254 or 256-750)	State number to which the terminal goes if CAV is supported but there is no document within the DPM and the device is in an operational condition.
7	3	Compare Against Buffer (Range 000-001)	<p>Specifies whether the amount read from the document should be compared with the buffer specified in table entry 8.</p> <p>000 - Do not compare with buffer 001 - Compare with buffer</p>
8	3	Buffer (Range 000-002)	<p>Specifies which buffer the amount entered by the cardholder is contained in.</p> <p>000 - Amount buffer 001 - Buffer B 002 - Buffer C</p>
9	3	Must be 000	Reserved for Extension state number

---

## Q - DPM Document Accept State

This state is used with SSTs which have a DPM present. The cardholder can use it to allow document insertion.

The state will perform the following functions:

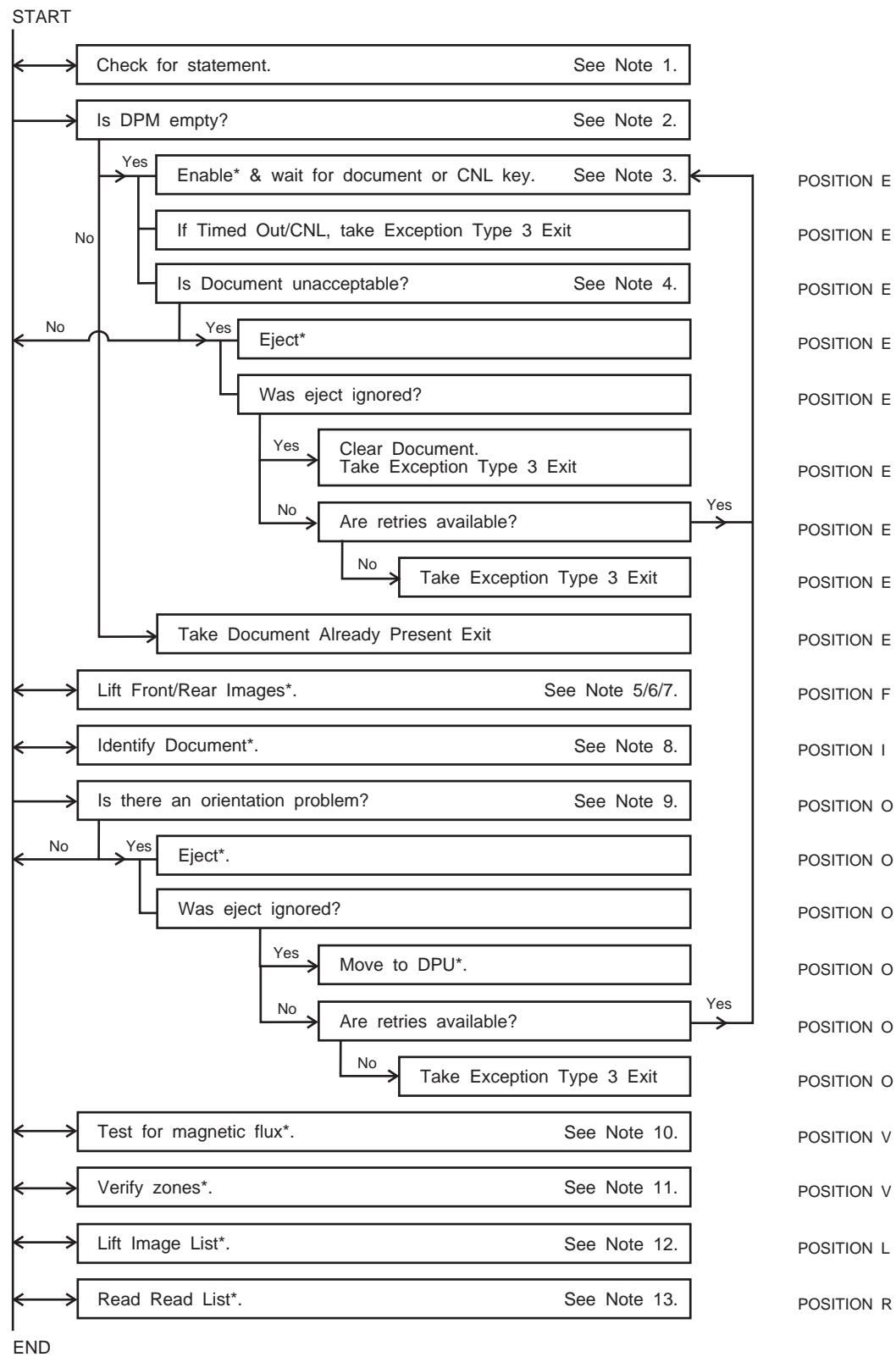
- Tidy up statements on 5665 SSTs
- Accept cardholder documents
- Return physically unacceptable documents to the cardholder
- Lift Full Front/Rear Images
- Identify documents automatically
- Return incorrectly oriented documents
- Check for the presence of magnetic flux on the document
- Check for endorsement using the current document definitions
- Verify List
- Read the document using the current document definitions
- Read List
- Return documents to the cardholder on the occurrence of a processing exception or on the occurrence of a device failure
- Capture documents as a 'last resort' .

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### Operational Description

The following diagram describes the functional behaviour of this state. Where it indicates that a State Exit is taken, the state takes that exit immediately and does not process the document any further. If exception handling is required (indicated by \* in the diagram), further processing of the document does not take place and the state carries out the functions defined in "Exception Handling" passage below.

Figure 2.1-1 State Q



\*Invoke Exception Handling if document/hardware exception.

## Notes To Operational Diagram

**Note:** 1. This is only applicable to 5665 SSTs.

If it is detected on entry to the state that a statement is lying at the entry/exit slot from a previous transaction, screen 'D0008' will be displayed. See Chapter 2.2, "D - DPM" passage, for details. If it is not removed before timer 95 expires, it is moved to the DPM Statement Printer Capture Bin. The state then exits to the state defined by extension state 3, table entry 6 (Exception Type 3 Next State Exit). See Chapter 2.4, "5665 Statement Printer" passage, for more information.

**Note:** 2. If it is detected that there is already a document present within the DPM, the state will exit directly to the state defined by extension state 3, table entry 2 (Document Already Present Next State Exit).

**Note:** 3. If the DPM is empty, the device will be enabled to accept a document using the Enable Code defined by table entries 2 and 3 (Document Enable Code - Upper and Lower). If the enable is successful, the screen defined by extension state 2, table entry 2 (Please Insert Document Screen), will be displayed.

When the DPM is enabled, the slow beeper is sounded and the depository MEI flashes for the time specified by timer 04 or until the Cancel key is pressed. The beeper will not be sounded if option digit 2c is set.

The beeper and MEI are disabled when a document is detected, the Cancel key is pressed or the timer expires. If the timer expires or the Cancel key is pressed, the state exits to the state defined by extension state 3, table entry 6 (Exception Type 3 Next State Exit).

If the device is unable to execute a successful enable, the state will perform exception handling as defined in "Exception Handling" passage below.

**Note:** 4. If the cardholder inserts a document which is physically unacceptable, it is returned to him. The screen defined by extension state 2, table entry 4 (Unacceptable Document Screen), is displayed. The beeper is sounded if the ejection is performed unless option 2c is set.

The cardholder is presented with the invalid document for up to the time specified by timer 94. The beeper stops when the cardholder

takes the document or when it is retracted if the cardholder does not retrieve it.

If the cardholder does not retrieve the invalid document, it is cleared to the envelope/reject bin. The state then exits to the state defined by extension state 3, table entry 6 (Exception Type 3 Next State Exit). A security trace message is journalled at this point to indicate that the clearing action has taken place. The trace message is 'T74', 'T75' or 'T82' as appropriate.

If the cardholder retrieves the document, the DPM is re-enabled if there are retries left, as defined by table entry 4 (Document Entry Retries). If there are no retries left, the DPM is not re-enabled and the state exits to the state defined by extension state 3, table entry 6 (Exception Type 3 Next State Exit).

If the device encounters a problem during this operation, the state performs exception handling as defined in "Exception Handling" passage below.

**Note:** 5. If the cardholder inserts a physically acceptable document, the screen defined by extension state 2, table entry 3 (Processing Document Screen), is displayed.

**Note:** 6. If the lifting of full images has been requested by table entry 5 (Lift Front/Rear Images), these will be lifted. If the device is unable to carry out this activity successfully, the state will perform exception handling as defined in "Exception Handling" passage below.

**Note:** 7. The screen defined by extension state 2, table entry 7 (Further Processing Screen), is displayed. This screen may be defined to include the full front/rear images if desired.

**Note:** 8. Document identification will take place if requested by table entry 6 (Control Candidates/Identify). If this yields multiple candidates, the action defined by table entry 6 is taken. If this requests exception handling, this will be performed.

If the device encounters a problem while carrying out this activity, the state will perform exception handling as defined in "Exception Handling" passage below.

**Note:** 9. If the orientation of the document is incorrect, it is returned to the cardholder. One of the screens defined by extension state 2,

table entries 5 and 6 (Upside Down Document Screen and Wrong Way Up Document Screen), is displayed as appropriate.

If the document is not taken, it is moved back into the DPU and the state performs exception handling.

If the cardholder retrieves the document, the DPM is re-enabled if there are retries left, as defined by table entry 4 (Document Entry Retries). If there are no retries left, the DPM is not re-enabled and the state exits to the state defined by extension state 3, table entry 6 (Exception Type 3 Next State Exit).

If the device encounters a problem while carrying out this activity, the state performs exception handling as defined in “Exception Handling” passage below.

**Note:** 10. The presence of magnetic flux on the document is checked as defined by extension state 1, table entry 3 (Magnetism Check Control). The state performs exception handling, as defined in “Exception Handling” passage below, if necessary.

**Note:** 11. Zone verification is carried out as defined by extension state 2, table entry 2 (Please Insert Document Screen). This uses the Verify List of the current document definition. The state performs exception handling, as defined in “Exception Handling” passage below, if necessary.

**Note:** 12. The images defined by the current document definitions image list are lifted as defined by extension state 1, table entry 4 (Image List Lift Control). If the device is unable to carry out this activity successfully, the state performs exception handling as defined by “Exception Handling” passage below.

**Note:** 13. The document is read using the Read List of the current document definition. This data is stored in Read Zones 1-10 for subsequent transmission in a transaction request message. If the device is unable to carry out this activity successfully, the state will perform exception handling as defined in “Exception Handling” passage below.

## Exception Handling

Exception handling is performed under certain document exception or device hardware errors. It is indicated in the Operational Diagram by \* .

The following exception handling will be performed:

- 1 Position = ‘E’ (Entry/Re-Entry)

The document will be returned to the cardholder. If the return fails or the document is not taken, it is moved to Bin 1.

If this operation is successful, the security trace message, ‘T74’, is journalled. If it is not successful and the device has gone fatal, either ‘T75’ or ‘T82’ will be journalled. If it is not successful but the device is not yet fatal, no security trace message will be journalled. The subsequent Close state ensures that a suitable trace message is journalled. See Appendix A, “Reserved Screens” for details of security trace messages. In each case the exit defined in extension state 3, table entry 6 (Exception Type 3 Next State Exit), is taken.

**2 Position = ‘F’ (Full Image Lift)**

As for position ‘E’ above.

**3 Position = ‘I’ (Identify)**

As for position ‘E’ above.

**4 Position = ‘O’ (Orientation)**

- a** If the document has been moved back into the DPU, it will be moved to Bin 1.

If this operation is successful, the security trace message, ‘T74’, is journalled. If it is not successful and the device has gone fatal, either ‘T75’ or ‘T82’ will be journalled. If it is not successful but the device is not yet fatal, no security trace message will be journalled. The subsequent Close state ensures that a suitable trace message is journalled. See Appendix A, “Reserved Screens” for details of security trace messages. In each case the exit defined in extension state 3, table entry 6 (Exception Type 3 Next State Exit), is taken.

- b** All other exceptions are treated as for position ‘E’ .

**5 Position = ‘V’ (Verify)**

As for position ‘E’ above.

**6 Position = ‘L’ (Lift Image List)**

As for position ‘E’ above.

**7 Position = ‘R’ (Read)**

- a** If the exception is a Misread, the exit defined in extension state 3, table entry 5 (Exception Type 2 Next State Exit), is taken.
- b** All other exceptions are treated as for position ‘E’ .

## Main State Table

Table Entry	Number of Characters	Contents	Description										
1	1	State Type	'Q'										
2	3	Document Enable Code (Upper)	Enable code used to set the initial document definition when the DPM is enabled to accept a deposit. See Note 1.										
3	3	Document Enable Code (Lower)											
4	3	Document Entry Retries (Range 000-003)	<p>Number of document entry retries the cardholder is allowed during the execution of this state.</p> <p>Retries are allowed during orientation correction or the correction of a physically unacceptable document</p> <table> <thead> <tr> <th>Value</th><th>Action</th></tr> </thead> <tbody> <tr> <td>000</td><td>Do not allow cardholder retries</td></tr> <tr> <td>001</td><td>Allow one further attempt following initial problem</td></tr> <tr> <td>002</td><td>Allow two further attempts following initial problem</td></tr> <tr> <td>003</td><td>Allow three further attempts following initial problem</td></tr> </tbody> </table>	Value	Action	000	Do not allow cardholder retries	001	Allow one further attempt following initial problem	002	Allow two further attempts following initial problem	003	Allow three further attempts following initial problem
Value	Action												
000	Do not allow cardholder retries												
001	Allow one further attempt following initial problem												
002	Allow two further attempts following initial problem												
003	Allow three further attempts following initial problem												
5	3	Lift Front/Rear Images (Range 000-063)	This entry is a representation of a 'bitmap' and is used to determine what Full Front and/or Full Rear images, if any, are to be lifted from the document. See Note 2.										

Table Entry	Number of Characters	Contents	Description								
6	3	Control Candidates/ Identify (Range 000-002)	<p>In certain circumstances, the DPM may be unable to identify uniquely the document inserted and will return up to three candidates. This field is used to determine what action should be taken if this occurs.</p> <table> <thead> <tr> <th>Value</th><th>Action</th></tr> </thead> <tbody> <tr> <td>000</td><td>Do not use the DPM Document Identification feature</td></tr> <tr> <td>001</td><td>Use the DPM Document Identification feature. If candidates are returned, then treat this as an exception and perform exception handling. See “Exception Handling” passage above, for details.</td></tr> <tr> <td>002</td><td>Use the DPM Document Identification feature. If candidates are returned, set the document definition to the preferred candidate.</td></tr> </tbody> </table> <p>If the DPM Document Identification feature is not supported and a non-zero value is used in this entry, this is treated as an error and exception handling is performed. See “Exception Handling” passage above, for details.</p>	Value	Action	000	Do not use the DPM Document Identification feature	001	Use the DPM Document Identification feature. If candidates are returned, then treat this as an exception and perform exception handling. See “Exception Handling” passage above, for details.	002	Use the DPM Document Identification feature. If candidates are returned, set the document definition to the preferred candidate.
Value	Action										
000	Do not use the DPM Document Identification feature										
001	Use the DPM Document Identification feature. If candidates are returned, then treat this as an exception and perform exception handling. See “Exception Handling” passage above, for details.										
002	Use the DPM Document Identification feature. If candidates are returned, set the document definition to the preferred candidate.										
7	3	Extension State 1 (Range 000-254 or 256-750)	State number for Extension state 1								
8	3	Extension State 2 (Range 000-750)	State number for Extension state 2 If a value of 255 is used, there is no Extension state 2. See “Extension 2 To State Q” passage for more details.								
9	3	Extension State 3 (Range 000-254 or 256-750)	State number for Extension state 3								

**Note:** 1. The two table entries are combined to form a decimal value in the range 0-65532. This value is used to validate the state at run-time. For example, if table entry 2 = 021 and table entry 3 = 345, the enable code value = 21345.

**Note:** 2. The following table summarises what types of front/rear images may be lifted and to which filename they are ‘lifted’ to:

Bit	Weight	Image Filename and Description
0	1	FRONTGLF.IMG Full, Front, Grey level image (100 dots/inch)
1	2	REARGLF.IMG Full, Rear, Grey level image (100 dots/inch)
2	4	FRONTGLR.IMG Rescaled 2/3, Front, Grey level image (100 dots/inch)
3	8	REARGLR.IMG Rescaled 2/3, Rear, Grey level image (100 dots/inch)
4	16	FRONTBIF.IMG Full, Front, Binary image (200 dots/inch)
5	32	REARBIF.IMG Full, Rear, Binary image (200 dots/inch)

### Example

To lift a binary image of the rear of the document as well as a rescaled grey level image of the front (a rear camera is present):

This corresponds to bits 5 and 2. Bit 2 has a weighting of 4 and bit 5 a weighting of 32. Therefore, the field should take the value 036.

If all the front and rear images were required, the entry would take the value 063.

Lifted Front/Rear images are flushed from the system in the following conditions:

- On entry to the Card Read and Card Read - PIN Entry Initiation states
- When the document has been returned to the cardholder
- When the document has been placed in a pocket/bin
- When the DPM has been enabled to accept a document
- When the Close state is executed.

## Extension 1 To State Q

Table Entry	Number of Characters	Contents	Description										
1	1	State Type	'Z'										
2	3	Zone Verify Control (Range 000-003)	Controls whether the DPM Verification feature is to be used and what action should be taken once the zones have been checked. Zone Verification will use the Verify List of the current document definition.										
			<table> <thead> <tr> <th>Value</th> <th>Action</th> </tr> </thead> <tbody> <tr> <td>000</td> <td>Do not perform zone verification</td> </tr> <tr> <td>001</td> <td>Carry out zone verification but do not use results</td> </tr> <tr> <td>002</td> <td>Carry out zone verification. If any of the zones are blank, perform Exception Handling. See "Exception Handling" passage above, for details.</td> </tr> <tr> <td>003</td> <td>Carry out zone verification. If any of the zones are filled in, perform Exception Handling. See "Exception Handling" passage above, for details.</td> </tr> </tbody> </table> <p>If the DPM Zone Verification feature is not supported and a non-zero value is used in this entry, this will be treated as an error and will cause exception handling to be invoked. See "Exception Handling" passage above, for details.</p>	Value	Action	000	Do not perform zone verification	001	Carry out zone verification but do not use results	002	Carry out zone verification. If any of the zones are blank, perform Exception Handling. See "Exception Handling" passage above, for details.	003	Carry out zone verification. If any of the zones are filled in, perform Exception Handling. See "Exception Handling" passage above, for details.
Value	Action												
000	Do not perform zone verification												
001	Carry out zone verification but do not use results												
002	Carry out zone verification. If any of the zones are blank, perform Exception Handling. See "Exception Handling" passage above, for details.												
003	Carry out zone verification. If any of the zones are filled in, perform Exception Handling. See "Exception Handling" passage above, for details.												
3	3	Magnetism Check Control (Range 000-002)	Controls whether the DPM Magnetic Flux feature is to be used and what action should be taken once it has been checked.										
			<table> <thead> <tr> <th>Value</th> <th>Action</th> </tr> </thead> <tbody> <tr> <td>000</td> <td>Do not check for the presence of magnetic flux on the document.</td> </tr> <tr> <td>001</td> <td>If magnetic flux is detected, perform Exception Handling. See "Exception Handling" passage above, for details.</td> </tr> <tr> <td>002</td> <td>If magnetic flux is NOT detected, perform Exception Handling. See "Exception Handling" passage above, for details.</td> </tr> </tbody> </table>	Value	Action	000	Do not check for the presence of magnetic flux on the document.	001	If magnetic flux is detected, perform Exception Handling. See "Exception Handling" passage above, for details.	002	If magnetic flux is NOT detected, perform Exception Handling. See "Exception Handling" passage above, for details.		
Value	Action												
000	Do not check for the presence of magnetic flux on the document.												
001	If magnetic flux is detected, perform Exception Handling. See "Exception Handling" passage above, for details.												
002	If magnetic flux is NOT detected, perform Exception Handling. See "Exception Handling" passage above, for details.												

## State Tables

## Q - DPM Document Accept State

Table Entry	Number of Characters	Contents	Description						
			If the DPM Check Magnetic Flux feature is not supported and a non-zero value is used in this entry, this will be treated as an error and the state will perform Exception Handling. See “Exception Handling” passage above, for details.						
4	3	Image List Lift Control (Range 000-001)	<p>Controls whether the images defined by the Image List of the Current Document Definition should be lifted.</p> <table> <thead> <tr> <th>Value</th><th>Action</th></tr> </thead> <tbody> <tr> <td>000</td><td>Do not lift the images defined by the Current Document Definitions Image List.</td></tr> <tr> <td>001</td><td>Lift the images defined by the Current Document Definitions Image List.</td></tr> </tbody> </table> <p>Images lifted using the Image List are flushed from the system:</p> <ol style="list-style-type: none"> <li>1. On entry to the Card Read and Card Read - PIN Entry Initiation states</li> <li>2. When the document has been returned to the cardholder</li> <li>3. When the document has been placed in a pocket/bin</li> <li>4. When the DPM has been enabled to accept a document <b>and</b></li> <li>5. If the current document definition changes</li> </ol>	Value	Action	000	Do not lift the images defined by the Current Document Definitions Image List.	001	Lift the images defined by the Current Document Definitions Image List.
Value	Action								
000	Do not lift the images defined by the Current Document Definitions Image List.								
001	Lift the images defined by the Current Document Definitions Image List.								
5	3	Document Captured Screen (Range 000-999)	<p>Displayed when the document inserted is captured. A capture will be performed either by the exception handling or directly by the execution of the state.</p> <p>Typically a document will be captured if it is not processable and was not retrieved by the cardholder.</p> <p>The Document Captured screen will be displayed for a period defined by timer 87. See Chapter 4.2, “Configuration Parameters Load” passage, for details.</p>						
6	3	000	Reserved for future use						
7	3	000	Reserved for future use						
8	3	000	Reserved for future use						
9	3	000	Reserved for future use						

## Extension 2 To State Q

Table Entry	Number of Characters	Contents	Description
1	1	State Type	'Z'
2	3	Please Insert Document Screen (Range 000-999)	This screen is displayed when the DPM has been successfully enabled or re-enabled to accept a cardholder's document  If the use of this extension has not been requested, screen 'D0001' will be used. See Note.
3	3	Processing Document Screen (Range 000-999)	This screen is displayed when the document has passed the entry sensor.  If the use of this extension has not been requested, screen 'D0002' will be used. See Note.
4	3	Unacceptable Document Screen (Range 000-999)	This screen is displayed when a document is detected which cannot be processed.  If the use of this extension has not been requested, screen 'D0003' will be used. See Note.
5	3	Upside Down Document Screen (Range 000-999)	This screen is displayed when a document is detected as having the wrong leading edge.  If the use of this extension has not been requested, screen 'D0004' will be used. See Note.
6	3	Wrong Way Up Document Screen (Range 000-999)	This screen is displayed when a document is detected with the front of the document facing the wrong way.  If the use of this extension has not been requested, screen 'D0005' will be used. See Note.
7	3	Further Processing Screen (Range 000-999)	This screen is displayed after the processing Document Screen and may be used to display the lifted images.  If the use of this extension has not been requested, screen 'D0010' will be used. See Note.
8	3	000	Reserved for future use
9	3	000	Reserved for future use

**Note:** See Chapter 2.2, "D - DPM" passage, for details of these screens.

## Extension 3 To State Q

Table Entry	Number of Characters	Contents	Description
1	1	State Type	'Z'
2	3	Document Already Present Next State Exit (Range 000-254 or 256-750)	This exit is taken if it is detected that a document is already present in the device.
3	3	No Exception Next State Exit (Range 000-254 or 256-750)	This exit is taken if the document is accepted and processed without error.
4	3	Exception Type 1 Next State Exit (Range 000-254 or 256-750)	<p>This exit is taken in the following cases:</p> <ol style="list-style-type: none"> <li>1. The Exception Handling Scheme, defined in the "Exception Handling" passage above, determines it should be.</li> <li>2. The document is accepted and processed without error but the document definition was set to the preferred candidate during that processing.</li> </ol>
5	3	Exception Type 2 Next State Exit (Range 000-254 or 256-750)	<p>This exit is taken when the Exception Handling Scheme, defined in the "Exception Handling" passage above, determines it should be.</p> <p>It should be taken when an exception has occurred which may require subsequent Central Interaction/Decision (that is, Misread document).</p>
6	3	Exception Type 3 Next State Exit (Range 000-254 or 256-750)	<p>This exit is taken in the following cases:</p> <ol style="list-style-type: none"> <li>1. The cardholder has failed to insert a document within the required time or number of retry attempts.</li> <li>2. The cardholder has failed to retrieve a physically unacceptable document within the time specified and it has been cleared to Bin 1.</li> <li>3. The Exception Handling Scheme, defined in the "Exception Handling" passage above, determines it should be.</li> </ol> <p>It should be taken when an exception has occurred which does not require subsequent Central Interaction.</p>
7	3	000	Reserved for future use
8	3	000	Reserved for future use
9	3	000	Reserved for future use

## R - Enhanced Amount Entry State

This state reads the amount entered by the cardholder, displays it on the CRT, 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 CRT is set). The Clear key is always active and clears the amount entered and the CRT echo filled to allow data entry retries within the Amount Entry state.

The Digital Audio Service can echo the keys pressed on the keyboard.

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 (Range 000-254 or 256-750)	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 (Range 000-254 or 256-750)	State number to which the terminal goes if the cardholder presses the Cancel key.
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.
6	3	FDK 'B' (or 'H') Next State Number	The other keys are inactive. Enter 255 to deactivate any FDK or touch area.
7	3	FDK 'C' (or 'G') Next State Number	(Range 000-254 or 256-750)
8	3	FDK 'D' (or 'F') Next State Number	
9	3	Extension State Number (Range 000-254 or 256-750)	State number of the Extension state.

## Extension To State R

Table Entry	Number of Characters	Contents	Description
1	1	State Type	'Z'
2	3	Document Amount Buffer (Range 000-002)	<p>This field determines which buffer the amount entered will be stored in:</p> <p>000 - Amount buffer 001 - Buffer B 002 - Buffer C</p>
3	3	Amount Display Screen Number (Range 000-999)	<p>Overlay screen for setting the CRT 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 CRT. This is space filled until the required start position for the currency character is reached. See Chapter 2.2, "International Currency Display Format" passage, for details.</p> <p>The default echo field for eight digits is: bbbb\$b0.00 where b = space.</p> <p>The default echo field for twelve digits is: bbbbbbbb\$b0.00 where b = space.</p>
4	3	Start CAV command (Range 000-001)	<p>000 - Do not start CAV 001 - Start CAV processing if a document is available</p> <p>The start CAV command will only be set if all the following conditions are met:</p> <ol style="list-style-type: none"> <li>1. The state table entry requires it.</li> <li>2. The DPM is configured.</li> <li>3. The CAV software utilities are present.</li> <li>4. The DPM core severity is not greater than warning.</li> <li>5. The recognition utility severity is not greater than warning.</li> <li>6. There is a document inside the DPM.</li> </ol>
5-9	15	Must be 000	Reserved

## 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.

This state does not determine the language used by the Digital Audio Service. 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. See “V - Language Select From Card State” passage for details.

Table Entry	Number of Characters	Contents	Description
1	1	State Type	'S'
2	3	No Language Code Next State Number (Range 000-254 or 256-750)	State number to which the terminal goes if the language code is illegal or cannot be read.
3	3	Language Code = 0 Next State (Range 000-254 or 256-750)	State number to which the terminal goes if the language code is 0.
4	3	Language Code = 1 Next State (Range 000-254 or 256-750)	State number to which the terminal goes if the language code is 1.
5	3	Language Code = 2 Next State (Range 000-254 or 256-750)	State number to which the terminal goes if the language code is 2.
6	3	Language Code = 3 Next State (Range 000-254 or 256-750)	State number to which the terminal goes if the language code is 3.
7	3	Language Code = 4 Next State (Range 000-254 or 256-750)	State number to which the terminal goes if the language code is 4.

## State Tables

### S - Language Code Switch State

Table Entry	Number of Characters	Contents	Description
8	3	Language Code = 5 Next State (Range 000-254 or 256-750)	State number to which the terminal goes if the language code is 5.
9	3	Extension state number (Range 000-750)	<p>State number of the Extension state containing the next states for language codes 6-9.</p> <p>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.</p>

### Extension To State S

Table Entry	Number of Characters	Contents	Description
1	1	State Type	'Z'
2	3	Language Code = 6 Next State (Range 000-254 or 256-750)	State number to which the terminal goes if the language code is 6.
3	3	Language Code = 7 Next State (Range 000-254 or 256-750)	State number to which the terminal goes if the language code is 7.
4	3	Language Code = 8 Next State (Range 000-254 or 256-750)	State number to which the terminal goes if the language code is 8.
5	3	Language Code = 9 Next State (Range 000-254 or 256-750)	State number to which the terminal goes if the language code is 9.
6-9	3	Must be 000	Reserved

**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.

## 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. If you use this state table, we recommend that it is the first state table you use during transaction processing. You can ensure that it is by assigning state number 000 to it. The terminal automatically enters state 000 when put In-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.

The Digital Audio Service is turned off in this state, so the keyboard is not echoed.

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. See Chapter 2.3, "Touch Screen FDK Emulation" passage, for details.

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. See Chapter 2.3, "Keyboard Data", for details.

This state supports non-magnetic smart cards. See Card Read State 'A' for details of how smart card data is handled.

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.

If an MM sensor with CIM86 MCRW is present and configured, a CIM86 verify operation is performed if all the following conditions are met:

- A successful FIT match has been obtained
- The field PMMSR indicates that a CIM86 verification should be performed
- CIM86 has not been disabled by an Enhanced Configuration Parameters load.

If the CIM86 verify code is good and/or digit 2 of PMMSR is F, the Good Read Next State Number exit (table entry 3) is taken. Otherwise, the Error Screen Number exit (table entry 4) is taken.

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. See Chapter 2.2, “Special Features” passage, for details.

**Note:** You must not use this state if the terminal is configured with an Encryptor Keyboard Controller (EKC). See Section 5, “Security Features”, for details of the EKC.

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 on the CRT.
3	3	Good Read Next State Number (Range 000-254 or 256-750)	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) <b>or</b> 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.
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 Card Read state.
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 (Range 000-254 or 256-750)	State number of the Extension state containing information for parallel PIN entry.

**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 the PIN. This screen is displayed on card entry. The identified screen must leave the CRT cursor positioned at the beginning of the PIN Entry display area. An '*' 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 (Range 000-254 or 256-750)	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.
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 example.)
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 example.)
6-9	12	Must be 000 for each table entry	Reserved

**Example:**

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. See Chapter 2.7, "Financial Institution Tables", for more details.

This state also determines the language which the Digital Audio Service will use.

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. See Chapter 2.2, "Multi-Language Screens" passage, for more details.

Table Entry	Number of Characters	Contents	Description
1	1	State Type	'V'
2	3	Next State Number (Range 000-254 or 256-750)	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)	Number of screens in each language group.

---

## 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 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
3	3	FDK 'B' Next State Number	
4	3	FDK 'C' Next State Number	(Range 000-254 or 256-750).
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. See Chapter 2.3, "Touch Screen FDK Emulation" passage, for details.

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. See Chapter 2.3, "Keyboard Data", for details.

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 (Range 000-254 or 256-750)	State number to which the terminal goes if the cardholder fails to respond to the CRT message within the permitted time limit. Enter 255 if the time-out function is not required.
4	3	Cancel Next State Number (Range 000-254 or 256-750)	State number to which the terminal goes if the Cancel key is pressed.
5	3	FDK Next State Number (Range 000-254 or 256-750)	State number to which the terminal goes if an FDK or touch area is pressed.
6	3	Extension State Number (Range 000-254 or 256-750)	State number of Extension state containing assigned values for the eight FDKs or touch areas.

## State Tables

### X - FDK Information Entry State

Table Entry	Number of Characters	Contents	Description
7	3	Buffer ID (Range 010-039)	<p>Identifies which buffer is to be edited and the number of zeros to add to the values specified in the Extension state:</p> <p>01X - General purpose buffer B 02X - General purpose buffer C 03X - Amount buffer. See Note 2</p> <p>X specifies the number of zeros in the range 0-9</p>
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 'T' (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 Note 1.
9	3	Must be 000	Reserved

**Note:** 1. 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.

**Note:** 2. 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, the amount entered is assumed to be a whole amount.

## 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.
3	3	Value stored if FDK 'B' or FDK 'B' touch area pressed	(Range 000-999)
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 'T' or FDK 'T' 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 are using digital audio, FDKA must select language 0, FDKB must select language 1, and so on. 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. See Chapter 2.3, “Touch Screen FDK Emulation” passage, for details.

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. See Chapter 2.3, “Keyboard Data”, for details.

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 (Range 000-254 or 256-750)	State number to which the terminal goes if the cardholder does not respond to the CRT message within the specified time limit. Enter 255 if the time-out function is not required.
4	3	Cancel Next State Number (Range 000-254 or 256-750)	State number to which the terminal goes if the cardholder presses the Cancel key.

Table Entry	Number of Characters	Contents	Description
5	3	FDK Next State Number (Range 000-254 or 256-750)	State number to which the terminal goes if the cardholder presses an FDK or touch area.
6	3	Extension State Number (Range 000-254 or 256-750)	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 Note.)
9	3	Multi-Language Screens Selection Extension State Number (Range 000-254 or 256-750)	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.

**Note:** 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.

## Extension 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 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.
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	<b>Note:</b> 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.
6	3	Operation Code stored if FDK 'F' or FDK 'F' touch area pressed	
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	

## Multi-Language Extension 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.
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	

## 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 which enables the keys to the left of the CRT 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.

The Digital Audio Service does not echo the keyboard in this 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 (Range 000-254 or 256-750)	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 (Range 000-254 or 256-750)	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 (Range 000-254 or 256-750)	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 (Range 000-254 or 256-750)	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: <ol style="list-style-type: none"> <li>1. There is no FIT match.</li> <li>2. Cardholder tampering is detected by the EKC. See Section 5, “Security Features” for details of the EKC.</li> <li>3. PIN block generation fails. Note that the option to send the PIN buffer irrespective of failure does not operate.</li> </ol>
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 (Range 000-254 or 256-750)	State number of the Extension state.

## 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.
4-9	18	Must be 000	Reserved.

**Note:** If local checks 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, please read the NCR publication *Using NDC+ Exits*.

## i - Audio Control State

The Audio Control State has two purposes:

- It can display a prompt screen and allow the cardholder to set the volume at which messages will be played for the duration of the current transaction
- It can switch audio channels. You can use it solely for this purpose without displaying the prompt screen.

The terminal has two audio channels: a loudspeaker and a headphone jack. The state table sets which audio channels are in use on entry to this state, and whether the cardholder will be given the option to adjust the volume. If the cardholder is to be given the option, then a message prompting the cardholder to adjust the volume is played repeatedly. The message is not played if the option is not offered.

The cardholder may press:

- FDKs to increase or decrease the volume  
This functionality can be disabled by setting entry 7 in the state table. If you map the FDKs to the numeric keyboard, the cardholder can adjust the volume by pressing numeric keys instead of the FDKs
- ENTER to set the volume at its current level. The state takes the Function Complete Next State exit
- CANCEL to return the volume to its default level. The state takes the Function Complete Next State exit.

If the cardholder does not press any keys within the time specified by Timer 0, then this state invokes the Time Out State. Make sure that the screen associated with the Time Out State is helpful to cardholders with visual difficulties. For example, you can map FDKs to the PIN pad and play an appropriate message.

The Audio Control State's prompt screen must not contain an audio message.

The volume returns to its default level on exit from the Close State.

Table Entry	No. of Chars	Contents	Description
1	1	State type	'i' (69H)
2	3	Prompt screen (000-999)	Prompts user to adjust volume. This screen is only displayed if Table Entry 7 indicates that the volume is to be adjusted.
3	3	Time-out Next State Number (000-254 or 256-750)	State number to which the terminal proceeds if the cardholder has not responded within the time specified by Timer 0. An entry of 255 disables the time-out feature.
4	3	Function Complete Next State Number (000-254, 256-750)	State number to which the terminal proceeds if: <ul style="list-style-type: none"> <li>— the cardholder selects Cancel or Enter</li> <li>— table entry 7 selects a channel but disables volume adjustment</li> <li>— there is no audio file present on the terminal</li> </ul>
5	3	Increase Volume FDK Mask (000-255)	Specifies which FDKs will increase the volume in this state. Bit 0 relates to FDK A, bit 1 to FDK B etc. If a bit is 1 then the FDK referred to is active; otherwise it is inactive. The FDKs are not enabled unless the least significant bit of table entry 7 is 1. A value of <b>000</b> disables this entry and is discouraged.
6	3	Decrease Volume FDK Mask (000-255)	Specifies which FDKs will decrease the volume in this state. Bit 0 relates to FDK A, bit 1 to FDK B etc. If a bit is 1 then the FDK referred to is active; otherwise it is inactive. The FDKs are not enabled unless the least significant bit of table entry 7 is 1. A value of <b>000</b> disables this entry and is discouraged. Where the same FDK is specified as having both Increase Volume and Decrease Volume functions, Decrease Volume takes precedence.
7	3	Audio Control (000-015)	This entry is bitmapped: Bit number: b3 b2 b1 b0 Bit 0 turns volume adjust on (1) and off (0) Bit 1 enables (1) or disables (0) the effect of bits 2 and 3 Bit 2 enables (1) or disables (0) the terminal's loudspeaker Bit 3 enables (1) or disables (0) the audio jack For instance, a value of <b>007</b> enables volume adjustment and directs audio output to the speaker; <b>015</b> enables volume adjustment and enables both channels. A value of <b>003</b> is discouraged in this entry: this would turn both channels off but enable volume adjustment. If this entry does not instruct a change to the audio channel in use, the current audio channel(s) will remain in use.
8	3	Audio Message (000-999)	Specifies which audio message will be played. Provided that table entry 7 indicates that the volume is to be adjusted, the message will be played repeatedly until the state is exited. If there is no audio file present on the terminal, it will take the Function Complete Next State exit.
9	3	Reserved	

## k - Smart FIT Check State

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

The Smart FIT Check state is designed to be entered from a C-Exit state, such as the Chip Data Read state, which will have read the chip data from the smart card, and placed the data in the magnetic track buffers. (See Appendix U, 'Smart Card Handling' for details of the Chip Data Read state). The Smart FIT Check state then performs a FIT check on the contents of the three buffers.

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

Table Entry	No. of Chars	Contents	Description
1	1	State type	'k' (6BH)
2	3	Reserved (000).	Not used - set to 0. This is left blank to align the following table entries to the same positions as those in the Card Read State, allowing common FIT check procedures to be used.
3	3	Good Read Next State Number (Range 000-254 or 256-750)	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	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	First of three entries indicating which card track buffer(s) will be read. See note.
6	3	Read Condition 2	Second of three entries indicating which card track buffer(s) will be read. See note.
7	3	Read Condition 3	Third of three entries indicating which card track buffer(s) will be read. See note.
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. It may be a close state or a return to another C-Exit state which places the chip data in the read buffers before calling a different Smart FIT Check state with different read conditions.

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

Bit Number	Meaning
0	Read Track 3
1	Read Track 2
2	Read Track 1
3-7	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. If read condition 1 is satisfied, the Good Read Next State Number (table entry 3) exit is taken. Otherwise, read condition 2 is attempted, if it is satisfied, the Good Read Next State Number (table entry 3) exit is taken. Otherwise, read condition 3 is attempted, 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.

---

## 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
- Screen timer from Interactive Transaction Response message expires when numeric keypad or FDKs are active
- The cardholder fails to enter a document within the period specified by timer 94.

See Chapter 4.2, “Configuration Parameters Load” passage, for more details on timers.

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.

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 CRT 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.

When used in association with DPM document entry, the Time-Out state will only be executed if the cardholder has additional retries left.

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. See Chapter 2.3, “Touch Screen FDK Emulation” passage, for details.

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. See Chapter 2.3, “Keyboard Data”, for details.

State Tables  
**Time-Out State**

## Chapter 2.2

# Screen Data

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Introduction	2.2-1
What Is A Screen ?	2.2-1
Customised Screens	2.2-1
Reserved Screens	2.2-1
Types Of Reserved Screen	2.2-2
C - Cardholder Display	2.2-3
Screen 'C00'	2.2-3
Screen 'C01'	2.2-3
Screen 'C02'	2.2-3
Screen 'C03'	2.2-3
Screen 'C04'	2.2-3
Screen 'C05'	2.2-3
Screen 'C06'	2.2-4
Screens 'C09' - 'C19'	2.2-4
D - DPM	2.2-4
Screen 'D0000' - Envelope Unacceptable	2.2-4
Screen 'D0001' - Please Insert Document Screen	2.2-5
Screen 'D0002' - Processing Document Screen	2.2-5
Screen 'D0003' - Unacceptable Document Screen	2.2-5
Screen 'D0004' - Upside Down Document Screen	2.2-5
Screen 'D0005' - Wrong Way Up Document Screen	2.2-5
Screen 'D0006' - Please Take Document Screen	2.2-5
Screen 'D0007' - Document Being Printed Screen	2.2-5
Screen 'D0008' - Please Take Statement Screen	2.2-5
Screen 'D0009' - Document Being Ejected Screen	2.2-5
Screen 'D0010' - Further Processing Screen	2.2-6
G - Graphic Pictures	2.2-6
K - Extended Screen Controls	2.2-6
Receipt	2.2-8
Journal	2.2-8
Receipt and Journal	2.2-9
Statement	2.2-9
DPM Image Print	2.2-10
Key for Receipt, Journal and Statement Printers	2.2-10
Set First Line Position	2.2-10
Line Feed	2.2-10

Table of Contents  
Screen Data

Character Sets	2.2-10
Set Left Margin	2.2-11
Set Right Margin	2.2-11
Key for DPM Image Print	2.2-11
L - Logos	2.2-12
M - Supervisor Menus	2.2-12
X, Y, Z - State of Health	2.2-12
Editing The Contents Of Reserved Screens	2.2-13
<hr/>	
Formatting Rules For Cardholder Display Screens	2.2-14
CRT Display Characters	2.2-14
Operator Interface Display Characters	2.2-15
Control Characters	2.2-16
Track 1 Name Display	2.2-18
ISO Format Cards	2.2-19
VISA Format Cards	2.2-19
Auto Select Backwards Search	2.2-19
Auto Select Forwards Search	2.2-19
ABA Format Cards	2.2-20
Name Display	2.2-20
Graphics Services	2.2-20
VGA	2.2-21
Card Display Translator	2.2-21
Special Features	2.2-21
Voice	2.2-22
Screen Blinking and Colour Control	2.2-24
Changing Display In Idle	2.2-27
Select Primary Character Set	2.2-28
Select Secondary Character Set	2.2-29
Left Margin Control	2.2-29
Set Display Mode Control	2.2-30
Logo Control	2.2-30
Picture Control	2.2-31
Display Image Files Control	2.2-32
Animation and Digital Video	2.2-32
International Currency Display Format	2.2-33
Example:	2.2-33
<hr/>	
Multi-Language Screens	2.2-35
Re-Defining Reserved Screens	2.2-37

# Introduction

In this chapter we give you information on the following topics:

- What is a screen ?
- Customised screens
- Reserved screens
- Types of reserved screen
- Formatting rules for cardholder display screens
- Multi-language screens.

## What Is A Screen ?

A screen is a string of characters that defines what is to be displayed and where to display it. There are two types of screen:

- Customised - screens that you create
- Reserved - screens that are already defined within the terminal software.

## Customised Screens

A customised screen is a screen that you create. 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 Chapter 4.2, “Screen/Keyboard Data Load” passage. 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 000 to 999. It is this number that is referenced by parameters in the state tables during transaction processing.

## 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 pre-defined times, such as when the terminal is in Out-of-Service or Off-Line mode. 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 DPM reserved screens, the error screens and the State of Health/TM-Alert reserved screens. These consist of an alpha character that defines the screen type, followed by four numeric digits that define the particular screen. SOH screens can be displayed during Out-of-Service, In-Service, Off-Line or Suspend mode.

## Types Of Reserved Screen

We have defined the following reserved screen types:

- ‘A’ - Supervisor CRT and Enhanced Operator Interface Acknowledgements
- ‘C’ - Cardholder Display
- ‘D’ - DPM
- ‘E’ - Error Screens
- ‘G’ - Graphic Pictures
- ‘H’ - Supervisor Basic Operator Interface Display
- ‘T’ - Supervisor Information
- ‘K’ - Extended Screen Controls
- ‘L’ - Logos
- ‘M’ - Supervisor Menus
- ‘P’ - Supervisor CRT and Enhanced Operator Interface Prompts
- ‘Q’ - Supervisor Basic Operator Interface Prompts
- ‘R’ - Simulated Receipt Preprint
- ‘S’ - Supervisor Information Lines
- ‘T’ - Journal Trace
- ‘X’ - State of Health on Enhanced Operator Interface, CRT or printout
- ‘Y’ - State of Health on CRT only
- ‘Z’ - State of Health on Basic Operator Interface only.

In this passage we give you details of nine of the above screen types:

- ‘C’ - Cardholder Display
- ‘D’ - DPM
- ‘G’ - Graphic Pictures
- ‘K’ - Extended Screen Controls
- ‘L’ - Logos
- ‘M’ - Supervisor Menus
- ‘X’, ‘Y’ and ‘Z’ - State of Health.

For details of the remaining screen types, see Appendix A, “Reserved Screens”. Except for ‘R’ screens (Simulated Receipt Preprint) which are covered in chapter 2.4, ‘Printer Data’.

## C - Cardholder Display

Screen type 'C' is reserved for use during cardholder transactions. It provides the following screens that are displayed at pre-defined 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 which enables the keys to the left of the CRT 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.
- See Chapter 2.1, "Time-Out State" passage, for details.

### 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. See Chapter 4.4, "Functions The Terminal Can Perform To Complete A Transaction" passage, for details. This screen is displayed for the amount of time specified by timer 02. For details of timers, see Chapter 4.2, "Configuration Parameters Load" passage.

### 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’ .

### Screens ‘C09’ - ‘C19’

Contain downloaded settlement transaction data.

All of the above screens can be downloaded to the terminal. If any of these screens are not downloaded, the following defaults occur:

- ‘C00’ - default to screen ‘000’ for Diebold compatibility
- ‘C01’ - default to screen ‘001’ for Diebold compatibility
- ‘C02’ - default to screen ‘002’ for Diebold compatibility
- ‘C03’ - default to screen ‘003’ for Diebold compatibility
- ‘C04’ - default to null screen
- ‘C05’ - default to screen ‘C02’
- ‘C06’ - default to screen ‘C02’
- ‘C09’ - ‘C19’ - null screen.

**Note:** If the option to enable the FDKs to the left of the CRT is set, any interactive cardholder screens that use these keys will have to be updated to tell the user that the left-hand keys are active. See Chapter 2.1, “E - Four FDK Selection Function State” passage, for details. These screens are defined in Interactive Transaction Response messages sent to the terminal from Central. See Chapter 4.4, “Interactive Transaction Response” passage, for details.

---

## D - DPM

Screen type ‘D’ is reserved for use during document processing.

These reserved screens do not support a Language Select facility as such, but you can use the Override Reserved Screen Command to select the desired language. See Chapter 4.2, “Override Reserved Screens Command” passage, for details.

### Screen ‘D0000’ - Envelope Unacceptable

Displayed when the envelope cannot be deposited successfully. A typical screen would prompt the cardholder to take back the envelope.

### **Screen ‘D0001’ - Please Insert Document Screen**

Prompts the cardholder to insert a document.

### **Screen ‘D0002’ - Processing Document Screen**

Displayed when a document has been accepted, asking the cardholder to wait while it is processed.

### **Screen ‘D0003’ - Unacceptable Document Screen**

Displayed when the document cannot pass beyond the front end transport or has reached the DPU but is not within acceptable tolerances. The document will be returned to the cardholder. A typical screen would prompt the cardholder to take back the document.

### **Screen ‘D0004’ - Upside Down Document Screen**

Displayed when the document has been inserted with the wrong leading edge. A typical screen would display the lifted front image with arrows describing the correction required and prompt the cardholder to take the document.

### **Screen ‘D0005’ - Wrong Way Up Document Screen**

Displayed when the document has been inserted with the front facing the wrong way. A typical screen would display the rear image with arrows describing the correction required and prompt the cardholder to take the document.

### **Screen ‘D0006’ - Please Take Document Screen**

Displayed when Central has explicitly requested that the document should be returned to the cardholder and the document has reached the Exit shutter. A typical screen would display the front image and prompt the cardholder to take the document.

### **Screen ‘D0007’ - Document Being Printed Screen**

Displayed while printing is taking place. A typical screen would display the front image and indicate that it was being endorsed.

### **Screen ‘D0008’ - Please Take Statement Screen**

This screen applies to 5665 SSTs only. Displayed at the beginning of a function if the cardholder had not taken their statement from a previous transaction, prompting them to do so.

### **Screen ‘D0009’ - Document Being Ejected Screen**

Displayed when Central has explicitly requested that the document should be returned to the cardholder. A typical screen would

display the front image and inform the cardholder that the document was being returned.

### **Screen ‘D0010’ - Further Processing Screen**

This screen is similar to screen ‘D0002’ but may contain the lifted front/rear images. See Chapter 4.4, “Transaction Reply” passage, for details.

---

## **G - Graphic Pictures**

Screen type ‘G’ is reserved for graphic pictures. See Appendix C, “Graphics Pictures”, for details.

- ‘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 above 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. See “Special Features” passage later in this chapter for details.

---

## **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. See the following passage, “Control Characters”, for details of control sequences. The logo selected for display is defined by the Indirect Next State Index/Logo Number (PSTDX) parameter in the current FIT entry.

Screens ‘K01’ - ‘K06’ reset the receipt, journal and statement printers to their original settings.

Using Diagnostics, CSOH or TM-Alert 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, one of the following screens is sent to each of the printers:

- Screen ‘K01’ and optionally ‘K07’, ‘K08’ and ‘K09’ (if the thermal printer is configured) are sent to the receipt printer
- Screen ‘K02’ and optionally ‘K07’, ‘K08’ and ‘K10’ (if the thermal journal printer is configured) are sent to the journal printer

- Screen ‘K03’ and optionally ‘K14’ (if the enhanced thermal printer is configured) are sent to the statement printer.
- Screens ‘K11’, ‘K12’ and ‘K13’ are used to distinguish between pre-loaded printer graphics files and DPM document images.

It is also possible that Central could change the printer settings during a download. To make sure that these changes do not affect Diagnostics, CSOH or TM-Alert, screens ‘K04’ - ‘K10’ are sent to the printers immediately before using these options.

Screens ‘K04’ - ‘K06’ initially contain the same data as screens ‘K01’ - ‘K03’. This means that if you require the terminal to maintain non-default settings before and after using Diagnostics, CSOH or TM-Alert, you must set screens ‘K01’ - ‘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’ file or by downloading the screen from Central. You must ensure that the appropriate directory, see Appendix K “NDC+ Diskbuild/2 Requirements”, is set up during the diskbuild, see “Receipt and Journal” in this section.

Screen ‘K08’ may contain the control sequence which identifies the file with the customisable data for code page 000. See *Define Downloadable Character Set* in Chapter 2.4. By default, screen ‘K08’ is not defined.

Screens ‘K09’ and ‘K10’ may be edited to include the *Define Downloadable Bit Image* control sequence 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.

Screens ‘K11’, ‘K12’ and ‘K13’ are used to distinguish between pre-loaded printer graphics files and document images lifted by the DPM. Read the section ‘Printer Control Characters’ in Chapter 2.4 for a description of the use of these files by the *Print Graphics* escape sequence. These screens are held in RESERVD. They may contain only ASCII text.

Screen ‘K14’ is empty by default, but can be edited to include the *Download Logo* command sequence which identifies an image and downloads the file to the thermal statement printer’s memory. If you define your own ‘K14’ screen you must ensure that the appropriate directory and graphics files are set up during or after the Diskbuild process. The default path, defined in ‘K07’, is \ndcrcpt. The combined path and filename must not exceed 30 characters.

**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.

The default contents for screens ‘K01’ - ‘K13’ are defined below (all details are in hex):

### **Receipt**

‘K01’ and ‘K04’

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

‘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’ and ‘K05’

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

'K10'

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'

\ndcrcpt	Path to the Financial Institution Receipt and Journal specific data including image files, graphic files and customer defined code pages. Maximum length is 30.
----------	---

'K08'

1B 26 <code page filename> 1B 5C	Define Custom Code Page
----------------------------------	-------------------------

## Statement

'K03' and 'K06'

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

**DPM Image Print**

'K11'

30	Single density
31 30 30	Compression ratio: Actual size
'CAZONE.IMG'	File name

'K12' and 'K13'

Empty screens

**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. See Appendix B, "Character Sets", for details. 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.

### **Key for DPM Image Print**

The content of screens K11 - K13 sets the printer density, rotation of the document image, compression ratio and file name as follows:

The first character sets the printer density and the rotation:

'0' (30 hex)	Single	No rotation
'1' (31 hex)	Double	No rotation
'2' (32 hex)	Single	Clockwise
'3' (33 hex)	Double	Clockwise
'4' (34 hex)	Single	Anti clockwise
'5' (35 hex)	Double	Anti clockwise
'6' (36 hex)	Single	180 degrees
'7' (37 hex)	Double	180 degrees

The next three characters set the compression ratio:

'020' (30 32 30)	20% actual size
'040' (30 34 30)	40% actual size
'060' (30 36 30)	60% actual size
'080' (30 38 30)	80% actual size
'100' (31 30 30)	Actual size
'120' (31 32 30)	120% actual size

Subsequent characters specify the file name.

An illegal character in the Printer Density position will set the printer density to Single; illegal values of compression ratio will set the compression ratio to 100 (actual size).

## L - Logos

Screen type 'L' is reserved for logos. Screens 'L00' - 'L15' are reserved for 16 pre-defined 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. See "Special Features" passage later in this chapter for details.

## M - Supervisor Menus

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

- Select
- Replenish
- Configure
- Access.

See Appendix A, "Reserved Screens", for details of these menus.

Additional 'M' screens have been defined which ensure that NDC+ will operate in the same way as previous releases if you choose not to use the touch screen keyboard features. The actual screen display data contained in these screens is never used. The transaction processing layout with and without the Clear/Cancel key swap and the Supervisor mode layouts with the same swap are referenced by association with these new reserved screens to allow them to be used at run time:

- 'M06' - Transaction processing standard layout
- 'M09' - Transaction processing standard layout with Clear/Cancel keys swapped
- 'M10' - Supervisor mode standard layout
- 'M11' - Supervisor mode standard layout with Clear/Cancel keys swapped
- 'M13' - Encryption key entry layout.

You may edit these screens to customise the default layouts.

## X, Y, Z - State of Health

Screen types 'X', 'Y' and 'Z' are reserved for State of Health (SOH) status information. See Appendix A, "Reserved Screens", for details.

SOH gathers status information on all the devices in the terminal in a display list. You can display the information on the CRT, enhanced operator interface or basic operator interface, or print it on the journal or receipt printers. You can change the text of these

screens by downloading new text in a Screen Data load from Central.

The SOH screen categories are:

- ‘X’ - SOH on the enhanced operator interface, CRT or printout
- ‘Y’ - SOH on the CRT only
- ‘Z’ - SOH on the basic operator interface only.

When SOH information is displayed on the CRT, the default screen group used is group ‘Y’ . Group ‘Y’ is empty on delivery, but may be downloaded with replacements for the ‘X’ group. Group ‘Y’ screens may contain control codes for features such as character sets and colour changes, unlike other reserved screens. However, if any of the screens that are required to build up a composite SOH screen are not found, group ‘X’ screens are displayed instead. Group ‘X’ and group ‘Z’ screens are constrained to the same control code limitations that apply to standard reserved screens used in Supervisor mode. When a printout is required, the information is provided by screen group ‘X’ .

Screen ‘X0009’ sets the fore- and background colours for the SOH display area on the CRT, while screen ‘X0010’ resets the colours of the Supervisor display to what they were previously. These screens are exclusively reserved for SOH, and must not be used for other purposes. Group ‘Y’ screens ‘Y0009’ and ‘Y0010’ perform the same functions as ‘X0009’ and ‘X0010’ .

---

## Editing The Contents Of Reserved Screens

The data files INIPTR, RESVD0 and RESVD1 have been replaced by a single file, RESRVD. This file is a plain ASCII text file which you can easily edit locally. This file may be used as a source for NDC cold-start user 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.

RESRVD 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. 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:** You must be careful if you are using an editor that adds control characters that these are not added to RESRVD.

---

# Formatting Rules For Cardholder Display Screens

In this passage we define the formatting rules for all screens that are displayed on the CRT during State Table processing. These formatting rules include:

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

See Appendix M, "Screen Display Considerations", for general points to consider when you are preparing screens for display.

---

## CRT Display Characters

The CRT can display any character contained in the following 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.

Character Set ID	Number of Characters	Designator
Customer graphics 1	64	'6'
Customer graphics 2 (Arabic)	64	'7'
Customer graphics 3	64	'8'
Customer graphics 4 (Pixels)	64	'9'
Chinese 1	64	'.'
Chinese 2	64	';'
Chinese 3	64	'<'
Chinese 4	64	'='
Chinese 7	64	'@'
Chinese 8	64	'A'
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.

See Appendix B, "Character Sets", for the default character sets provided on CRTs and printers.

## Operator Interface Display Characters

The basic, enhanced and VGA enhanced operator interfaces can display any character contained in the following character set:

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

## Control Characters

We define the function of each control character for CRT screen activity below.

Character	ASCII Code	Function
FF	0C hex	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.
SO	0E hex	Inserts the screen called by the next three characters. Screens can be 'nested' to 5 levels using SO.
SI	0F hex	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 CRT: @,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 CRT: @,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,:,<,>, where '@' is the left-hand column and '?' is the right-hand column. See Appendix E for a diagram showing the CRT screen layout and FDK alignment. See Chapter 2.3, "Touch Screen FDK Emulation" passage, for a diagram showing the Touch Screen FDK Emulation areas.
		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 hex	Causes the name encoded on Track 1 of the card to be displayed, starting at the current CRT cursor position (32 characters maximum). Both ISO and VISA display formats are supported.
DC1	11 hex	Enable video. Shows the screen display.

Character	ASCII Code	Function
DC2	12 hex	Disable video. This command inhibits the screen display so that the cardholder does not see the display being built on screen. We recommend 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 hex	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 - Animation See "Special Features" passage later in this chapter for details.
CR	0D hex	Causes the cursor to be moved to the character position specified by the current left-hand margin on the following line.
VT	0B hex	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:

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.

## **Graphics Services**

NDC+ 5.00 and above support two graphics services, VGA and Card Display Translator (CDT). VGA is the service that has been supported by previous releases. CDT supports most of the VGA service with the following exceptions:

- Text and cursor blinking
- 320 x 200 x 256 graphics mode
- NCR Compression Algorithm picture format.

CDT supports the following additional features:

- 640 x 480 x 256 graphics mode
- References to picture filenames, including DPM image files, as well as picture numbers
- Animation

- MPEG files.

## VGA

NDC+ downloads a picture number to the VGA using a Picture Control or Logo Control escape sequence. The VGA references CONFIG.CON to determine the filename represented by this number. This picture is then displayed.

See the *Programmer's Manual for the VGA Service* for more information.

## Card Display Translator

The CDT operates in conjunction with the VGM service, by using the underlying functionality of the VGM to provide the display. When the CDT is configured, NDC+ can download picture numbers or picture filenames.

If NDC+ downloads a picture number, the CDT references CONFIG.CON to determine the associated filename. This picture is then displayed by the VGM.

If NDC+ downloads a picture filename, using a Display Image Files Control escape sequence, the CDT passes this straight to the VGM and the picture is displayed.

See the *Programmer's Manual for the Cardholder Display Translator* for more information.

---

## Special Features

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

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

Feature	Introducer	Identifier
Display image files control	ESC 'P'	'E'
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. See Chapter 4.2, “Enhanced Configuration Parameters Load” passage, for details.

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.

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

Digital audio is invoked by the following 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 Note	1
ESC '\\'	String Terminator	2

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

## Guidelines on Using Multiple Screens with Digital Audio

If you have two or more digital audio messages in the same screen, only the last one is played.

If a second screen is displayed before the digital audio message playing on the first screen is completed, one of the following conditions occurs:

- The first message continues to play while the second screen is displayed, if the second screen does not contain any other digital audio messages.
- If the second screen does contain a digital audio message, the first message is stopped and the second message begins to play. If the second screen contains a stop command, that is, play DAUDI999.MSG, the first message is stopped in mid-sentence.

If a screen contains both a digital audio message and a nested screen with digital audio message, it is the last message that is played. This means that if the parent message occurs before the nested message as defined in the screens, the nested message is played. If the parent message occurs after the nested message, the parent message is played.

It is possible that automatic messages could interfere with digital audio messages defined in other screens. If a message is playing in one screen, and the application moves to a state where an automatic message is to be played, the first message is stopped and the automatic message is played. You can avoid this situation by disabling the automatic voice feature. See Chapter 4.2, “Enhanced Configuration Parameters Load” passage, for details.

### **Screen Blinking and Colour Control**

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

Character	Description	Number of Characters
ESC '['	Control Sequence Introducer	2
Variable	Screen blinking and colour control commands	2
;	Field separator	1
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.		
m	Function-defining character	1

The variable field is made up from the following commands:

#### **Blinking Commands**

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

### **Foreground Colour Control 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

### **Background Colour Control 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**

	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**

	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:** 1. Blinking is not supported by the CDT. However, animation can be used to produce a similar effect.

**Note:** 2. 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 the configuration file. NDC+ will reset attributes each time a new screen number is to be displayed. Therefore, you should ensure that the desired default settings are applied each time a new screen is to be displayed.

**Note:** 3. With the VGA/CDT 256-colour palette, pictures can use all the 256 colours but text can only use the first 16. This can cause problems with the display if the colour palette has been poorly defined.

See the *Programmer's Manual For The VGA Service* and *Programmer's Manual For The Cardholder Display Translator* for details of this and other restrictions on colour control commands.

### Changing Display In Idle

It is possible to have a changing screen display while the terminal is idle, waiting for the next card to be inserted. The following control sequence can be included in the idle screen referenced from the Card Read state to produce a changing screen while the terminal is waiting for card entry. The terminal cycles through the specified display sequence, displaying and delaying as required. If a delay control sequence occurs at the end of the idle screen, the cycling is repeated indefinitely until a card is entered.

You can also use idle screens when the terminal is in Out-of-Service, Off-Line, Supervisor (when control is at the rear) or Suspend mode.

You can use this feature for cardholder advertising and to prevent screen burn out. It is only applicable to the CRT and is invoked by the following control sequence:

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, 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 CRT 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 the Configuration File. See *S4 Building A Load Disk* for details.

If you are using rotating idle screen sequences for Out-of-Service or Supervisor screens, we recommend 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.

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 CRT by the following control sequence.

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.

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**

This command allows you to set the display mode.

Character	Description	Number of Characters
ESC 'P'	Device Control String Introducer	2
'i'	Control String ID	1
Variable	The display mode	1
ESC '\'	String Terminator	2

The display mode will be one of the following:

- 0 - 640 x 350 x 16 (VGA/CDT)
- 1 - 640 x 480 x 16 (VGA/CDT)
- 2 - 640 x 480 x 256 (CDT)
- 3 - 320 x 200 x 256 (VGA)

### **Logo Control**

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

Character	Description	Number of Characters
ESC 'P'	Device Control String Introducer	2
'1'	Control String ID	1
Parameter	The logo number to be displayed. 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.

NDC+ supports up to four screen resolutions. See “Set Display Mode Control” passage for details.

You can change the screen resolution by displaying a full-screen logo with the new screen resolution held in the logo header information. You can use the pcxhead tool to view the information contained in the logo header. See *EGA/VGA Configuration Toolset Guide* for details of pcxhead.

### **Picture Control**

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

The six pre-defined lead-through pictures are numbered ‘000’ - ‘001’, ‘003’ - ‘006’, and are also displayed by reserved graphics screens ‘G00’ - ‘G01’, ‘G03’ - ‘G06’ .

Pictures can be called up by the following control string:

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.

NDC+ supports up to four screen resolutions. See “Set Display Mode Control” passage for details.

You can change the screen resolution by displaying a full-screen picture with the new screen resolution held in the picture header information. You can use the pcxhead tool to view the information contained in the picture header. See *EGA/VGA Configuration Toolset Guide* for details of pcxhead.

### **Display Image Files Control**

Images from a document may be lifted during a transaction or during the DPM Document Accept state. This control code allows you to display these images on the screen if you have a CDT, using the following control string:

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

The filename is an ASCII string containing the filename of the image file, for example, AMOUNT.IMG is the filename associated with an image zone defining the position of the handwritten amount.

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

The image files available for display purposes are held either in the root directory of the DPM RAM drive (if one has been set up at installation time) or in the \S4DPMIMG directory of the system disk. See *S4 Building A Load Disk* for more details.

### **Animation and Digital Video**

This enables you to display a pre-defined animation or digital video sequence on the screen if you have a CDT. This sequence is a type of picture and is displayed as a picture. See “Picture Control” passage for details.

An animation or digital video sequence may alternatively be defined as a file. In this case it is displayed as an image file. See “Display Image Files Control” passage for details.

## 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 CRT 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 pre-fill 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 ','.

In the following example, we describe the echo field for eight-digit fields, and then show the extensions for twelve digits.

### **Example:**

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

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. In Native mode, the default is '\$ \*\*\*\*\*0.00'.

In Diebold Emulation mode, the default screen is constructed using screens '004', '005' and '006' as follows:

(screen 004)\*\*\* (screen 005)\*\*0 (screen 006)00

Screens '004', '005', and '006' may contain graphic characters and the VT control character, but no other control sequence.

When configured by the option in the Configuration Parameters Load message, the amount entry buffer can contain up to twelve digits. See Chapter 4.2, "Configuration Parameters Load" passage, for details. This affects the amount echo field in the following ways:

- Up to 12 data entry characters (\*) can be used
- In Native mode, the default is '\$ \*\*\*\*\*0.00' if no echo field format is defined
- In Diebold Emulation mode, the default is constructed in the following way:

(screen 004)\*(screen 005)\*\*\* (screen 005)\*\*\* (screen 005)\*\*0  
(screen 006)00

#### **Example of Default Echo Display Format**

bbbbbb\$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

In this passage we tell you how to create multi-language screens and multi-language spoken messages.

You can create multi-language customer CRT 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', 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 an Eight FDK Selection Function state, or Language Select From Card state, in order to select the language.

For example, if four languages are required, 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

The Digital Audio Service can play multi-language spoken announcements while these multi-language screens are displayed. The language may be changed only:

- by the Language Select From Card State, which makes a selection according to the language preference encoded on the card
- by the Eight FDK Selection Function State, which allows the cardholder to express a preference.

Equivalent messages in different languages may have identical filenames (e.g. 1.SPC). To distinguish these files, they reside in different directories.

The file NDCAUD associates a unique number with every message file. You assign these message file numbers in the same way as you assign numbers to screens. Each language is associated with a *group base* which is identical to the screen group base. The group number must be **0** for the default language. The number of the speech file played in a particular state is the number of the specified speech file plus the group base for the particular language. The group base of messages in a particular language is identical to the group base of screens in that language. It is set by the same state, namely Language Select From Card.

For example, if message number **050** were *Please take your money* in the default language and the screen group bases were as above, then message **150** would be the equivalent message in language A, **250** in language B and so forth.

Read the section *Understanding the Digital Audio Service* in Appendix R of this manual for full details.

## Re-Defining Reserved Screens

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

- ‘C00’ - The default value of 000 must be used.

The relative screen ‘000’ in each language group must contain the time-out screen. If a value other than the default value 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, 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.

The usage of each screen does not change.

Screen Data

## Multi-Language Screens

Chapter 2.3

# Keyboard Data

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Introduction	2.3-1
What Is A Keyboard ?	2.3-1
Traditional Keyboard Layouts	2.3-2
Transaction Processing	2.3-2
Supervisor Mode	2.3-3
Encryption Key Entry	2.3-4
Defining A Keyboard	2.3-5
Physical Keyboard	2.3-5
Touch Screen Keyboard	2.3-5
Example	2.3-6
Nested Keyboards	2.3-6
States And Keyboards	2.3-8
Screens And Keyboards	2.3-14
Associating Screens And Keyboards	2.3-14
Touch Screen FDK Emulation	2.3-14
Touch Areas	2.3-15

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Table of Contents

**Keyboard Data**

# Introduction

In this chapter we give you information on the following topics:

- What is a keyboard ?
- Traditional keyboard layouts
- Defining a keyboard
- Nested keyboards
- States and keyboards
- Screens and keyboards.

## What Is A Keyboard ?

The keyboard is the interface between the cardholder and the terminal. To get input from a keyboard, the following steps are required:

- 1 Define the return codes which identify which key or touch area has been pressed.
- 2 Select the particular set of return codes which will be activated.
- 3 Select the number of keys to be input before autoactivation occurs.

Previously, NDC+ used fixed keyboard layouts and only supported touch screens by FDK emulation. The only flexibility available was the choice of left or right FDKs and the position of the Clear and Cancel keys, which could be set using local options. Now NDC+ supports full touch screen keyboards and has expanded control of the physical keyboard layout so that the positions of all keys can be redefined. Default keyboards are included with NDC+ and may be customised to suit your requirements.

**Note:** When an EKC encryptor is configured, secure PIN entry is used. Because the touch screen is not secure, it is mandatory that any keyboard layout specified for secure PIN entry must use the physical keyboard only for numeric entry. The touch screen can only be used in FDK emulation during this secure PIN entry.

## Traditional Keyboard Layouts

There are three traditional keyboard layouts:

- Transaction processing
- Supervisor mode
- Encryption key entry.

### Transaction Processing

The following illustration shows the positions and existing return codes for the standard cardholder keyboard during transaction processing. The top number in each key box is the numeric identifier of the physical key, while the number in brackets is the return code of that key in hexadecimal notation.

Figure 2.3-1 Transaction Processing

17 (FA)	1 (31)	2 (32)	3 (33)	4 (FF)	18 (F6)
19 (F9)	5 (34)	6 (35)	7 (36)	8 (F2)	20 (F5)
21 (F8)	9 (37)	10 (38)	11 (39)	12 (F1)	22 (F4)
23 (F7)	13 (0)	14 (30)	15 (0)	16 (0)	24 (F3)

The alternative to this layout is where the return codes FF and F2 are swapped to allow the Clear and Cancel keys to move. The autoactivator values are assigned as follows:

FA (FDK 'T' )	FF (Clear)	F6 (FDK 'A' )
F9 (FDK 'H' )	F2 (Cancel)	F5 (FDK 'B' )
F8 (FDK 'G' )	F1 (Enter)	F4 (FDK 'C' )
F7 (FDK 'F' )		F3 (FDK 'D' )

**Note:** The traditional layout for the rear keyboard has not been changed and cannot be customised.

## Supervisor Mode

The following illustration shows the positions and existing return codes for the standard cardholder keyboard during Supervisor mode. If you define an invalid keyboard in Supervisor mode, it is ignored and the standard keyboard is enabled.

Figure 2.3-2 Supervisor Mode

17 (FA)	1 (31)	2 (32)	3 (33)	4 (F2)	18 (F6)
19 (F9)	5 (34)	6 (35)	7 (36)	8 (F3)	20 (F5)
21 (F8)	9 (37)	10 (38)	11 (39)	12 (F1)	22 (F7)
23 (F2)	13 (0)	14 (30)	15 (0)	16 (F4)	24 (F1)

The alternative to this layout is where the return codes F3 and F2 are swapped to allow the Clear and Cancel keys to move. The autoactivator values are assigned as follows:

FA (SOH Print or ISS)	F2 (Clear)	F6 (Next)
F9 (SOH On/Off)	F3 (Cancel)	F5 (Previous)
F8 (TM On/Off)	F1 (Enter)	F7 (Not used)
F2 (Clear)	F4 (Aux)	F1 (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 following illustration shows the positions and existing return codes for the cardholder keyboard during Encryption Key Entry. If you define an invalid keyboard for Encryption Key Entry, it is ignored and the following keyboard is enabled.

Figure 2.3-3 Encryption Key Entry

17 (41)	1 (31)	2 (32)	3 (33)	4 (0)	18 (42)
19 (43)	5 (34)	6 (35)	7 (36)	8 (0)	20 (44)
21 (45)	9 (37)	10 (38)	11 (39)	12 (F1)	22 (46)
23 (F2)	13 (0)	14 (30)	15 (0)	16 (F4)	24 (F1)

The autoactivator values are assigned as follows:

	F1 (Enter)	
F2 (Clear)	F4 (Aux)	F1 (Enter)

# Defining A Keyboard

There are two types of keyboard:

- Physical keyboard, which consists of the keypad and FDKs
- Touch screen keyboard, which is displayed on the screen.

In this passage we tell you how to define each type.

## Physical Keyboard

To define a physical keyboard, each key is defined by a position code followed by a return code. The position code identifies the physical location of the key and the return code defines the code which is returned to the terminal when the key is pressed. Each entry in the keyboard definition file consists of pairs of data in the following form:

Label	No. Of Chars	Range	Description
KP	2	01-62	The position number
KC	2	00-FF	The return code for the position

When this data is downloaded from Central, the range is checked. If a value is not within a valid range or a set of data is incomplete, that key definition is ignored. If the same position number occurs more than once, with different return codes, the last return code defined is used.

**Note:** The return code range is limited by which keys are expected by the application which is used. See “States And Keyboards” passage for details.

## Touch Screen Keyboard

You can design touch screen keyboards which are easier to use than the physical keyboard. This is particularly helpful for cardholders with physical disabilities. This passage is only appropriate if your terminal supports touch screen keyboards.

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 64 areas can be defined as hex 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.

Each touch area is defined as follows:

Label	No. Of Chars	Range	Description
TPx <sub>1</sub>	8	00000000-FFFFFF	X co-ordinate of first corner
TPy <sub>1</sub>	8	00000000-FFFFFF	Y co-ordinate of first corner
TPx <sub>2</sub>	8	00000000-FFFFFF	X co-ordinate of second corner
TPy <sub>2</sub>	8	00000000-FFFFFF	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 by which keys are expected by the application which is used. See “States And Keyboards” passage for details.

### Example

A generic keyboard can be set up with numeric keys 0-9, Cancel, Clear and FDKs ‘A’, ‘B’ . A state which only requires FDKs ‘A’, ‘B’ and Cancel will ignore the numeric keys and Clear. A state which only requires 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.

This example applies equally to physical keyboards and touch screen keyboards.

**Note:** KC and TC are effectively the same but in different keyboard types.

## Nested Keyboards

A compound keyboard layout can be built up from a combination of other keyboards. For instance, separate keyboard definitions could be defined for the numeric keys, the left FDKs and the right FDKs. A keyboard could then be defined to include any or all of these three layouts as nested keyboards. This minimises repetitive definition of common keys such as Clear, Cancel and Enter.

The format of this field is as follows:

Label	No. Of Chars	Range	Description
Nest No	3	000-999	Nested keyboard number

If a value is not within the valid range, that nesting is ignored.

The nesting level is limited to one. This means that a primary keyboard can reference a secondary layout, but this secondary keyboard will not provide further data if it also has a nested layout.

---

## States And Keyboards

Keyboards can be enabled in the following states:

- PIN Entry
- Four FDK Selection Function
- Amount Entry
- Information Entry
- Transaction Request
- Enhanced PIN Entry
- DPM Document Accept
- Enhanced Amount Entry
- Card Read - PIN Entry Initiation
- FDK Information Entry
- Eight FDK Selection Function
- Customer Selectable PIN Entry
- Audio Control State
- Exit States
- Time-Out.

They can also be used by the cardholder during an Interactive Transaction Response.

If a screen number referenced in one of these state tables is associated with a keyboard layout, this layout is set up. Options such as swapping left and right FDKs or swapping Clear and Enter keys are ignored. If a keyboard is not associated with the screen, a default layout is used. The selection of a default layout will include any swap options.

If, during a transaction, a user-defined keyboard is about to be used but there is an error with the definition, the transaction flow goes directly to a default close state.

Exit States are responsible for their own keyboard use.

**Note:** 1. If a layout provides more return codes than a particular state needs, the extra keys will not be enabled.

**Note:** 2. Out-of-range values result in the set of data being ignored. If the resultant layout is incomplete for a state's use, the transaction flow may go to the close state.

**Note:** 3. 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.

The left/right swap option operates in the following states:

- PIN Entry
- Four FDK Selection Function
- Amount Entry
- Information Entry
- Transaction Request
- Enhanced PIN Entry
- Enhanced Amount Entry
- Time-Out.

It does not affect the following states:

- DPM Document Accept
- Card Read - PIN Entry Initiation
- FDK Information Entry
- Eight FDK Selection Function
- Audio Control State.

The following table shows which keys must be provided for in a replacement keyboard and the screen which is used to provide the layout association:

State	Screen Used For Layout Association	Essential Keys	Return Codes
PIN Entry	Table entry 2	Clear Cancel Enter Numeric keys 0-9 FDK 'A'	FF hex F2 hex F1 hex 30-39 hex F6 hex
Four FDK Selection Function	Table entry 2	Cancel	F2 hex
		Table entries 5-8 define exits to take depending on the FDK selected by the cardholder. If any of these are active, the corresponding FDKs must be provided in the keyboard layout:	
		FDK 'A' FDK 'B' FDK 'C' FDK 'D'	F6 hex F5 hex F4 hex F3 hex

## Keyboard Data States And Keyboards

State	Screen Used For Layout Association	Essential Keys	Return Codes
Amount Entry	Table entry 2	Clear Cancel Numeric keys 0-9	FF hex F2 hex 30-39 hex
Table entries 5-8 define exits to take depending on the FDK selected by the cardholder. If any of these are active, the corresponding FDKs must be provided in the keyboard layout:			
			FDK 'A' F6 hex FDK 'B' F5 hex FDK 'C' F4 hex FDK 'D' F3 hex
If FDK 'A' is active, the layout must also provide the following:			
			Enter F1 hex
Information Entry	Table entry 2	Clear Cancel Numeric keys 0-9	FF hex F2 hex 30-39 hex
Table entries 5-8 define exits to take depending on the FDK selected by the cardholder. If any of these are active, the corresponding FDKs must be provided in the keyboard layout:			
			FDK 'A' F6 hex FDK 'B' F5 hex FDK 'C' F4 hex FDK 'D' F3 hex
If FDK 'A' is active, the layout must also provide the following:			
			Enter F1 hex
Transaction Request	Table entry 2	Clear Cancel Enter Numeric keys 0-9 FDK 'A' FDK 'B' FDK 'C' FDK 'D' FDK 'F' FDK 'G' FDK 'H' FDK 'I'	FF hex F2 hex F1 hex 30-39 hex F6 hex F5 hex F4 hex F3 hex F7 hex F8 hex F9 hex FA hex

State	Screen Used For Layout Association	Essential Keys	Return Codes
Enhanced PIN Entry	Table entry 2	Clear Cancel Enter Numeric keys 0-9 FDK 'A'	FF hex F2 hex F1 hex 30-39 hex F6 hex
DPM Document Accept	See Note 1	Cancel	F2 hex
Enhanced Amount Entry	Table entry 2	Clear Cancel Numeric keys 0-9	FF hex F2 hex 30-39 hex
Table entries 5-8 define exits to take depending on the FDK selected by the cardholder. If any of these are active, the corresponding FDKs must be provided in the keyboard layout:			
		FDK 'A' FDK 'B' FDK 'C' FDK 'D'	F6 hex F5 hex F4 hex F3 hex
		If FDK 'A' is active, the layout must also provide the following:	
		Enter	F1 hex
Card Read - PIN Entry Initiation	Table entry 2	Clear Cancel Numeric keys 0-9	FF hex F2 hex 30-39 hex
Extension state table entry 5 defines the FDKs that are active as Accept keys during PIN entry. For each FDK that is active, the corresponding FDK must be provided in the keyboard layout:			
		FDK 'A' FDK 'B' FDK 'C' FDK 'D' FDK 'F' FDK 'G' FDK 'H' FDK 'T'	F6 hex F5 hex F4 hex F3 hex F7 hex F8 hex F9 hex FA hex
		If FDK 'A' is active, the layout must also provide the following:	
		Enter	F1 hex

## Keyboard Data States And Keyboards

State	Screen Used For Layout Association	Essential Keys	Return Codes
FDK Information Entry	Table entry 2	Cancel	F2 hex
		Table entry 6 defines the active FDKs. If any of these are active, the corresponding FDKs must be provided in the keyboard layout:	
		FDK 'A' FDK 'B' FDK 'C' FDK 'D' FDK 'F' FDK 'G' FDK 'H' FDK 'I'	F6 hex F5 hex F4 hex F3 hex F7 hex F8 hex F9 hex FA hex
Eight FDK Selection Function	Table entry 2	Cancel	F2 hex
		Table entry 6 defines the active FDKs. If any of these are active, the corresponding FDKs must be provided in the keyboard layout:	
		FDK 'A' FDK 'B' FDK 'C' FDK 'D' FDK 'F' FDK 'G' FDK 'H' FDK 'I'	F6 hex F5 hex F4 hex F3 hex F7 hex F8 hex F9 hex FA hex
Customer Selectable PIN Entry	Table entry 2	Clear Cancel Enter Numeric keys 0-9 FDK 'A'	FF hex F2 hex F1 hex 30-39 hex F6 hex
Audio Control State	Table entry 2	Clear Cancel Enter Numeric keys 0-9 FDK 'A' FDK 'B' FDK 'C' FDK 'D' FDK 'F' FDK 'G' FDK 'H' FDK 'I'	FF hex F2 hex F1 hex 30 - 39 hex F6 hex F5 hex F4 hex F3 hex F7 hex F8 hex F9 hex FA hex

State	Screen Used For Layout Association	Essential Keys	Return Codes
Time-Out	'C00'	Cancel FDK 'A' FDK 'B'	F2 hex F6 hex F5 hex

Like all other screens, the language offset system can operate on this screen reference. This means that the different screens for each language must each provide the necessary keys. If the associated keyboard does not provide the necessary keys, the default keyboard will be used.

**Note:** 1. If this state has an extension state 2, the screen used to provide a keyboard layout association is given by extension state 2, table entry 2. If the state does not have an extension state 2, the screen used to provide a keyboard layout association is 'D0001'. If 'D0001' has been overridden, the replacement screen is used (with language selection, if appropriate).

**Note:** 2. If the cardholder fails to input the PIN quickly enough, the transaction flow will proceed to the Time-Out state. After this, the layout of the keyboard will be that specified for the state that follows the Card Read - PIN Entry Initiation state. Therefore the new associated keyboards provided for use during the Card Read - PIN Entry Initiation state must be identical to the keyboards associated with any following PIN entry state.

It is better to enter the PIN using the physical keyboard rather than a touch screen keyboard, to maintain security.

## Screens And Keyboards

### Associating Screens And Keyboards

Associations between screens and keyboards are created using the Screen And/Or Keyboard Data Load command. See Chapter 4.2, “Customisation Data Commands”, for details.

When a screen is displayed but there is no user-defined keyboard associated with it, a default keyboard is enabled if one would have been enabled in a previous NDC+ release.

### Touch Screen FDK Emulation

In this passage, we tell you how to use touch screens to emulate FDKs. This passage only applies if your terminal supports touch screen FDK emulation.

A touch screen contains eight fixed touch areas which are touched instead of pressing the corresponding FDKs.

Touch screens can be used when the cardholder is required to make a selection from the screen during the following states:

- PIN Entry
- Four FDK Selection Function
- Amount Entry
- Information Entry
- Transaction Request
- Enhanced PIN Entry
- DPM Document Accept
- Enhanced Amount Entry
- Card Read - PIN Entry Initiation
- FDK Information Entry
- Eight FDK Selection Function
- Customer Selectable PIN Entry
- Audio Control State
- Exit States
- Time-Out.

They can also be used by the cardholder during an Interactive Transaction Response.

You can change the screens that are displayed when the cardholder is required to make a selection using a Screen Data Load command from Central. See Chapter 4.2, “Customisation Data Commands”, for details. However, the number and position of the touch areas are fixed and cannot be changed.

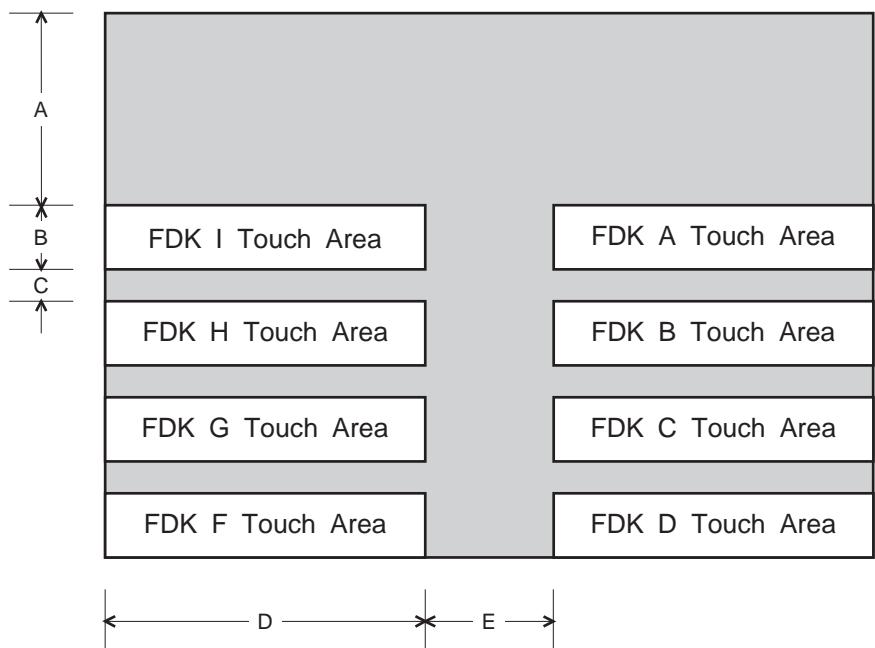
In order for Central to download the correct screens, it requests information from the terminal as to whether FDKs or a touch screen is configured. The terminal responds to this request by sending a solicited configuration information status message to Central. See Chapter 3.2, “Status Information” passage, for details.

### Touch Areas

In the following diagram we show the location of the emulated FDK touch areas.

---

Figure 2-4 Touch screen FDK emulation



The heights and widths are as follows:

A is 5/16 of the screen height

B is 2/16 of the screen height

C is 1/16 of the screen height

D is 15/32 of the screen width

E is 2/32 of the screen width.

If the touch screen is calibrated correctly, these heights and widths correspond to the following rows and columns:

A is 5 rows

B is 2 rows

C is 1 row

Keyboard Data  
Screens And Keyboards

D is 15 columns

E is 2 columns.

Chapter 2.4

# Printer Data

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Introduction	2.4-1
--------------	-------

Printer Types Supported By NDC+	2.4-2
5665 Statement Printer	2.4-3

---

Default Prints For PPD And DPM	2.4-5
PPD Default Print	2.4-5
Eight Character Amount Buffer	2.4-5
Twelve Character Amount Buffer	2.4-5
DPM Default Print	2.4-6

---

Printer Control Characters	2.4-8
Enhanced Printer Control Codes	2.4-10
Set Left Margin	2.4-10
Set Right Margin	2.4-11
Select OS/2 Code Page	2.4-12
Select International Character Sets	2.4-12
Select Arabic Character Sets	2.4-13
Print Downloadable Bit Image	2.4-13
Print Barcode	2.4-14
Print Graphics	2.4-15
Download Logo	2.4-16
Print Logo	2.4-17
Define Downloadable Character Set	2.4-17
Define Downloadable Bit Image	2.4-18
Select Printing Position of HRI Characters	2.4-18
Select Width of Barcode	2.4-19
Select Horizontal Height of Barcode	2.4-20

---

Character Sets	2.4-21
----------------	--------

---

Statement Printer Controls	2.4-24
Left Margin Control	2.4-24

Table of Contents  
Printer Data

Right Margin Control	2.4-24
Margin Control Use	2.4-25
Lines Per Inch Control	2.4-25
Download Logo	2.4-26
Print Logo	2.4-26
<hr/>	
Graphic Files For Logo Printing On The Statement Printer	2.4-27
Page Size	2.4-27
Graphic File Size	2.4-27
Overlaying	2.4-27
Printer Resolutions	2.4-28
<hr/>	
Simulated Pre-Printed Receipt Messages	2.4-29
<hr/>	
Sideways Printing On Receipt	2.4-33

## Introduction

In this chapter we give you information on the following topics:

- Printer types supported by NDC+
- Default prints for PPD and DPM
- Printer control characters
- Character sets
- Statement printer controls
- Simulated pre-printed receipt messages
- Sideways printing on receipt.

---

## Printer Types Supported By NDC+

The NDC+ SST software supports printing on five different devices:

- Receipt
- Journal
- Statement
- Programmable printing depository (PPD)
- DPM.

It is possible to enable printing on both the electronic journal and the physical journal device at the same time. Dual Mode Journal Printing is supported from NDC+ 6.01, in both Native and Diebold Emulation mode.

Sideways printing is supported with the receipt printer, and with the journal printer for DPM document images.

From release 6.01, NDC+ provides support for logo printing on the 80 column enhanced thermal statement printer.

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. See Chapter 4.4, “Transaction Reply Commands”, for details.

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 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.

The statement printer is restricted by the compressed data field length. The PPD and the DPM envelope printer (not present on the 5665) can print up to 80 characters. DPM document printers can print up to 100 ASCII 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:

- 24 or 49 lines on a non-thermal receipt printer (depending upon the dip switch settings)

- and 24 lines or greater up to a maximum of 55 on a thermal receipt printer (depending upon the dip switch settings).

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. To allow long supervisor printouts, the automatic cut is not performed on the first transaction print on the receipt.

When printing in sideways mode on the 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. See *NDC+ Supervisor's Reference Manual* Appendix A for details. This is not supported in sideways printing mode on the receipt printer.

**Note:** In Diebold mode, line feeds are inserted between transaction prints on the journal printer.

---

## 5665 Statement Printer

On a 5665, the statement printer shares its exit with the entry/exit of the DPM. In addition to the statement printer capture bin at the rear, there is an additional statement printer capture bin, which is below this entry slot. This is referred to as the DPM Statement Printer Capture Bin. The DPM Statement Capture Bin does not have a self-clearing state of health. Use the supervisor replenish menu function, INIT STMNT, to clear this state of health.

Transactions that cause replenishment conditions to go to 'bin filled/overfilled' may be triggered by documents or statements being captured. Power failures or operation in diagnostics generally result in statements being put into the rear bin, while unacceptable documents and statements not taken by the cardholder are put into the front bin. Both bins are monitored to give an overall 'filled/overfilled' status. It is important to ensure that both bins are cleared.

If the cardholder chooses to carry out a DPM-type transaction but has not taken a previously presented statement, the statement will be captured after a period specified by timer 95. Screen 'D0008' is displayed to prompt the cardholder to take the statement. See Chapter 2.2, "Types of Reserved Screen" passage, for details. A similar action is carried out if the DPM Document Accept state is entered when a statement is present.

If the statement printer reaches a severity level of fatal and the problem is in the common transport area, the DPM will no longer be usable. The next command which attempts to use the DPM will receive a fatal response. However, if the statement printer goes fatal

because of a problem outside the shared area, the DPM will continue to operate as normal.

The same applies to fatal conditions detected for the DPM. A fatal error which occurs to the DPM in the shared area will cause both devices to go fatal, whereas a fatal error in an area specific to the DPM will not affect the statement operations.

Despite this, the existing Central interface with respect to the Statement Printer remains unaffected.

**Note:** A severity byte is returned in DPM status messages to highlight certain problems with the shared transport and with the DPM Statement Printer Capture Bin. See Chapter 3.5, “Device Fault Status Information - Native Mode”, for details.

## Default Prints For PPD And DPM

### 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

- 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. See Chapter 2.1, "F - Amount Entry State" passage, for details.
- 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'. See *NDC+ Supervisor's Reference Manual* for details. 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 Diebold mode, the date is always displayed as mm/dd/yy. In Native mode, the date is displayed in one of four formats: MM/DD/YY, DD/MM/YY, YY/MM/DD or YY/DD/MM. The date format is set by the option set in the Enhanced Configuration Parameters Load Message, and the third and fourth formats are available only if the Digital Camera System is configured. See Chapter 4.2, "Enhanced Configuration Parameters Load" passage, for details. 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\*012345678901234567890123456789 20/11/90 15:30:29 000000

#### Twelve Character Amount 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. See Chapter 2.1, “F - Amount Entry State” passage, for details. 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. In Diebold mode, the date is always displayed as mm/dd/yy. In Native mode, the date is displayed in one of four formats: MM/DD/YY, DD/MM/YY, YY/MM/DD or YY/DD/MM. The date format is set by the option set in the Enhanced Configuration Parameters Load Message, and the third and fourth formats are available only if the Digital Camera System is configured. See Chapter 4.2, “Enhanced Configuration Parameters Load” passage, for details. 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 \*012345678901234567890123456789    20/11/90    15:30:29    000000

## DPM Default Print

In certain conditions a default message will be printed on a deposited document. When this happens, Central must ensure that the zone is large enough to hold 50 characters.

The following data will be printed:

btttbaaaaaaaaaaaabmm/dd/yybhh:mm:ssbmmmmmbrrrrr

### Key

b	Blank
ttt	Current Transaction Serial Number
aaaaaaaaaaaaaa	Amount Buffer with leading zeros suppressed and with exactly one decimal place marker (length 13)

mm/dd/yy

Terminal Calendar Date—in one of four formats:  
MM/DD/YY, DD/MM/YY, YY/MM/DD or  
YY/DD/MM. The date format is set by the option  
set in the Enhanced Configuration Parameters  
Load Message, and the third and fourth formats  
are available only if the Digital Camera System is  
configured. See Chapter 4.2, “Enhanced  
Configuration Parameters Load”, for details.

hh:mm:ss

Terminal Time (using 24 hour convention)

mmmmmmm

Machine Number

rrrrr

Reserved for future use

## Printer Control Characters

These characters allow data to be formatted for display. The printers vary in the control characters they support. The control characters are shown below, with any special printer characteristics noted:

Character	ASCII Code	Function
LF	0A hex	Causes the next graphic character to be printed on the next line at the column defined by the left margin.
		Journal Subsequent LF controls with no intervening graphic characters are ignored.
		PPD/DPM Envelope All ignored.
		DPM Document Causes a Write or Write and Confirm error
FF	0C hex	Receipt Causes a feed to black mark (or feed of 24 lines in normal printing mode, or feed to the length of the longest print line in sideways printing mode up to a maximum of 80 columns if black mark detection is not used), cut and deliver to customer.
		Journal Causes a line feed.
		Statement Causes a feed to black mark, cut and deliver to customer.
		PPD/DPM Envelope Ignored.
		DPM Document Causes a Write or Write and Confirm error

Character	ASCII Code	Function																
SO	0E hex	Fills an area of the printer form with spaces. This 'SO' command is followed by a single graphic character indicating the desired number of spaces to be inserted as follows:																
		<table> <thead> <tr> <th>Character</th> <th>No. Of Spaces</th> </tr> </thead> <tbody> <tr> <td>1-9</td> <td>1-9</td> </tr> <tr> <td>:</td> <td>10</td> </tr> <tr> <td>;</td> <td>11</td> </tr> <tr> <td>&lt;</td> <td>12</td> </tr> <tr> <td>=</td> <td>13</td> </tr> <tr> <td>&gt;</td> <td>14</td> </tr> <tr> <td>?</td> <td>15</td> </tr> </tbody> </table>	Character	No. Of Spaces	1-9	1-9	:	10	;	11	<	12	=	13	>	14	?	15
Character	No. Of Spaces																	
1-9	1-9																	
:	10																	
;	11																	
<	12																	
=	13																	
>	14																	
?	15																	
		PPD/DPM Envelope      Ignored.																
		DPM Document      Causes a Write or Write and Confirm error																
		Statement      International alphanumeric set 3 (designator 7, B or E) does not contain a space character. In this case the area will be filled with 'space' .																
ESC	1B hex	Control character introducing supplementary control codes. See "Character Sets" and "Statement Printer Controls" passages later in this chapter for details.																
		PPD/DPM Envelope      Ignored.																
		DPM Document      Causes a Write or Write and Confirm error																

Character	ASCII Code	Function
HT	09 hex	Statement Positions the next graphic character in the next tab column. Tabs are defined to be in every eighth column from the left margin. A tab past the right margin positions the character in the first position of the next line. Multiple tabs are permitted.
	PPD/DPM Envelope	Ignored.
	DPM Document	Causes a Write or Write and Confirm error
	Others	Not defined for NDC+. Causes print-head movement and misalignment of data.

**Note:** For the statement printer, we recommend 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.

Using the default top margin of one inch, the following maximum number of lines can be printed:

Size of Media	Lines Per Inch	Maximum Lines
<b>101.6 mm/4 inch</b>	6	17
<b>101.6 mm/4 inch</b>	8	23
<b>152.4 mm/6 inch</b>	6	29
<b>152.4 mm/6 inch</b>	8	39

For different values of top margin/line feed, we recommend 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).

### 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.

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.

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.

### Select OS/2 Code Page

You can select one of the supported OS/2 code pages, See Appendix B, 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.

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, see *Define Downloadable Character Set*.

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.

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'. See "Simulated Pre-Printed Receipt Messages" in this chapter.

### Select Arabic Character Sets

An application can make use of the Arabic character set with this control sequence which overrides the customisation switch setting.

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'. See "Simulated Pre-Printed Receipt Messages" in this chapter.

### Print Downloadable Bit Image

This control sequence allows a predefined bit image to be printed in one of four formats.

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 *Define Downloadable Bit Image*.

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'. See "Simulated Pre-Printed Receipt Messages" in this chapter.

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:

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.

The control sequence should not be included in Transaction Reply printer data which is to be interlaced with reserved screen 'R01'. See "Simulated Pre-Printed Receipt Messages" in this chapter.

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.

This is supported on thermal receipt and journal printers only.

### Print Graphics

With this control sequence, you can print a document image or a pre-loaded Epson printer graphics file on a thermal printer. Small document images may also be printed on a dot matrix printer. The size allows for printing a Courtesy Amount Verification zone with a dot matrix printer.

Document images are pictures of documents which have been scanned by the Document Processing Module. These files are in uncompressed NCR Image 1 format.

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 same escape sequence is used to print both types of file:

Character	Description		Number of Characters
1BH	ESC	Private use Escape Sequence Indicator	1
47H	'G'	Escape Sequence ID	1
<i>filename</i>		Name of file with graphics data	Variable
1BH 5CH	ESC '\'	Control Sequence Terminator	2

In order to determine whether the file named by *filename* is a document image or a pre-loaded Epson graphics file, the system looks for *filename* in the three reserved screens K11, K12 and K13. If found in these screens, the *filename* is treated as a document image; otherwise it is treated as an Epson graphics file. The reserved screens also specify single or double density printing, the compression ratio and the rotation of the document image. Full details of these screens are given in Section 2.2 of this manual under *K — Extended Screen Controls*.

**Note 1** If electronic journalling is configured and an attempt is made to journal a DPM image, the *filename* will be written to the journal.

**Note 2** Journalling of DPM images during hard copy backup is not supported.

The format for the Epson Graphics file is described in the *Programmer's Manual for the 40 Column Printer*.

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 location of 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'. See "Simulated Pre-Printed Receipt Messages" in this chapter.

### Download Logo

This control sequence applies to the enhanced thermal statement printer (SDC+) only. Use it to download the contents of HP Laser Jet II graphic files from the terminal's disk to the thermal statement printer's memory buffers.

Character	Description	Number of Characters	
1BH	(ESC)	Private use Escape Sequence Indicator	1
2AH	(*)	Escape Sequence ID	1
<ASCII value>	'1' = define HPII image one . '9' = define HPII image nine	1	
<filename>	Name of file with data for selected image file	variable	
1BH 5CH	(ESC'\')	Control Sequence Terminator	2

<filename> in the control sequence contains ASCII characters of the filename only. Note that a maximum of 9 images can be loaded. Defining a new image erases the previous one with the same identification number. 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.

## Print Logo

This control sequence applies to the enhanced thermal statement printer (SDC+) only. Use it to print the graphical data downloaded to the thermal statement printer's memory buffer.

Character	Description	Number of Characters
1BH (ESC)	Private use Escape Sequence Indicator	1
2FH ('\\')	Escape Sequence ID	1
<ASCII value>	'1' = execute HPII image one . '9' = execute HPII image nine	1
1BH 5CH (ESC'\\')	Control Sequence Terminator	2

The maximum size per print file is 64K bytes. An image that results in a print file greater than this limit should be split into separate files and overlaid to produce the desired image. See "Graphic Files For Logo Printing On The Statement Printer" in this chapter.

## 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 NDC+ recommendation is to use standard mode only.

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*.

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.

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*.

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 default setting is '1'.

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

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 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'.

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'.

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 and DPM envelope printer support the single size alphanumeric 1 character set (96 characters).

The receipt and journal printers support as standard the first 96 characters from the single and double size alphanumeric 1 character set.

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 character set for the DPM document printer depends on what you purchase with your system. See *Document Processing Application Development Guidelines* for more information.

The default character set for all printers except the DPM document printer 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:

Character	Description	Number of Characters
1BH (ESC)	Private Use Escape Sequence Introducer	1
'(	Escape Sequence ID	1
Variable	Character Set Designator	1

The following character set designators are available:

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 Note
'?'	5	Double size alphanumeric 2. See Note
'B'	5	Double size alphanumeric 3. See Note

Designator	Characters Per Inch	Character Set
'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)
'G'	12	12 cpi size alphanumeric 2 (statement only)
'H'	12	12 cpi size alphanumeric 3 (statement only)
'T'	10	Single size alphanumeric 4
'J'	10	Single size alphanumeric 5
'K'	5	Double size alphanumeric 4. See Note
'L'	5	Double size alphanumeric 5. See Note
'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)

**Note:** 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 are selected instead of the standard sets by a hardware switch on the printer.

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. We recommend that the character set is selected at the start of each statement.

See Appendix B, “Character Sets” for the default character sets provided on CRTs and printers.

## Statement Printer Controls

In this passage we give details of the control sequences that apply to the statement printer specifically.

- Left margin control
- Right margin control
- Margin control use
- Lines/inch control
- Download logo
- Print logo

### Left Margin Control

This control sequence gives the column where the print head is positioned following an LF character. The default value is 0.

Character	Description	Number of Characters
1BH (ESC)	5BH '['	Control Sequence Introducer
<ASCII DATA>	Column number range From 000 to (right margin - 4)	Var (1-3)
70H	'p'	Function-defining character

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.

Character	Description	Number of Characters
1BH (ESC)	5BH '['	Control Sequence Introducer
<ASCII DATA>	Column number range From (left margin + 4) to 132	Var (1-3)
71H	'q'	Function-defining character

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.

Character	Description	Number of Characters
1BH (ESC)	5BH 'l'	Control Sequence Introducer
<ASCII DATA>	Lines/inch selector range from 00 to 03	2
72H	'r'	Function-defining character

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:

Value	Spacing (Lines/inch)
00	8
01	8
02	6
03	6

Other values are ignored.

## Download Logo

This sequence downloads the contents of HP Laser Jet II graphic files from the terminal's disk to the enhanced thermal statement printer's memory buffers.

Character	Description	Number of Characters
1BH (ESC)	Private use Escape Sequence Indicator	1
2AH ('*)	Escape Sequence ID	1
<ASCII value>	'1' = define HPII image one . '9' = define HPII image nine	1
<filename>	Name of file with data for selected image file	variable
1BH 5CH (ESC'\')	Control Sequence Terminator	2

<filename> in the control sequence contains ASCII characters of the filename only. A maximum of 9 images can be loaded to the statement printer. Defining a new image erases the previous one with the same identification number.

## Print Logo

This control sequence prints the graphical data downloaded to the enhanced thermal statement printer's memory buffer by the control sequence Download logo.

Character	Description	Number of Characters
1BH (ESC)	Private use Escape Sequence Indicator	1
2FH ('\\')	Escape Sequence ID	1
<ASCII value>	'1' = execute HPII image one . '9' = execute HPII image nine	1
1BH 5CH (ESC'\')	Control Sequence Terminator	2

# Graphic Files For Logo Printing On The Statement Printer

When you are creating image files to be printed by the enhanced thermal statement printer (SDC+), there are some important points to note to ensure the best results.

## Page Size

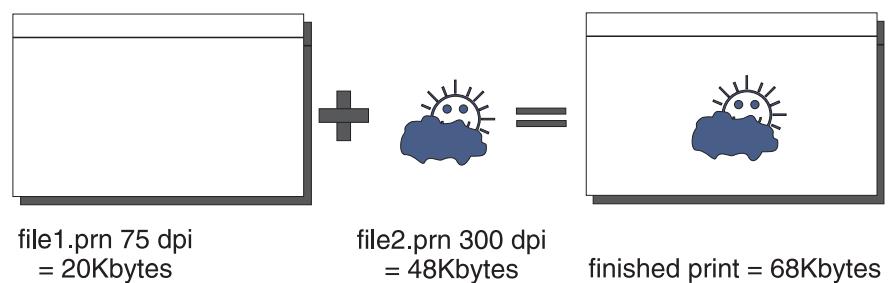
You should always choose 'legal' ( $8\frac{1}{2}$ " by 14") page size, regardless of the actual size of the paper in the printer. Any other size will result in misaligned text on the document.

## Graphic File Size

The limit on the size of file that can be sent to the statement printer is 64K bytes. Any file bigger than this will cause unpredictable results. You should also bear in mind that if you use the maximum of nine image files, all up to the maximum size, you are likely to experience a considerable delay on exiting Supervisor mode, for example, as the files are downloaded.

## Overlaying

An image file that would create a print file of over 64k bytes should be split into two or more smaller files. These separate files can then be downloaded and when actioned by the print logo command, they will overlay to produce a single image, as shown below.



To overlay text onto graphical images correctly, each new statement data field in the Transaction Reply must commence with data set to 19h (EM). This is the control which moves the media in the printer to the first line position.

The following example would load two background images with id numbers 1 and 2 to the printer. Then, in the printer's buffer, the images would be overlaid with text before being printed.

**Example:**

The printer message fields in a Transaction Reply from the Host:

```
19H 'TEST BALANCE DATA FROM ACCOUNT No1234567' 1BH  
2FH '1' 1BH 2FH '2' 0CH
```

Contents of reserved screen 'K14':

```
1BH 2AH '1' 'IMAGE01.HP2' 1BH 5CH  
1BH 2AH '2' 'IMAGE02.HP2' 1BH 5CH
```

Note that when designing a background form, it is easier to fit the image fields to the text fields than vice versa.

**Printer Resolutions**

There are three resolutions available to the printer driver when generating the print file : 75, 150 and 300 dpi. Resolution is selected via the windows printer setup.

The size of print files, and therefore download time, can be greatly reduced by choosing low resolution graphics for images such as boxes or tables. High resolution should be used only for images such as logos.

A separate file is required for each different resolution. Each one is downloaded and actioned separately, to produce the desired image by overlaying.

---

## 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:

Printer Data  
Simulated Pre-Printed Receipt Messages

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.

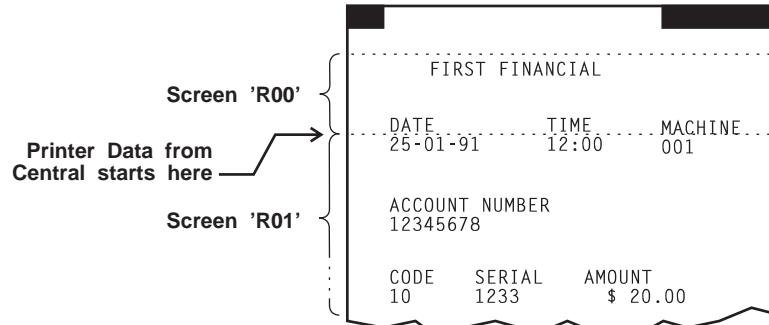
This feature allows blank stationery to be used with a Central application program that was originally designed to operate with pre-printed stationery. Another use of these screens is to align the first print line with pre-printed headers. This is done by building screen 'R00' with the required number 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 2.4-1  
Simulated pre-printed receipt



In the following example, we show the coding for the screens.

Screen 'R00'	Print Line
(SO) '4 FIRST FINANCIAL' (LF)	1
(LF)	2
(LF)	3
'DATE' (SO) '10 TIME' (SO) '6 MACHINE' (LF)	4

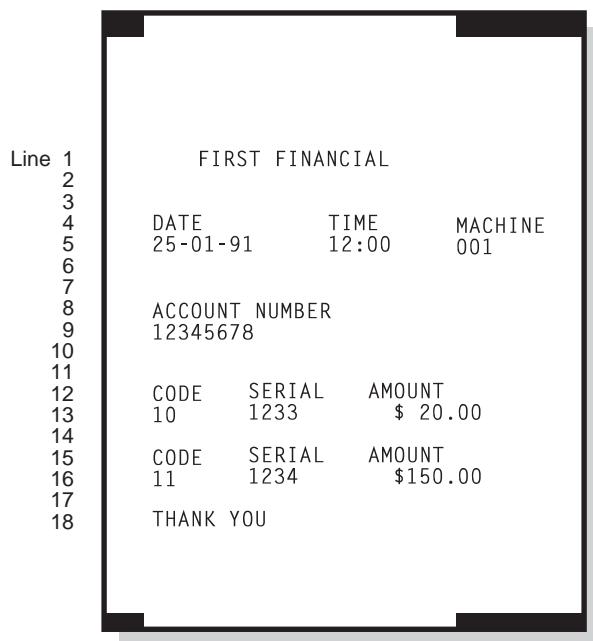
Screen 'R01'	Top Of Receipt Print Data	Print Line
(LF)	'25-01-91 12:00 001' (LF)	5
(LF)	(LF)	6
(LF)	(LF)	7
'ACCOUNT NUMBER' (LF)	(LF)	8
(LF)	'12345678' (LF)	9
(LF)	(LF)	10
(LF)	(LF)	11
'CODE SERIAL AMOUNT' (LF)	(LF)	12
(LF)	'10' (SO) '61233' (SO) '6\$ 20.00' (LF)	13
(LF)	(LF)	14

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

In the following diagram we show an example of the final receipt produced:

---

Figure 2.4-2  
Final Receipt



Pre-print screens must not contain form feed controls. Form feed controls in printer data are allowed and produce multiple receipts, each with full pre-print.

---

## 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. See Chapter 4.4, “Transaction Reply Commands.”

Printing of images, graphics and double size characters is not supported in sideways printing mode, with the exception of DPM images.

Sideways printing on the receipt is not supported in supervisor mode.

You can set the left and right margins of printer data to be printed sideways on the receipt by using the *Set Left Margin* and *Set Right Margin* control sequences in this chapter.

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 the Host causes this line count to be exceeded the sideways statement shall be cut after 20 lines and the remaining data printed on the next statement(s).

The reserved screens ‘R00’ and ‘R01’ are not supported and should not be downloaded to an ATM which is to be used for sideways printing on the receipt.

Printer Data  
**Sideways Printing On Receipt**

Chapter 2.5

## Supervisor Messages

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Supervisor Messages	2.5-1
Character Sets	2.5-1
Control Codes	2.5-1
Screen Size Limitations	2.5-1
CRT/VEROP/Enhanced Operator Interface Layout	2.5-2
CRT/VEROP/Enhanced Operator Interface SOH Screen Layout	2.5-4
Basic Operator Interface SOH Screen Layout	2.5-5
Printer Layout	2.5-7
Automatic Screen Editing	2.5-7
Media Status Messages	2.5-13
Test Cash Report	2.5-14
Check CDM Report	2.5-14

Table of Contents

**Supervisor Messages**

# Supervisor Messages

In the following passages we define the formatting rules for supervisor messages that are output to the CRT, the basic and enhanced operator interfaces, the VEROP, and the receipt and journal printers. These rules cover the following:

- Character sets
- Control codes
- Screen size limitations
- CRT layout
- Printer layout
- Automatic screen editing
- Media status messages
- Test cash report
- Check CDM 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 downloading the alternative text with the reserved screen number. Appendix A lists all supervisor reserved screens, showing the function for which they are used and the default text.

## 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:

Screen Type	Usage	No. Of Rows	No. Of Columns
'A'	CRT/VEROP/Enhanced Operator Interface Acknowledgement Lines	1	32
'D'	DPM	14	32
'E'	Error Messages	1	19
'H'	Basic Operator Interface	1	5
'T'	CRT/Enhanced Operator Interface/Printer Information Output	14	32
'M'	CRT/VEROP/Enhanced Operator Interface/Printer Menus	13	32
'P'	CRT/VEROP/Enhanced Operator Interface Data Entry Prompts	1	27
'Q'	Basic Operator Prompts - 'Q00' - 'Q28' - 'Q30' - 'Q53'	1 2	5 40
'S'	Media Status Lines	1	32
'T'	Journal Trace	15	32
'X'	CRT/VEROP/Enhanced Operator Interface SOH Messages	Var	32
'Y'	CRT SOH Messages	Var	32
'Z'	Basic Operator Interface SOH Messages	Var	40

## CRT/VEROP/Enhanced Operator Interface Layout

If supervisor functions are selected from the fascia keyboard, the enhanced operator interface or VEROP, all screens are displayed from the left-most column. The following table shows the display positions.

Screen Type	Usage	Row Position	Column Position
'A'	Acknowledgement Line	14	1-32
'A'	Last Supervisor Control Key	16	7-26
'E'	Error Messages	14	1-19

Screen Type	Usage	Row Position	Column Position
'T'	Information Display	1-14	1-32
'M'	Menus	1-13	1-32
'P'	Prompt Line	15	1-27
'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 hallmark question or 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.

## CRT/VEROP/Enhanced Operator Interface SOH Screen Layout

The CRT/VEROP/enhanced operator interface uses type 'X' screens to display SOH. A sample display is shown below:

Row Position	Column Position		
	1	2	3
	12345678901234567890123456789012		
1	STATE OF HEALTH	***	3/99
2	40 COL PRINTER		
3	JOURNAL MECHANISM		255
4	EXIT SENSOR FAIL		
5	REPLACE MECHANISM NOW		(1234H)
6			
7	<<PRINT		NEXT>>
8		( SELECT MENU )	
9			
10	<<SOH		PREV>>
11			
12			
13	<<TM		

The first line of SOH text is a single-line screen, 'X0000'. Character positions 24-26 are reserved to show the skill level of the SOH entry. Positions 28-32 are reserved for an entry index. Leading zeros are suppressed.

Lines 2 and 3 are a two-line screen from the group 'X0501' - 'X0850'. It defines the device or service and possible module of the entry. The last three character positions in line 3 are reserved for the display of any additional information, which is displayed in decimal.

Lines 4 and 5 detail the description of the fault and the suggested action to be taken. This is a two-line screen from the group 'X0901' - 'X1600'. The screen displayed is defined by a combination of the SOH value and the Message ID. The last seven characters of line 5 are reserved for the Message ID.

Lines 6-13 are built from one of four screens, 'X0003' - 'X0006'. These screens are limited to eight lines each and are used to indicate the current supervisor menu. Screen 'X0008' is used here when not in Supervisor mode.

If the present entry is not recognised, lines 4 and 5 are replaced by the screen 'X0001'. This allows the reporting of unusual conditions.

Row Position	Column Position		
	1	2	3
	12345678901234567890123456789012		
4	UNRECOGNISED STATE OF HEALTH		
5	SOH = 0AH	MSG ID = 1234H	

In line 5, positions 7-8 and 23-26 are reserved for the SOH value and the Message ID. The positions of these numerical values are fixed, so you will need to bear this in mind if you customise this screen.

The purpose of using these downloadable, reserved screens is to allow the bank to use their preferred language. The actual figures provided for the SOH value, the Message ID, and so on, are there to allow faults to be reported independently of the language.

To allow simplified selection of colours for the SOH area on the cardholder display, two screens have been reserved. **These screens should not be used for any other purpose.** The screen numbers are 'X0009' for SOH colour and 'X0010' for the reset colour. Each screen defines both foreground and background colours.

If both screens are present, screen 'X0009' is used to set colour at the start of displaying the SOH entry and 'X0010' is used as the reset colour at the end of the SOH entry. If both screens are not present, no set/reset of colour is performed.

If you are using 'Y' screens, 'Y0009' and 'Y0010' are used to set the screen colours.

## Basic Operator Interface SOH Screen Layout

The rear basic operator interface display is much more restrictive than the facia or enhanced operator interface displays. As a result, displaying SOH causes the current supervisor menu screen to be replaced. The basic operator interface uses type 'Z' screens to display SOH. A sample display is shown below:

Row Position	Column Position			
	1	2	3	4
	1234567890123456789012345678901234567890			
1	STATEMENT PRINTER PAPER	255 *** 10/99		
2	PAPER OUT - LOAD PAPER NOW	1234H SEL-		

The first 26 characters of the first line of SOH text is a single-line screen. This is a screen in the group 'Z0501' - 'Z0850'.

The rest of the line is reserved for any additional information in positions 28-30, the skill level in positions 32-34, and an entry index in positions 36-40.

The first 26 characters of the second line of SOH text is a single-line screen in the group 'Z0901' - 'Z1600'. This is selected on the basis of the SOH value and the Message ID. Positions 29-33 are reserved for the Message ID.

The operation of the lettered keys remains unaltered during the execution of functions. The SOH display is removed when a menu prompt would not otherwise have been displayed, that is, in a function that has its own prompts.

The last six characters are used to provide the menu prompt and echo. The prompts come from screens 'Z0000' - 'Z0003' for the Select, Replenish, Configure and Access menus.

You can still use the Enter key to print the supervisor menu on the journal. In addition to the menu, an index of the display list keys will be printed from screen 'X0011'.

If the entry is not a recognised SOH, the following display is shown:

Row Position	Column Position			
	1	2	3	4
	1234567890123456789012345678901234567890			
1	STATEMENT PRINTER PAPER	C:OFF	1/99	
2	UNKNOWN SOH	SOH=0AH,MSG_ID=1234H	SEL-	

The first 26 characters of the first line of SOH text is a single-line screen from the group 'Z0501' - 'Z0850'. It identifies the service or device and possibly module that the entry relates to. Positions 30-34 are filled by screen 'Z0004', which indicates the on/off toggle. The last five positions are reserved for the entry index.

The second line is obtained from screen 'Z0005'. This displays the fact that the SOH is unrecognised. Positions 18-19 and 29-33 are reserved to allow display of the appropriate SOH numeric values.

If the terminal is completely healthy, screen 'Z0009' is displayed when in Supervisor mode and screen 'Z0012' is displayed when not in Supervisor mode.

**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. The following table lists the screens, edit positions and edit information:

Screen Name	Screen Number	Edit Position		Edit Information
		Line	Columns	
EJ Log Section Copied	'A47'	1	10-12	EJ Log Section Copied
Encryption Key A Entry Assist.	'I00'	8	24-25	Current Key Digit
Encryption Key B Entry Assist.	'I01'	8	24-25	Current Key Digit
Cash Counters	'I03'	2-6	16-20	Cassette Type 1 Counter A, B, C, D
		2-6	25-29	Cassette Type 2 Counter A, B, C, D
		9-13	16-20	Cassette Type 3 Counter A, B, C, D
		9-13	25-29	Cassette Type 4 Counter A, B, C, D
		14	16-29	Date and Time of Clearing
Card/Deposit Counters	'I04'	2	20-24	Card Count
		3	16-29	Date and Time of Clearing
		5	20-24	Envelope Count
		6	16-29	Date and Time of Clearing
		8	20-26	Activity Count
		9	8-12	Pocket A Count
		9	19-32	Date and Time of Clearing
		10	8-12	Pocket B Count
		10	19-32	Date and Time of Clearing
		11	8-12	Pocket C Count
		11	19-32	Date and Time of Clearing
		12	8-12	Bin 1 Count
		12	19-32	Date and Time of Clearing

## Supervisor Messages

### Supervisor Messages

Screen Name	Screen Number	Edit Position		Edit Information
		Line	Columns	
Configuration Data	'I06'	2	16-17	Roll Width
		2	25-32	Electronic Journal
		3	16-17	Left Column
		4	16-21	Track 1 Option ('ISO', 'VISA', 'AUTO-B' or 'AUTO-F')
		5	16-23	Message Mode Number
		6	16-21	Machine Number
		7	16-23	Date
		8	16-23	Time
		9	16-22	Printer Code
		11	10-14	Cassette Type 1 - Cash Value
Cassette Data	'I07'	11	25-29	Cassette Type 2 - Cash Value
		12	10-14	Cassette Type 3 - Cash Value
		12	25-29	Cassette Type 4 - Cash Value
		13	16-22	Restart Mode
Screen Display	'I08'	1	23-25	Current Screen Number
Encryption Key V Entry Assist.	'I09'	8	24-25	Current Key Digit
Access Data	'I10'	2	17-22	Initial Entry Display
		3	17-21	Initial Entry Display
		4	17-26	Exit mode
		5	17-32	MAC Data
		6-7	17-28	SOH Data
Hallmark Verification	'I11'	2	7-26	Hallmark Question
		3	7-14	Hallmark Answer
		4	7-14	Firmware Authentication Value
		5	7	PIN Entry Control Parameter
		6	7	Inhibited PIN Entry Flag
		7	17-23	ROM Firmware Level

Screen Name	Screen Number	Edit Position		Edit Information
		Line	Columns	
	8	17-23	RAM Firmware Level	
	9	17-24	EKC Serial Number	
Machine No./ Date/Time	'I21'	1	8-13 15-16 18-19 21-22	Machine Number  Date  Time
			24-25 27-28 30-31	
Depository Counters	'I22'	5	27-31	Bin 1 Count
		5	27-31	Deposits Made (Envelope)
		7	27-31	Pocket A Count
		8	27-31	Pocket B Count
		9	27-31	Pocket C Count
DPM Archive Default Message	'I24'	1	2-5 7-19 21-28 30-37 39-44 46-50	TSN  Amount  Date  Time  Machine Number  Reserved
Coin Counters	'I42'	4-6 4-6 9-11 9-11 12	16-20 25-29 16-20 25-29 16-29	Hopper 1 Counter Hopper 2 Counter Hopper 3 Counter Hopper 4 Counter Date and Time of Clearing
Additional Configuration Data	'I44'	3 3 4 4 5	11-15 28-32 11-15 28-32 15	Hopper 1 - Cash Value Hopper 2 - Cash Value Hopper 3 - Cash Value Hopper 4 - Cash Value Loudspeaker volume

## Supervisor Messages

### Supervisor Messages

Screen Name	Screen Number	Edit Position		Edit Information
		Line	Columns	
		6	15	Audio jack volume
Default Volume SST	'I61'	4	27	Default speaker volume
Default Volume Jack	'I62'	4	27	Default jack volume
Dual Mode Journal Printing	'I63'	1	1	Dual
EJ Backup - EOP	'I64'	4	9-21	Backup log file number 1
		5	9-21	Backup log file number 2
		6	9-21	Backup log file number 3
		7	9-21	Backup log file number 4
		8	9-21	Backup log file number 5
		9	9-21	Backup log file number 6
		10	9-21	Backup log file number 7
		11	9-21	Backup log file number 8
		12	9-21	Backup log file number 9
		13	9-21	Backup log file number 10
EJ Backup - BOP	'I65'	1	4-15	Backup log file number 1
		2	4-15	Backup log file number 2
Check CDM Status	'Q42'	1	10-13	Hopper 1 Status
		1	24-27	Hopper 2 Status
		1	37-40	Chute Status
		2	10-13	Hopper 3 Status
		2	24-27	Hopper 4 Status
Coin Counters	'Q43'	2	2-9	Hopper 1 Counter
		4	2-9	Hopper 2 Counter
		6	2-9	Hopper 3 Counter
		8	2-9	Hopper 4 Counter
		10	23-36	Date and Time of Clearing

Screen Name	Screen Number	Edit Position		Edit Information
		Line	Columns	
Card/Deposit Counters	'Q44'	1	16-20	Card Count
		1	27-40	Date and Time of Clearing
		2	16-20	Envelope Count
		2	27-40	Date and Time of Clearing
		3	16-20	Pocket A Count
		3	27-40	Date and Time of Clearing
		4	16-20	Pocket B Count
		4	27-40	Date and Time of Clearing
		5	16-20	Pocket C Count
		5	27-40	Date and Time of Clearing
		6	16-20	Bin 1 Count
		6	27-40	Date and Time of Clearing
		7	16-22	Activity Count
Envelope Serial No.	'T00'	1	20-23	Envelope Serial Number
Diagnostic Dispense	'T13'	2	10-11	Notes from Cassette Type 1
		2	26-27	Notes from Cassette Type 2
		3	10-11	Notes from Cassette Type 3
		3	26-27	Notes from Cassette Type 4
Cash Cleared	'T17'	3	10-14	Cassette Type 1 Dispense Count
		3	26-30	Cassette Type 2 Dispense Count
		4	10-14	Cassette Type 3 Dispense Count
		4	26-30	Cassette Type 4 Dispense Count
		6	10-14	Cassette Type 1 Remaining Count
		6	26-30	Cassette Type 2 Remaining Count
		7	10-14	Cassette Type 3 Remaining Count
		7	26-30	Cassette Type 4 Remaining Count
Card Count Cleared	'T18'	1	19-23	Captured Cards
Deposit Count Cleared	'T19'	1	20-24	Envelopes Deposited

Supervisor Messages  
Supervisor Messages

Screen Name	Screen Number	Edit Position		Edit Information
		Line	Columns	
Cash Added	'T20'	2	10-14	Cassette Type 1 Cash Added
		2	26-30	Cassette Type 2 Cash Added
		3	10-14	Cassette Type 3 Cash Added
		3	26-30	Cassette Type 4 Cash Added
Account Number of Captured Cards	'T36'	1	19-32	Account Number from Card
EJ Log Copied	'T45'	1	18-25	Checksum
Depository Counter	'T49'	1	28-32	Bin 1 Count
Depository Counter	'T50'	1	28-32	Pocket A Count
Depository Counter	'T56'	1	28-32	Pocket B Count
Depository Counter	'T57'	1	28-32	Pocket C Count
Coins Cleared	'T58'	3	12-16	Hopper 1 Dispense Count
		3	29-33	Hopper 2 Dispense Count
		4	12-16	Hopper 3 Dispense Count
		4	29-33	Hopper 4 Dispense Count
		7	12-16	Hopper 1 Remaining Count
		7	29-33	Hopper 2 Remaining Count
		8	12-16	Hopper 3 Remaining Count
		8	29-33	Hopper 4 Remaining Count
Coins Added	'T59'	2	12-16	Hopper 1 Coins Added
		2	29-33	Hopper 2 Coins Added
		3	12-16	Hopper 3 Coins Added
		3	29-33	Hopper 4 Coins Added
Diagnostic Coin Dispense	'T60'	2	12-16	Coins from Hopper 1
		2	29-33	Coins from Hopper 2
		3	12-16	Coins from Hopper 3
		3	29-33	Coins from Hopper 4
Document Cleared	'T74'	2	17-32	Card Account Number
		3-7	13-32	Document Data

Screen Name	Screen Number	Edit Position		Edit Information
		Line	Columns	
Document Clear Failed No Cardholder Access	'T75'	2	17-32	Card Account Number
		3-7	13-32	Document Data
Power Failure During Dispense	'T76'	4	10-14	Cassette Type 1 Dispense Count
		4	26-30	Cassette Type 2 Dispense Count
		5	10-14	Cassette Type 3 Dispense Count
		5	26-30	Cassette Type 4 Dispense Count
		7	10-14	Cassette Type 1 Remaining Count
		7	26-30	Cassette Type 2 Remaining Count
		8	10-14	Cassette Type 3 Remaining Count
		8	26-30	Cassette Type 4 Remaining Count
		11	10-14	Hopper 1 Dispense Count
		11	26-30	Hopper 2 Dispense Count
		12	10-14	Hopper 3 Dispense Count
		12	26-30	Hopper 4 Dispense Count
		14	10-14	Hopper 1 Remaining Count
		14	26-30	Hopper 2 Remaining Count
		15	10-14	Hopper 3 Remaining Count
		15	26-30	Hopper 4 Remaining Count
Document Clear Failed Cardholder Access	'T82'	2	17-32	Card Account Number
		3-7	13-32	Document Data

## Media Status Messages

The Media Status message is built by the terminal from the Media Status header (screen 'I05') and Media Status lines (screens 'S00' - 'S13', 'S19' - 'S24', 'S26', 'S31' - 'S45', 'S60' - 'S78', 'S80' - 'S85'). 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 you are using the operator interface, the equivalent information is given on the display.

C12 -- indicates that the top and second cassettes are operational.

C-2 -- indicates that only the second cassette is operational.

If an exit shutter fault is detected, screen 'S25' is displayed on the CRT after screen 'I07'. If you are using the operator interface, screen 'H06' is displayed. The cassette operational messages are not displayed while the exit shutter fault exists.

---

## Check CDM Report

When you select this from the CRT or enhanced operator interface, this report is built by the terminal from the Check CDM header (screen 'I45') and Hopper/Chute Status lines (screens 'S46' - 'S59', 'S63' - 'S70'). Screen 'I45' is overlaid from line 2 onwards with Hopper/Chute Status lines.

If the low thresholds of the CDM have not been set, screen 'S79' is displayed on line 3 with the following message:

COIN LOWS NOT SETUP

A typical report is as follows:

```
*CHECK CDM* } Screen 'I45'  
COIN HOPPER 1 LOW  
COIN HOPPER 2 GOOD  
COIN HOPPER 3 GOOD  
COIN HOPPER 4 MISSING  
TRANSPORT CHUTE GOOD
```

If you are using the basic operator interface, the equivalent information is given on the display by screen ‘Q42’ with screens ‘Q37’ - ‘Q41’. Once the information has been displayed, you must press the Enter key to acknowledge the state of the CDM.

A typical report is as follows:

```
HOPPER1= LOW HOPPER3= GOOD CHUTE= GOOD
HOPPER2= GOOD HOPPER4= MISS PRESS <ENT>
```

If the low thresholds of the CDM have not been set, screen ‘S79’ is displayed.

If you press the Aux key during this function, the help screen ‘Q36’ is displayed.

Supervisor Messages

**Supervisor Messages**

Chapter 2.6

# Configuration Parameters

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Introduction	2-1
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Configuration Parameters Load Message	2-2
Camera Control	2-2
Card Read Error	
Threshold	2-2
Card Write Error Threshold	2-2
Supply Mode, Ready Status And Amount	
Buffer Length Options	2-2
Logical Unit Number - LUNO	2-3
Timer Number	2-3
Number Of 800 Millisecond Ticks Per Timer Field	2-4

---

Enhanced Configuration Parameters Load Message	2-5
Camera Control Option	2-5
Supply Mode, Ready Status And Amount	
Buffer Length Options	2-5
Auto Voice	2-5
Date Format	2-5
Roll Width	2-5
Left Column	2-5
Track 1 Format	2-6
Diebold Status Reporting For Vandal Guard	2-6
Tamper Indicating Control Option	2-6
Extended Status Control Option	2-6
Specific Command Reject Option	2-6
Card Read Error Threshold Option	2-6
Card Write Error Threshold Option	2-6
Transaction Status Information Option	2-6
Journal Printer Backup Time Option	2-7
Journal Printer Backup Print Operations Option	2-7
Optical Sensor Option	2-7
Journal Printer Backup Log Tamper Option	2-7
Envelope Dispenser Status Option	2-7
Send Enhanced/TI Sensor Status	
Unsolicited Message Option	2-8
Media Entry Indicators Flash Rate Option	2-8

## Table of Contents

### Configuration Parameters

Touch Screen Error Reporting Option	2-8
Remote Relay Option	2-8
TPA Informed of SM Activity Option	2-8
Include PAN in DCS Data	2-9
Enable Audible Echo of Keyboard	2-9
Report DAS Errors	2-9
SOH/Fitness Option	2-9
MCN Range	2-11
Enhanced EJ Backup	2-11
Report Dual Mode EJ and Hardcopy	
Backup Unsolicited Messages	2-11
Print Track 2 to Journal	2-11
Non-Magnetic Card Accept	2-11
Timer Number	2-12
Number Of Seconds Per Timer Field	2-13
<hr/>	
Further Configuration	2-14

## Introduction

In addition to states, screens and printer data, you can further customise the way the terminal operates by downloading configuration parameters. The set of parameters available depends on whether you are running NDC+ in Diebold Emulation mode or using NCR's Native mode version, which offers enhanced configuration options.

The configuration parameters are downloaded to the terminal in the following two messages:

- Configuration Parameters Load message - this is a message compatible with Diebold and only contains parameters necessary for Diebold Emulation mode
- Enhanced Configuration Parameters Load message - this message contains the full range of configuration options and timers for Native mode.

In the following passages we introduce and discuss the configuration parameters available for each message. See Chapter 4.2, “Configuration Parameters Load” and “Enhanced Configuration Parameters Load” passages, for more details.

# Configuration Parameters Load Message

This message only contains the parameters necessary for Diebold Emulation mode.

## Camera Control

For terminals fitted with a camera, this parameter sets automatic picture-taking on or off. When the option is set, the terminal takes a date and time picture when the card is successfully staged, that is, in position within the card reader. A machine number and transaction serial number picture is taken after a Transaction Reply command is received by the terminal. The options are as follows:

Code	Automatic Picture-Taking
'0'	Yes
'1'	Yes
'2'	No
'3'	No

## Card Read Error Threshold

This parameter sets the limit of consecutive card read errors that can occur before the terminal sends a Read Error Status Message to Central. The maximum value is 255, and the default value is ten.

## Card Write Error Threshold

This parameter sets the limit of consecutive Track 3 Write errors that can occur before the terminal sends a Write Error Status Message to Central. The maximum value is 255, and the default value is three.

## Supply Mode, Ready Status And Amount Buffer Length Options

This one parameter sets the following configuration options:

000 - No option selected.

001 - Ready Status. A separate Ready status message is sent to Central in response to a Transaction Reply Message.

002 - Supply Mode. The terminal will automatically return to the previous mode when it leaves Supply mode.

008 - Amount Buffer Length. The amount buffer length is set to twelve digits. The default length is eight digits.

The value to be downloaded is formed by adding the values for the three options together. For example, if you have selected the Ready and Amount buffer options, the value to download is 001+000+008 = 009.

The default setting is all options off.

---

## Logical Unit Number - LUNO

This parameter lets you set whether the logical unit number, LUNO, will be transmitted in Transaction Request, Solicited and Unsolicited Status Messages. The number tells Central which terminal transmitted the message. If this field is not present, the LUNO defaults to 000, or to a previously downloaded value held by the terminal. If the data security feature is configured, an additional six characters are present containing the security terminal number.

---

## Timer Number

This parameter lets you set the time-out value for each of the timers that the terminal application uses. The following timers are available:

- 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 insertion time-out
- 05 - Cash retract time-out
- 06 - Poll/select time-out
- 07 - Present time-out
- 08 - Night safe deposit time-out
- 09 - Card removal time-out
- 10 - Additional present time-out
- 82 - Camera Delay Period
- 83 - File Expiry Mechanism
- 87 - DPM document captured screen time-out
- 91 - In Service inspection time-out
- 92 - SOH/TM-Alert cyclical display time-out
- 93 - SOH/TM-Alert next/previous time-out
- 94 - Document/envelope eject time-out

95 - Statement retract time-out

96 - Statement present time-out

97 - Door access open time-out

98 to 99 - Reserved

For more details of these timers, see Chapter 4.2, “Configuration Parameters Load” passage.

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**Number Of 800  
Millisecond Ticks Per  
Timer Field**

This parameter lets you determine 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.

# Enhanced Configuration Parameters Load Message

This message contains the full range of parameters necessary for Native mode.

## Camera Control Option

For terminals that are fitted with a camera, this parameter lets you set automatic picture-taking on or off. The default setting is on.

## Supply Mode, Ready Status And Amount Buffer Length Options

This one parameter sets the following configuration options:

000 - No option selected.

001 - Ready Status. A separate Ready status message is sent to Central in response to a Transaction Reply Message.

002 - Supply Mode. The terminal will automatically return to the previous mode when it leaves Supply mode.

008 - Amount Buffer Length. The amount buffer length is set to twelve digits. The default length is eight digits.

The default setting is all options off.

## Auto Voice

This parameter lets you set the automatic voice feature, if your terminal is fitted with one, to off or on. The default setting is on.

## Date Format

This parameter lets you set the date format to one of: MMDD(YY), DDMM(YY), YYMMDD or YYDDMM. The third and fourth options are available only if the Digital Camera Service is configured.

The default is MMDDYY.

## Roll Width

This parameter lets you define 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 is not supported in sideways printing mode.

## Left Column

This parameter lets you define the left-most column used in Receipt and Journal print screens in messages from Central. The range is 001-040, and the default value is 008. This option is not supported in sideways printing mode.

## Track 1 Format

This parameter lets you set the method of extracting the name and title from Track 1 data on the card.

001 - ISO format.

002 - VISA format.

003 - Auto search backwards.

004 - Auto search forwards.

The default is 001 - ISO format.

## Diebold Status Reporting For Vandal Guard

This parameter is retained for NDC compatibility only. No vandal guard errors are ever reported.

## Tamper Indicating Control Option

The Tamper Indicating Status Reporting option only applies when the terminal is configured for Diebold Status Reporting. This parameter lets you set whether the Tamper Indicating (TI) statuses should be sent to Central. The default is not to transmit TI statuses.

## Extended Status Control Option

The Extended Status Control option only applies when the terminal is configured for Diebold Status Reporting and status reporting is required. It can be set on or off. When this option is set, statuses are sent for Time-of-Day Clock, Camera, Encryptor and Door Access. The default is not to transmit these statuses.

## Specific Command Reject Option

This parameter lets you set whether the terminal should or should not transmit Specific Command Reject options. The default is not to transmit these statuses.

## Card Read Error Threshold Option

The Card Read Error Threshold only applies when the terminal is configured for Diebold Status Reporting. This parameter sets the number of consecutive card read errors that can occur before the terminal sends an error status to Central. The maximum value is 255, and the default value is ten.

## Card Write Error Threshold Option

The Card Write Error Threshold only applies when the terminal is configured for Diebold Status reporting. This parameter sets the limit of consecutive Track 3 Write errors that can occur before the terminal sends a Write Error Status Message to Central. The maximum value is 255, and the default value is three.

## Transaction Status Information Option

This parameter sets whether the transaction status information from the last command should be appended to Transaction Request Messages. The default is not to append information.

## Journal Printer Backup Time Option

This parameter sets the maximum time that Journal Printer backup is allowed before all journaling is discontinued. This option is not supported when dual mode journal printing is active.

## Journal Printer Backup Print Operations Option

This parameter sets the maximum number of print operations to be buffered while the Journal Printer is fatal. This option is not supported when dual mode journal printing is active.

## Optical Sensor Option

This parameter sets whether the optical sensor is disabled on the Accept command when CIM86 severity reaches fatal. The default is not to disable the optical sensor.

## Journal Printer Backup Log Tamper Option

This parameter lets you set one of the following options:

- Print the tampered record on the journal within bracketed characters.
- Send the last printed security trace number, date, time and record offset as part of the transaction data in a journal printer unsolicited status message.
- Send the last printed security trace number, date, time and record offset as part of the transaction data in a journal printer unsolicited status message and copy the tampered record to disk for retrieval by the FREE JDATA supervisor function.

Note : Setting this parameter to 002 or 003 while dual mode journal printing is active, will result in no hardcopy backup unsolicited device status messages being sent to the host, unless option 35 (Report Dual Mode EJ and Hardcopy Backup Unsolicited Messages) is set to 002.

## Envelope Dispenser Status Option

This option determines whether envelope dispenser status messages are sent, remote status indicators are set and the remote relay is activated. The default value is 000.

000 - Do not send envelope dispenser status messages, set the remote status indicators or activate the remote relay.

001 - Send envelope dispenser status messages.

002 - Set the remote status indicators and activate the remote relay.

003 - Send envelope dispenser status messages, set the remote status indicators and activate the remote relay.

**Send Enhanced/TI Sensor Status Unsolicited Message Option**

This option allows the Enhanced TI/Sensor Status Unsolicited Message to be sent from the terminal when tampering is suspected on devices not supported in the existing TI/Sensor Status Unsolicited Message. The default value is 000.

000 - Do not send the Enhanced TI/Sensor Status Unsolicited Message. Continue to send the existing TI/Sensor Status Unsolicited Message.

001 - Send the Enhanced TI/Sensor Status Unsolicited Message when appropriate. Do not send the existing TI/Sensor Status Unsolicited Message.

**Media Entry Indicators Flash Rate Option**

This parameter lets you determine the flash rate for the Media Entry Indicators. The flash rate can range from 4.0 Hz to continuously on. The default is 4.0 Hz. This option applies to Native Mode only.

**Touch Screen Error Reporting Option**

This option determines whether touch screen keyboard status messages are sent, remote status indicators are set and the remote relay is switched. The default value is 000.

000 - Do not send touch screen keyboard status messages, set the remote status indicators or switch the remote relay.

001 - Send touch screen keyboard status messages.

002 - Set the remote status indicators and switch the remote relay.

003 - Send touch screen keyboard status messages, set the remote status indicators and switch the remote relay.

**Remote Relay Option**

This parameter determines when the remote relay is active. The default value is 000.

000 - Remote relay is active when a device condition that needs operator intervention occurs and during Off-Line mode.

001 - Remote relay is only active when the terminal is in service.

**TPA Informed of SM Activity Option**

This option determines whether the Transaction Processing Application (TPA) Host is informed of the SM installation. The two possible values are:

000 - Do not inform the TPA Host. This is the default from a cold start.

001 - Inform the TPA Host. See "Software Management Installation Status Messages" in Chapter 3.2.

## Include PAN in DCS Data

This parameter determines whether the cardholder's Primary Account Number is included in the data sent to the security camera. This applies to the DCS camera only. The default value is 000. The two possible values are:

000 — Include PAN in DCS data.

001 — Do not include PAN in DCS data.

## Enable Audible Echo of Keyboard

This option turns on audible echo: that is, as the cardholder presses keys on the cardholder keypad, the Digital Audio Service will speak them ('one', 'two' etc.) The default value is 000. The two possible values are:

000 — Do not enable audible echo of keyboard.

001 — Enable audible echo of keyboard.

## Report DAS Errors

This option determines whether errors in the Digital Audio Service are reported to the host. The default value is 000. The two possible values are:

000 — Do not report DAS errors to the host.

001 — Report DAS errors to the host.

## SOH/Fitness Option

This option controls NDC+ behaviour to ensure that the State of Health of the Cash Dispenser agrees with its Fitness. It has two possible values:

000 - Do not simulate entry into Supervisor Mode nor attempt a dispenser fitness test.

001 - Simulate entry into Supervisor Mode and attempt a dispense fitness test (the default setting).

The operation of this option depends on whether the safe door is open or closed on exit from Supervisor Mode.

- If the safe door is left open on exit from Supervisor Mode, then an apparent mismatch between State of Health and Fitness of the Cash Dispenser is introduced by the operator. This renders the Cash Dispenser inoperable.

This situation is remedied by the default setting. It will cause NDC+ to perform the following operations when the safe door is finally closed:

- 1 Issue the Entry to Supervisor Mode message
- 2 Display the Out of Service screen on the Cardholder Display

- 3 Exercise the dispenser. One note is dispensed from each cassette and purged to the purge bin, after which the shutter is opened and closed
- 4 Exercise any other devices that are normally run on exit from Supervisor Mode
- 5 Issue the Exit from Supervisor message.

Thus the option provides a means to correct the operator's error automatically, while ensuring the Host system is kept fully informed of Supervisor activity.

This corrective operation is only performed when it is safe to do so. For example, should the safe door be closed during a transaction, the corrective action will be performed when the terminal returns to the Card Read State.

Users who do not want to adopt the above functionality should either:

- Set the option to 000,
- or
- Remove the following line from the APPDEFS.FCS file that is supplied on the installation disks and copied to the \NDCADI subdirectory of their Diskbuild PC and proceed with their normal Diskbuild procedures. The presence of this line allows NDC+ to detect that the Safe Door has been closed.

```
URID={QN="MCP_CLEAR_FITNESS"URID="1"}
```

- If the Safe Door is closed on exit from Supervisor Mode and a Fitness problem still exists with the Cash Dispenser, or any installed cassette, then the default action would result in a Dispenser Fitness Test. This would cause one note to be dispensed from each cassette and purged to the purge bin after which the shutter would be opened and closed.

Users who do not want to adopt the above functionality should set the option to 000. In NDC+ this is option 33, SOH/Fitness option.

## MCN Range

This option controls the range of the Message Coordination Number (MCN). The default is 31(Hex) to 3F(Hex), this parameter allows you to extend the range to 7E(Hex). The possible values of this parameter are:

000 = 31H to 3FH (default)

001 = 31H to 7EH

Any other value will keep the previous MCN range.

## Enhanced EJ Backup

This option controls the number of EJ log backup files that are stored for recall. The default mode is standard mode which allows the storage, retrieval and copying of the latest EJ log backup file only. The Enhanced mode allows up to 10 backup files. The two possible values are:

000 = Standard mode (default).

001 = Enhanced mode.

## Report Dual Mode EJ and Hardcopy Backup Unsolicited Messages

This option controls the reporting of dual mode EJ and hardcopy backup unsolicited device status messages to the Host. The possible values are:

000 — Do not report either dual mode EJ or hardcopy backup unsolicited error messages to the Host. This is the default setting.

001 — Report only dual mode EJ unsolicited error messages to the Host.

002 — Report both dual mode EJ and hardcopy backup unsolicited error messages to the Host.

## Print Track 2 to Journal

This option allows data from card track 2 to be automatically printed to the journal printer when a card is read. Supported in both Native and Diebold modes. The possible values are:

000 = Do not print data on journal. This is the default mode.

001 = Print data on journal.

## Non-Magnetic Card Accept

This option allows the SST to be set up to accept non-magnetic cards. The possible values are :

000 - Magnetic accept commands only will be sent to the card reader. Magnetic cards only will be accepted. This is the default.

001 - Non-magnetic accept commands will be sent to the card reader. This mean that both magnetic and non-magnetic cards will be accepted.

If this option is not present in the enhanced configuration parameters load message magnetic cards only will be accepted.

See Appendix U, ‘Smart Card Handling’ for details.

## Timer Number

This parameter lets you set the time-out value for each of the timers that the terminal application uses. The following timers are available:

- 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/document insertion time-out
- 05 - Cash retract time-out
- 06 - Poll/select time-out
- 07 - Present time-out
- 08 - Night safe deposit time-out
- 09 - Card removal time-out
- 10 - Additional present time-out
- 82 - Camera Delay Period
- 83 - File Expiry Mechanism
- 87 - DPM document captured screen time-out
- 91 - EJ inspection time-out
- 92 - SOH/TM-Alert cyclical display time-out
- 93 - SOH/Alert next/previous time-out
- 94 - Document/envelope eject time-out
- 95 - Statement retract time-out
- 96 - Statement present time-out
- 97 - Door access open time-out
- 98 to 99 - Reserved.

For more details of these timers, see Chapter 4.2, “Configuration Parameters Load” passage.

## Number Of Seconds Per Timer Field

This parameter sets the time-out value in seconds for each of the timers identified by the previous parameter. The maximum number of seconds is 255.

---

## Further Configuration

In addition to the Configuration parameters discussed above, you can further customise the terminal by setting local configuration parameters. You access these at the terminal using the Supervisor menus.

Local configuration parameters let you:

- Set the roll width used in print screens sent by Central. This performs the same function as the downloadable Roll Width parameter
- Set the machine number. This is recorded on the picture when the Picture-Taking option is enabled
- Set the terminal date and time. You can also set the date and time by downloading these from Central
- Set the message mode. This is the mode the terminal will report status messages in, and can be either Native or Diebold. If Diebold, the PIN or No-PIN option can be selected. Additional option digits are available in each message mode
- Display downloaded screens and cardholder reserved screens
- Set the number of notes in each cash cassette
- Set the number of coins in each coin hopper
- Set the printer that the terminal will use to print supplies information
- Set how the terminal will recover after a power failure. There are four options: Default action, Diebold Emulation mode, Native mode and Auto Recovery.

For more information on these and other functions accessible when the terminal is in Supervisor mode, see *NDC+ Supervisor's Reference Manual*.

Chapter 2.7

# Financial Institution Tables

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Introduction	2.7-1
What Is A Financial Institution Table ?	2.7-1
FIT Data	2.7-2
FIT Fields	2.7-5
PIDDX (Institution ID Index)	2.7-5
PFIID (Institution ID)	2.7-5
PSTDX (Indirect Next State Index)	2.7-5
PAGDX (Algorithm/Bank ID Index)	2.7-6
PMXPN (Maximum PIN Digits Entered)	2.7-6
PCKLN (Maximum PIN Digits Checked)	2.7-7
PINPD (PIN Pad)	2.7-7
PANDX (PAN Data Index)	2.7-9
PANLN (PAN Data Length)	2.7-9
PANPD (PAN Pad)	2.7-10
PRCNT (Track 3 PIN)	2.7-10
POFDX (PIN Offset Data)	2.7-11
PDCTB (Decimalisation Table)	2.7-11
PEKEY (Encrypted PIN Key Key)	2.7-11
PINDEX (Index Reference Point)	2.7-11
PLNDX (Language Code Index)	2.7-13
PMMSR (MM Sensor Flag)	2.7-14
PREF2 (Second Index Reference Point)	2.7-14
PVBDX (GBP Data B Index)	2.7-14
PVBLN (GBP Data B Length)	2.7-14
Linked FITs	2.7-15
FITs On Terminals With Door Access Control	2.7-16
Diebold PIN Information Without FITs	2.7-17
Performing Diebold PIN Verification Without FITs	2.7-17
Algorithm Locator/ Identifier Field	2.7-17
Offset Index Data Field	2.7-18
Using The Offset Index Data	2.7-18

Table of Contents

**Financial Institution Tables**

# Introduction

In this chapter we give you information on the following topics:

- What is a Financial Institution Table ?
- FIT data
- Linked FITs
- FITs on terminals with Door Access Control
- Diebold PIN information without FITs.

## What Is A Financial Institution Table ?

The Financial Institution Table (FIT) is an important part of the customisation data for an 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. Only those institutions whose transactions are processed using Diebold processing without FITs will not require a FIT.

When a card is read, the FIT is searched to find the FIT entry which matches the FIID on the card. Parameters in this FIT entry and following linked FITs are then used for all subsequent PIN processing.

---

## FIT Data

Each FIT contains 20 fields. The last four of these are present if you have CIM86 or GBP PIN verification. They default 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.

In this passage we provide a FIT to show the format of the FIT data, and describe the contents of each field.

Each entry in the FIT Data load message has a value in the range 00-FF 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.

The following illustration shows you the fields in the FIT and indicates those fields that are offsets to data on the card.

---

Figure 2.7-1  
FIT fields and offsets

	<b>PIDDX</b>	Institution ID Index
	<b>PFIID</b>	Institution ID
	<b>PSTDX</b>	Indirect Next State Index
	<b>PAGDX</b>	Algorithm/Bank ID Index
	<b>PMXPN</b>	Maximum PIN Digits Entered
	<b>PCKLN</b>	Maximum PIN Digits Checked
	<b>PINPD</b>	PIN Pad
	<b>PANDX</b>	PAN Data Index
	<b>PANLN</b>	PAN Data Length
	<b>PANPD</b>	PAN Pad
	<b>PRCNT</b>	Track 3 PIN Retry Count Index
	<b>POFDX</b>	PIN Offset Index
	<b>PDCTB</b>	Decimalisation Table
	<b>PEKEY</b>	Encrypted PIN Key Key
	<b>PINDX</b>	Index Reference Point
	<b>PLNDX</b>	Language Code Index
	<b>PMMSR</b>	MM Sensor Flag
	<b>PREF2</b>	Second Index Reference Point
	<b>PVBDX</b>	GBP Data B Index
	<b>PVBLN</b>	GBP Data B Length

Field	Contents	Acronym	Definition	No of Digits
a	Institution ID Index	PIDDX	Index for Financial Institution ID number on card	2
b	Institution ID	PFIID	Financial Institution ID number	10
c	Indirect next state index	PSTDX	Index for entries in the Indirect next state table	2
d	Algorithm/ Bank ID index	PAGDX	Algorithm index for Diebold	2
e	Maximum PIN digits entered	PMXPN	Maximum number of PIN digits allowed for the cardholder to enter	2
f	Maximum PIN digits checked	PCKLN	Number of digits used for local PIN check	2
g	PIN pad	PINPD	Character used to pad PIN for transmission to Central and the encryption method used	2
h	PAN data index	PANDX	Index for location of PAN (Personal Account Number) on card	2
i	PAN data length	PANLN	PAN data field length	2
j	PAN pad	PANPD	Character used to pad PAN field for encryption	2
k	Track 3 PIN retry count index	PRCNT	Index for PIN retry count field on card	2
l	PIN offset index	POFDX	Index for PIN offset field on card	2
m	Decimalisation table	PDCTB	Decimalisation table used in encryption process	16
n	Encrypted PIN key	PEKEY	DES - Encrypted PIN key	16
o	Index reference point	PINDX	Track and index reference point information for all card-related entries in FIT	6
p	Language code index	PLNDX	Index for language code on card	2
q	CIM86 sensor flag	PMMSR	CIM86 sensor flag	2
r	GBP reference	PREF2	Second index reference point	2
s	GBP 'B' index	PVBDX	GBP validation data 'B' index	2
t	GBP 'B' length	PVBLN	GBP validation data 'B' length	2

**Note:** 1. For the two-digit fields, the terms 'digit 1' and 'digit 2' refer to the high and low nibbles respectively.

**Note:** 2. Field PREF2 contains the GBP validation data 'B' reference point in its first digit.

**Note:** 3. Fields 'q', 'r', 's' and 't' describe the location of the CIM86 Sensor and GBP PIN information in the FIT. They are only required if these features are used. However, if GBP PIN verification is required without CIM86 Sensor, the CIM86 Sensor field must still be present, so that the GBP PIN data is located at the correct offset within the table.

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

In this passage we discuss each of the fields in the FIT.

### 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 Financial Institution Number on the card. The range is 00-7F hex.

You should add 80 hex to this number if it is needed to modify the index delimiters in table entry PINDX. See the description of PINDX 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 Number. The terminal checks whether the Financial Institution Number found using PIDDIX 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.

### **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. 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.

EKC Present	Bits		PIN Block to be used
	7	6	
No	0	0	Diebold
No	1	0	ANSI
No	0	1	Illegal. See Note 1
No	1	1	Illegal. See Note 2
Yes	0	0	Reserved
Yes	1	0	Reserved
Yes	0	1	Illegal. See Note 1
Yes	1	1	BANKSYS

**Note:** 1. Bit 7 can be read as 0:Diebold, 1:ANSI and bit 6 can be read as 1:BANKSYS. This combination of bits is contradictory when the EKC is fitted. BANKSYS is seen as a connected block to ANSI.

**Note:** 2. BANKSYS PIN block is only available with an EKC.

If an EKC is configured and neither bit 7 or bit 6 of this field is set to 1, no PIN block is included in the Transaction Request Message sent to Central. See Section 5, “Security Features”, for details of Diebold, ANSI and BANKSYS PIN blocks.

### PCKLN (Maximum PIN Digits Checked)

This field identifies:

- The type of PIN verification used for this card (DES, VISA, Diebold or GBP PIN)
- If local or remote verification is required
- The number of PIN digits to be checked
- The length of the offset number.

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

001 - VISA

010 - DIEBOLD

011 - GBP PIN

100 - Reserved

For DES, VISA and Diebold PIN verifications, the lower five bit field specifies if local verification is to be performed, and the number of entered PIN digits to check. It must be less than or equal to PMXPN and in the range 04-10 hex. The value also specifies the length of the offset number. Remote verification is not available for VISA or Diebold Proprietary PIN verification.

If the lower seven bits of PCKLN are zero, no local PIN verification is performed and the only significant FIT entries are a, b, c, e, g, n and o.

**Note:** If an EKC is configured, Local PIN Verification must NOT be specified in any FIT.

### 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:

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

#### First Digit

Hex Value	Type of Encryption	Encryption Key and Sequence		Co-Ordination Number Included? See Note 1
		First	Second	
0	Single	COM	-	No
2	Double See Note 4	MASTER	COM	No
3	Double	PEKEY	COM	No
4	None See Note 3	-	-	No
8	Single	COM	-	Yes See Notes 2 and 5

#### First Digit

Hex Value	Type of Encryption	Encryption Key and Sequence		Co-Ordination Number Included? See Note 1
		First	Second	
A	Double	MASTER	COM	Yes See Notes 2 and 5
B	Double	PEKEY	COM	Yes See Notes 2 and 5
C	None See Note 3	-	-	Yes See Note 5

**Note:** 1. The Co-Ordination Number is the same as the one included in the Transaction Request message. It is added to the PIN data when Diebold PIN block is selected.

**Note:** 2. The Co-Ordination Number is also encrypted.

**Note:** 3. The encryption commands 4 and C hex which call for transmitting an unencrypted PIN are not secure.

**Note:** 4. Double encryption involves encrypting the PIN field using the first encryption key, then encrypting the encrypted PIN field, using the second encryption key.

**Note:** 5. The message co-ordination number is never included in this block when the data security feature is specified.

#### 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
- Diebold - two digits in the range 04-13 hex or 1F hex
- VISA - two digits with values 0D or 10 hex
- GBP - two digits in the range 00-10 hex (see PVBLN passage for details).

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.

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. See Chapter 2.1, "B - PIN Entry State" passage, for details.

**Note:** If an EKC is configured, local checking of the number of PIN digits must always be specified. A minimum of four digits is required.

### **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.

**Diebold** The value must be in the range 00-99 hex. Hex values A-F are not allowed. If the value of PAGDX is FF hex, PANPD is the algorithm number. Otherwise it is the PAD digit.

**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 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.

### **PINDEX (Index Reference Point)**

This six-digit field is the key to starting points for all of the other card fields referenced in the FIT - PIIDDX, PAGDX, PANDX, POFDX, PLNDX, and PRCNT.

- PIIDDX locates the Financial Institution Identification Number
- PAGDX locates the Algorithm Number/Bank ID
- 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, it is omitted from the FIT data. 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.

The following table gives the digit corresponding to each valid combination of track number, delimiter and direction:

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
8	2	End Sentinel	Backwards
9	3	End Sentinel	Backwards
A	1	End Sentinel	Backwards

Each digit in PINDEX specifies track and index reference points for one of the index entries in the FIT. The following table shows how these digits are assigned:

PINDEX Digit	Related Index	Related Card Data
1	PAGDX	Algorithm number (Diebold)
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 first digit is the MM sensor with CIM86 MCRW requirement, the second is the action to be taken when a CIM86 verify operation reports anything other than 'good' .

Digit 1 - MM Sensor with CIM86 MCRW requirement

- 0 - MM Sensor with CIM86 MCRW not required for cardholder's card group
- F - MM Sensor with CIM86 MCRW required for cardholder's card group

Digit 2 - MM Sensor with CIM86 MCRW 'failure' action

- 0 - Cancel transaction at terminal
- F - Send Transaction Request to Central with CIM86 verify code and allow Central to determine what action to take

For both digits, values other than F are treated as 0. Digit 2 is ignored unless digit 1 is F.

### **PREF2 (Second Index Reference Point)**

This field contains the second index reference point. The first digit is used for validation data 'B' . It identifies the track, the starting point and the direction to count in to find the data. This is the same method as used by PINDEX, and uses the same table of hex codes.

The second digit is reserved for future use.

### **PVBDX (GBP Data B Index)**

This field gives the offset of validation data 'B' on the card. PVBDX specifies this location as the offset from the reference point, identified by the first digit of PREF2, to the start of the data. The range of PVBDX is 00-7F hex.

### **PVBLN (GBP Data B Length)**

This field specifies the number of digits, from the location specified by PVBDX, that the terminal must use as validation data 'B' during GBP PIN verification. This number does not include embedded field separators, and must be in the range 00-10 hex.

During GBP PIN verification, validation data 'B' is appended to the PAN, with embedded field separators removed. The total of PANLN and PVBLN must be in the range 00-10 hex.

**Note:** PANLN is calculated differently for NDC DES and GBP PIN verification. For NDC DES, it is the length of the PAN plus any field separators. For GBP, it is the length of the PAN without any field separators, provided that PVBLN is not zero.

Validation data 'B' is only used for GBP PIN verification.

## Linked FITs

In this passage we tell you 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 does allow for 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.

We recommend 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.

## FITs On Terminals With Door Access Control

FITs can be used on terminals with the Door Access Control feature.

When the cardholder inserts a card at the vestibule door, the Track 2 data on the card is sent to the terminal that is responsible for door access control. If the card data matches one of the FIT entries, the door is unlocked. If there is no FIT match, the door remains locked.

The Door Access Control feature can operate at any time during terminal operation as long as the terminal has power and valid FITs.

# Diebold PIN Information Without FITs

In this passage we give you information on the following topics:

- Performing Diebold PIN verification without FITs
- Algorithm Locator/Identifier field
- Offset Index Data field
- Using the Offset Index Data.

## Performing Diebold PIN Verification Without FITs

If you want to perform Diebold PIN verification without FITs, you can do so by using the information contained in the Diebold PIN Information Load message. See Chapter 4.2, “Diebold PIN Information Load” passage, for details of the message fields. This message is downloaded from Central to the terminal, and when the information is used together with the PIN mode word value in the PIN Entry State, it allows PIN verification to take place.

We discuss the information contained in the Diebold PIN Information Load message in the following passages.

**Note:** We provide you with the Diebold Proprietary Algorithm. However, you must apply to INTERBOLD for permission to use it.

## Algorithm Locator/Identifier Field

This one-byte field specifies either the location of the algorithm number on the card, or the algorithm itself.

Value	Action
000	Used for testing only.
001-030	Locate the PAN using the PIN mode value. Once this has been located, start with the character after the start sentinel, and use the index to locate the two-digit algorithm number.  Index = Algorithm Locator value
031-079	Locate the PAN using the PIN mode value. Once this has been located, start with the character after the field separator following the PAN, and use the index to locate the two-digit algorithm number.  Index = Algorithm Locator value - 30

Value	Action
080	The two-digit algorithm number immediately precedes the PIN offset. Use the PIN mode value and offset index data to locate it.
081-099	This value is the algorithm number.

## Offset Index Data Field

The offset index data is made up of seven bytes. Each byte contains an index which, starting from the character after the first field separator on the card, locates the four-digit PIN offset number. If an index is zero, the offset is not used.

## Using The Offset Index Data

You use the offset index data, together with the PIN mode value in the PIN Entry state, to locate the PIN offset and PAN on the cardholder's card. A bit set in the PIN mode value identifies the specific offset to use.

PIN Mode Value	Offset Byte Number	Card Data Track	Overrun Count See Note 1
1	1	2	21
2	2	2	21
4	3	3	25
8	4	3	25
16	5	3	25 See Note 2
32	6	3	25 See Note 2
64	7	1	21 See Note 3

**Note:** 1. The PAN is located after the start sentinel. The overrun count is the maximum number of digits, starting with the first character of the PAN, that are searched in order to find a field separator. When this is found, you can calculate the length of the PAN.

**Note:** 2. Verification skips the first two characters of the PAN.

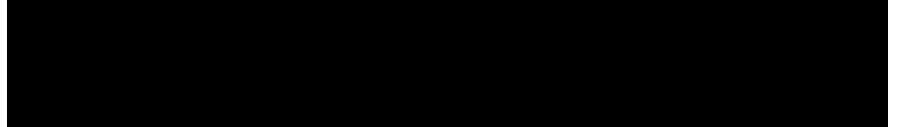
**Note:** 3. Track formats A and B are supported.

A PIN mode value can identify more than one offset. For each cardholder PIN entry attempt, they are used in turn until either verification succeeds or all the offsets are used. Offsets are tried from the lowest to the highest value.

For example, if the PIN Mode value is 22, the entered PIN is first verified using offset 2, looking for the PAN on card track 2. If this fails, verification is tried using offset 3, looking for the PAN on card track 3. If this fails, offset 5 is tried, with the PAN on track 3. If this fails, the PIN mode value options are exhausted ( $22 = 2 + 4 + 16$ ), and a PIN entry attempt failure is reported.

This counts as one attempt for the retry count in the PIN Entry state table.

Financial Institution Tables  
**Diebold PIN Information Without FITs**



Section 3

## Terminal to Central Messages

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Chapter 3.1

Transaction Request Messages

---

Chapter 3.2

Status Messages

---

Chapter 3.3

Exit to Host Messages

---

Chapter 3.4

EJ Upload Message

---

Chapter 3.5

Device Fault Status Information - Native Mode

---

Chapter 3.6

Device Fault Status Information - Diebold Emulation Mode

## Table of Contents

## Overview

# Terminal To Central Messages

In this section we identify and discuss the messages that the Central application receives from the terminal. These messages fall into the following categories:

- Transaction Request messages
- Solicited Status messages
- Unsolicited Status messages
- Software Management Installation Status messages
- Messages from Exits to Host
- EJ Upload message.

If you are a programmer creating the Central control application to support an NDC+ system, we recommend that you refer to this section in order to understand the format of the messages that the Central application will receive. You will then be able to design your application to decode and act upon these messages correctly.

In the following chapters we describe the format of each type of message. The messages are fixed in format and include a protocol-dependent header and trailer. We describe the protocol-independent message text between the header and trailer.

We describe the contents of the status information field in Solicited and Unsolicited Status messages, sent when the terminal is using either Native mode or Diebold Emulation mode status reporting.

We also describe the contents of Software Management Installation Status messages generated by NDC+.

To find the location of specific messages quickly, see Appendix D, “Quick Reference To Message Types”.

**Note:** For details of TM-Alert messages sent to Central, see the NCR publication, *TM-Alert Reference Manual*.



Chapter 3.1

## Transaction Request Messages

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Transaction Request Messages	3.1-1
Introduction	3.1-1
Message Format	3.1-1
Notes	3.1-13
Field 'ad3' Examples:	3.1-14
Field 'as6' Examples:	3.1-15

Table of Contents

## **Transaction Request Messages**

# Transaction Request Messages

## Introduction

In this chapter we give you information on the format of the Transaction Request message. This message contains the data that Central needs 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.

## 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.  See <i>NDC+ Supervisor's Reference Manual</i> for details.
FS	1	M	Field Separator.
FS	1	M	Field Separator.
e	8	See Note 4	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.

Transaction Request Messages  
Transaction Request Messages

Field	Number of Characters	Mandatory/Optional	Description
g	1	M	<p>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.</p> <p>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.</p> <p>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.</p>
FS	1	M	Field Separator.
h	Var (39)	See 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 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 Note 1	Operation Code Data. Contains the data collected in the Operation Code buffer as a result of function display keys pressed. States D, E and Y determine the contents of this field, which identifies the transaction selected by the cardholder.
FS	1	M	Field Separator.
k	8 or 12	See Notes 1, 5	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.

Field	Number of Characters	Mandatory/Optional	Description
1	Var (32)	See Note 1	PIN Buffer (Buffer A). Contains a 16-character PIN, encrypted as specified in the FIT, for remote PIN verification.
FS	1	M	Field Separator.
m	Var (32)	See 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 'timed-out' waiting for the cardholder to respond (via keyboard entry) to an Interactive Transaction Response, or a graphic 'E' if the cardholder pressed the Cancel key. 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	See Note 3	Field Separator. Not included if the terminal is configured with the No-PIN option.
n	Var (32)	See 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 Note 2	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 Note 6	Transaction Status Data Identifier. Identifies the data that follows in the next field as Transaction Status data:  '2' - status data.
r	Var (50)	See Note 6	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 Last Transaction Notes Dispensed - 20 bytes  If a CDM is present, the following data will also be included:

Transaction Request Messages  
**Transaction Request Messages**

Field	Number of Characters	Mandatory/Optional	Description
			Last Transaction Coinage Amount Dispensed - 5 bytes Last Transaction Coins Dispensed - 20 bytes
			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 TSN. The value will be one of the following:  '0' - none sent '1' - good termination sent '2' - error status sent '3' - transaction reply rejected.
			Last Transaction Notes Dispensed contains four five-digit decimal counts defining the notes dispensed on the last dispense transaction. These will be zero if the last function command received was not a dispense command.
			Last Transaction Coinage Amount Dispensed is included for migration purposes for Central Applications which support third generation coinage dispensing. It will be set to '00000' .
			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 from a 'cold' start.
FS	1	See Note 7, 8, 9	Field Separator.
aa1	1	See Note 7, 8, 9	Primary Code Line Data ID 'A' . Identifies the primary code line on the document for an ADM. It is included if the appropriate element is set in the Transaction Request state.  This field is reserved for NDC RMX.
aa2	Null	See Note 7, 8, 9	Primary Code Line Data. Reserved for NDC RMX.
FS	1	See Note 7, 8, 9	Field Separator.
ab1	1	See Note 7, 8, 9	Secondary Code Line Data ID 'B' . Identifies the secondary code line on the document for an ADM. It is included if the appropriate element is set in the Transaction Request state.  This field is reserved for NDC RMX.
ab2	Null	See Note 7, 8, 9	Secondary Code Line Data. Reserved for NDC RMX.
FS	1	See Notes 7, 8	Field Separator.

Field	Number of Characters	Mandatory/Optional	Description
ac1	1	See Notes 7, 8	CIM86 Data Identifier. Identifies the data that follows in the next field as CIM86 data.  '6' - CIM86 data.
ac2	1 or 17	See Notes 7, 8	CIM86 Code and Data. Contains CIM86 verify code, and eight bytes of encrypted data if a successful CIM86 verify has occurred.
FS	1	See Notes 7, 8	Field Separator.
ad1	1	See Notes 7, 8	<p>Read Zone 1 Data Identifier. A value of 'C' (43 hex) in this field identifies the rest of the field as data from the first read zone in the read list for the current document definition.</p> <p>If this field has been requested during the Transaction Request state but a read has not been performed, only this field will be present. Similarly, if there was no zone at this position in the Read List, only this field will be present.</p> <p>In certain error conditions the Read List that was actioned may have only been partly successful. Because of this, each zone has its own Read Zone Status, 'ad2' .</p> <p>Read errors during a transaction will be reported in a DPM solicited status message. See Chapter 3.2, "Solicited Status Messages" passage, for details. This solicited message will define what error has occurred but will not contain any of the read data that may have been acquired.</p> <p>The Read Zone Status and the Read Zone Data are both set to null on entry to the Card Read state and when the DPM is enabled to accept a document. It is also cleared to null if the current document definition changes.</p>
ad2	1	See Notes 7, 8	<p>Read Zone 1 Status. Contains the status of the Read Zone data field which follows. It may take one of the following values:</p> <p>'0' (30 hex) - the read was successful</p> <p>'1' (31 hex) - the read was successful, but data contains misread characters</p> <p>'2' (32 hex) - the data was not read, due to a failure of the DPU</p> <p>'3' (33 hex) - the recognition board has failed</p> <p>'4' (34 hex) - the bar code reading software has failed</p> <p>See field 'ad1' for details of when this field is cleared to null and when it is not included in the message.</p>

Transaction Request Messages  
**Transaction Request Messages**

Field	Number of Characters	Mandatory/Optional	Description
ad3	Var (100)	See Notes 7, 8	<p>Read Zone 1 Data. Data obtained when the zone was read and optionally edited using a pre-defined edit mask in the DDF.</p> <p>Unreadable characters are identified by '?' and blank areas are returned as 'space'. The data from each zone in the Read List may be edited using an edit mask previously set up in the DDF. If the mask is set up such that it expects the read data to be longer than it actually is, the data will be padded on the left with spaces. The edit mask uses '#' and '?' to represent characters which should be ignored or read respectively. See examples following this table.</p> <p>See field 'ad1' for details of when this field is cleared to null and when it is not included in the message.</p>
FS	1	See Notes 7, 8	Field Separator.
ae1	1	See Notes 7, 8	<p>Read Zone 2 Data Identifier. A value of 'D' (44 hex) in this field identifies the rest of the field as data from the second read zone in the read list for the current document definition.</p> <p>See field 'ad1' for further information.</p>
ae2	1	See Notes 7, 8	Read Zone 2 Status. See field 'ad2' for details.
ae3	Var (100)	See Notes 7, 8	Read Zone 2 Data. See field 'ad3' for details.
FS	1	See Notes 7, 8	Field Separator.
af1	1	See Notes 7, 8	<p>Read Zone 3 Data Identifier. A value of 'E' (45 hex) in this field identifies the rest of the field as data from the third read zone in the read list for the current document definition.</p> <p>See field 'ad1' for further information.</p>
af2	1	See Notes 7, 8	Read Zone 3 Status. See field 'ad2' for details.
af3	Var (100)	See Notes 7, 8	Read Zone 3 Data. See field 'ad3' for details.
FS	1	See Notes 7, 8	Field Separator.
ag1	1	See Notes 7, 8	<p>Read Zone 4 Data Identifier. A value of 'F' (46 hex) in this field identifies the rest of the field as data from the fourth read zone in the read list for the current document definition.</p> <p>See field 'ad1' for further information.</p>
ag2	1	See Notes 7, 8	Read Zone 4 Status. See field 'ad2' for details.
ag3	Var (100)	See Notes 7, 8	Read Zone 4 Data. See field 'ad3' for details.
FS	1	See Notes 7, 8	Field Separator.

Field	Number of Characters	Mandatory/Optional	Description
ah1	1	See Notes 7, 8	Read Zone 5 Data Identifier. A value of 'G' (47 hex) in this field identifies the rest of the field as data from the fifth read zone in the read list for the current document definition.  See field 'ad1' for further information.
ah2	1	See Notes 7, 8	Read Zone 5 Status. See field 'ad2' for details.
ah3	Var (100)	See Notes 7, 8	Read Zone 5 Data. See field 'ad3' for details.
FS	1	See Notes 7, 8	Field Separator.
ai1	1	See Notes 7, 8	Read Zone 6 Data Identifier. A value of 'H' (48 hex) in this field identifies the rest of the field as data from the sixth read zone in the read list for the current document definition.  See field 'ad1' for further information.
ai2	1	See Notes 7, 8	Read Zone 6 Status. See field 'ad2' for details.
ai3	Var (100)	See Notes 7, 8	Read Zone 6 Data. See field 'ad3' for details.
FS	1	See Notes 7, 8	Field Separator.
aj1	1	See Notes 7, 8	Read Zone 7 Data Identifier. A value of 'I' (49 hex) in this field identifies the rest of the field as data from the seventh read zone in the read list for the current document definition.  See field 'ad1' for further information.
aj2	1	See Notes 7, 8	Read Zone 7 Status. See field 'ad2' for details.
aj3	Var (100)	See Notes 7, 8	Read Zone 7 Data. See field 'ad3' for details.
FS	1	See Notes 7, 8	Field Separator.
ak1	1	See Notes 7, 8	Read Zone 8 Data Identifier. A value of 'J' (4A hex) in this field identifies the rest of the field as data from the eighth read zone in the read list for the current document definition.  See field 'ad1' for further information.
ak2	1	See Notes 7, 8	Read Zone 8 Status. See field 'ad2' for details.
ak3	Var (100)	See Notes 7, 8	Read Zone 8 Data. See field 'ad3' for details.
FS	1	See Notes 7, 8	Field Separator.
al1	1	See Notes 7, 8	Read Zone 9 Data Identifier. A value of 'K' (4B hex) in this field identifies the rest of the field as data from the ninth read zone in the read list for the current document definition.  See field 'ad1' for further information.
al2	1	See Notes 7, 8	Read Zone 9 Status. See field 'ad2' for details.
al3	Var (100)	See Notes 7, 8	Read Zone 9 Data. See field 'ad3' for details.

Transaction Request Messages  
Transaction Request Messages

Field	Number of Characters	Mandatory/Optional	Description
FS	1	See Notes 7, 8	Field Separator.
am1	1	See Notes 7, 8	Read Zone 10 Data Identifier. A value of 'L' (4C hex) in this field identifies the rest of the field as data from the tenth read zone in the read list for the current document definition.  See field 'ad1' for further information.
am2	1	See Notes 7, 8	Read Zone 10 Status. See field 'ad2' for details.
am3	Var (100)	See Notes 7, 8	Read Zone 10 Data. See field 'ad3' for details.
FS	1	See Notes 7, 8	Field Separator.
ar1	1	See Notes 7, 8	Document Data Identifier. A value of 'Q' (51 hex) in this field identifies the next fields as Document Data describing the document's physical characteristics. The information pertains to the current document definition.  If there is no current document definition set, the data identifier 'Q' will be present but the data will be null.  Field 'ar2' is set to zero and fields 'ar3' and 'ar4' are set to null on entry to the Card Read and Card Read - PIN Entry Initiation states and when the DPM is enabled to accept a document.
ar2	1	See Notes 7, 8	Magnetic Flux Detected. This field informs Central if magnetic flux has or has not been detected on the document. This field will always be present if field 'ar1' is present and there is a document being processed. It may take one of the following values:  '0' - No magnetic flux detector or magnetic flux information not obtained  '1' - No magnetic flux detected on document  '2' - Magnetic flux detected on document  See field 'ar1' for details of when this field is cleared to null.

Field	Number of Characters	Mandatory/Optional	Description
ar3	Var (16)	See Notes 7, 8	<p>Document Class Name. This is an ASCII string of up to 16 characters which represents the Class Name of the document. The Class Name is used within the Document Definition File to specify the zone lists for documents of this class.</p> <p>When the DPM is only able to identify a document to within a few probable candidates, a solicited error may result. This error will inform Central of up to three possible candidates that the DPM believes to be likely. Central may then set the document name in a following transaction reply. This name need not be one of the suggested choices. If Central does not use one of these choices, there will be no document class available.</p> <p>If the DPM is able to identify the document, both the class name and the document name will be available.</p> <p>See field 'ar1' for details of when this field is cleared to null.</p>
GS	1	See Notes 7, 8, 10	Group Separator.
ar4	Var (16)	See Notes 7, 8	<p>Document Name. This is an ASCII string of up to 16 characters which represents the name of the document. It is used to identify each document within the Document Definition File uniquely. This is the name of the identified or Central-selected document.</p> <p>If the identification software is not used, Central will have provided an enable code to provide the entry qualification of the document. This enable code may have been chosen after the cardholder has gone through a lead-through that resulted in the Operation Code buffer (field 'j') providing sufficient information about the document details. In this case, neither document name nor document class will be available to Central unless Central decides to set one explicitly.</p> <p>The group separator preceding the document name will be present in the message only if the document name is present.</p> <p>See field 'ar1' for details of when this field is cleared to null.</p>
FS	1	See Notes 7, 8	Field Separator.

Transaction Request Messages  
Transaction Request Messages

Field	Number of Characters	Mandatory/Optional	Description
as1	1	See Notes 7, 8	<p>Courtesy Amount Data Identifier. A value of 'R' (52 hex) in this field identifies the following fields as the information obtained during the last Courtesy Amount Verification state. If a Courtesy Amount Verification state has not been executed since the last Card Read state, this field will only contain the identifier, 'R'. If the exit from the last Courtesy Amount Verification state was not 'good', again the field will only contain the identifier, 'R'.</p> <p>The CAV fields, 'as2' - 'as6', will be cleared to null on entry to the Card Read and Card Read - PIN Entry Initiation states when the DPM is enabled for the accepting of documents and on entry to the Courtesy Amount Verification state. They are also cleared to null if the current document definition changes.</p> <p>The CAV fields, 'as5' and 'as6', will remain null if there was no comparison carried out during the Courtesy Amount Verification state.</p>
as2	1	See Notes 7, 8	<p>CAV Result. This field may take one of the following values:</p> <ul style="list-style-type: none"> <li>'0' - Amounts match.</li> <li>'1' - Amounts do not match. The cardholder is probably incorrect.</li> <li>'2' - Amounts do not match. The cardholder is probably correct.</li> <li>'3' - Amounts do not match. Do not know which is correct.</li> <li>'4' - No decision on matching - cardholder amount comparison was not requested in the Courtesy Amount Verification state.</li> <li>'A' - Amounts match but a dog-eared document was detected.</li> <li>'B' - Amounts do not match. The cardholder is probably incorrect. A dog-eared document was detected.</li> <li>'C' - Amounts do not match. The cardholder is probably correct. A dog-eared document was detected.</li> <li>'D' - Amounts do not match. Do not know which is correct. A dog-eared document was detected.</li> <li>'E' - No decision on matching - cardholder amount comparison was not requested in the Courtesy Amount Verification state. A dog-eared document was detected.</li> </ul> <p>See field 'as1' for details of when this field is cleared to null.</p>
as3	4	See Notes 7, 8	<p>CAV Auxiliary Status. This is a four-character field in the range 0000-FFFF hex. It represents the country-specific information returned from the DPM during CAV.</p> <p>See field 'as1' for details of when this field is cleared to null.</p>

Field	Number of Characters	Mandatory/Optional	Description
as4	Var (13)	See Notes 7, 8	<p>Amount Read. Left-aligned string of numeric digits, padded to the right with blanks (20 hex), representing the amount read from the Courtesy Amount Zone. This will contain exactly one decimal point and may contain '?' (3F hex) characters indicating where digits could not be read.</p> <p>See field 'as1' for details of when this field is cleared to null.</p>
as5	1	See Notes 7, 8	<p>Difference Sign. Set to '+' (2B hex) if the cardholder amount is believed to be greater than or equal to the Amount Read. Otherwise it is set to '-' (2D hex).</p> <p>See field 'as1' for details of when this field is cleared to null.</p>
as6	Var (13)	See Notes 7, 8	<p>Difference Magnitude. This field represents the magnitude of the maximum difference between the cardholder-entered amount and the amount read from the document, taking account of the 'significant characters' mask provided in the DDF for the courtesy amount zone. The format is the same as for field 'as4'. See examples following this table.</p> <p><b>Note:</b> When characters cannot be read from the courtesy amount, the maximum or worst possible difference is sent.</p> <p>See field 'as1' for details of when this field is cleared to null.</p>
FS	1	See Notes 7, 8	Field Separator.
at1	1	See Notes 7, 8	<p>Zone Verification Data Identifier. A value of 'S' (53 hex) in this field identifies the following field as the Zone Verification Results. If no zone verification has been carried out, only the Data Identifier will be present.</p> <p>Field 'at2' will be cleared to null on entry to the Card Read and Card Read - PIN Entry Initiation states and when the DPM is enabled for the accepting of documents. It is also cleared to null if the current document definition changes.</p>
at2	Var (10)	See Notes 7, 8	<p>Zone Verification Results. This field contains the results of having checked each zone in the document's verify list to see if there was an endorsement or mark of some sort within it. Up to ten zones may have been checked. Each zone that is checked will have an associated byte returned in this field in the same order as the zones in the classes Verify List. Each character may take one of the following values:</p> <p>'B' - blank zone 'M' - marked zone (zone is not blank)</p> <p>See field 'at1' for details of when this field is cleared to null.</p>

Transaction Request Messages  
**Transaction Request Messages**

Field	Number of Characters	Mandatory/Optional	Description
av1	1	See Notes 7, 8	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 Transaction Request State Table, see Chapter 2, and no CSP has been requested only this field will be present.
av2	Var(16)	See Notes 7, 8	CSP Data. This field contains an encrypted 16 character PIN, see the FIT table, Chapter 2.7.
FS	1	See Notes 7, 8	Field Separator.
aw1	1	See Notes 7, 8	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 Transaction Request State Table, see Chapter 2, 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 Notes 7, 8	Confirmation CSP Data. This field contains an encrypted 16 character PIN, see the FIT table, Chapter 2.7.
FS	1	See note 7, 8, 11	Field Separator
ax1	1	See note 7, 8, 11	VC Data ID 'W'. The value 'W' in this field identifies the following field as containing data inserted by Exits.
ax2	Var	See note 7, 8, 11	This field is available for use by Exits.
FS	1	See note 7, 8, 11	Field Separator
ay1	1	See note 7, 8, 11	VC Data ID 'X'. The value 'X' in this field identifies the following field as containing data inserted by Exits.
ay2	Var	See note 7, 8, 11	This field is available for use by Exits
FS	1	See note 7, 8, 11	Field Separator
az1	1	See note 7, 8, 11	VC Data ID 'Y'. The value 'Y' in this field identifies the following field as containing data inserted by Exits.
az2	Var	See note 7, 8, 11	This field is available for use by Exits
FS	1	See note 7, 8, 11	Field Separator
ba1	1	See note 7, 8, 11	VC Data ID 'Z'. The value 'Z' in this field identifies the following field as containing data inserted by Exits.
ba2	Var	See note 7, 8, 11	This field is available for use by Exits
FS	1	See note 7, 8, 11	Field Separator
bb1	1	See note 7, 8, 11	VC Data ID '['. The value '[' in this field identifies the following field as containing data inserted by Exits.
bb2	Var	See note 7, 8, 11	This field is available for use by Exits

Field	Number of Characters	Mandatory/Optional	Description
FS	1	See note 7, 8, 11	Field Separator
bc1	1	See note 7, 8, 11	VC Data ID '\'. The value '\' in this field identifies the following field as containing data inserted by Exits.
bc2	Var	See note 7, 8, 11	This field is available for use by Exits
w	1	O	Field Separator.
	1	O	Optional Data Fields. These fields will be used for future expansion.
	Var	O	Data.
FS	1	See Note 4	Field Separator.
x	8	See Note 4	Message Authentication Code Data. This field contains the calculated value for authentication of this message.

## Notes

**Note:** 1. Fields 'h' - '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 Diebold Emulation option can be set whereby the PIN Block is sent even when no keys have been loaded. See *NDC+ Supervisor's Reference Manual* for details.

**Note:** 2. 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.

**Note:** 3. The field separator after buffer B is not included if the terminal is configured with the Diebold No-PIN option. See *NDC+ Supervisor's Reference Manual* for details.

**Note:** 4. These fields are only present if the Data security feature is selected and the security flags settings require their inclusion. See *NDC+ Supervisor's Reference Manual* for details.

**Note:** 5. The standard field length is eight digits, but you can configure it for twelve digits. See Chapter 4.2, "Configuration Parameters Load" passage, for details.

**Note:** 6. These fields and the preceding field separator are only present if the download option selects them. See Chapter 4.2, "Enhanced Configuration Parameters Load" passage, for details. The field separator that precedes field 'q' must be present, even if fields 'q' and 'r' are not present.

**Note:** 7. The optional fields from 'aa' 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.

**Note:** 8. If any of the fields from 'aa' 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.

**Note:** 9. When fields 'aa1'/'aa2' and/or 'ab1'/'ab2' are requested to be sent using the Transaction Request state, the data identifiers will be included in the message but the data element of the field will be null. These fields are specific to the third generation ADM device which is not supported in NDC+.

**Note:** 10. The group separator preceding the document name will only be present if the document name is present.

**Note:** 11. Fields **ax\*** to **bc\*** are available for use by Exits. They may contain any 7-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.

### Field 'ad3' Examples:

Edit Mask	#####????##??
Data read	9876543210123
Read Zone Data	432123
Edit Mask	#####????##??
Data read	23459876543210123
Read Zone Data	432123
Edit Mask	#####????##??
Data read	50123
Read Zone Data	bbb523

### Key

# - Ignore the corresponding character

? - Read the corresponding character

b - Space character

### Field ‘as6’ Examples:

Significant chars	xxxxxx	Cardholder amount	223.18
Courtesy amount	1?7.45	Difference 1	+ 25.73
Max read amount	197.45	Difference 2	+ 115.73
Min read amount	107.45	Max difference	+ 115.73
Significant chars	xxxx##	Cardholder amount	123.45
Courtesy amount	123.4?	Difference 1	+ 0.00
Max read amount	123.00	Difference 2	+ 0.00
Min read amount	123.00	Max difference	+ 0.00
Significant chars	xxxx##	Cardholder amount	123.45
Courtesy amount	127.18	Difference 1	- 4.00
Max read amount	127.00	Difference 2	- 4.00
Min read amount	127.00	Max difference	- 4.00
Significant chars	xxxx##	Cardholder amount	123.45
Courtesy amount	1?3.18	Difference 1	- 70.00
Max read amount	193.00	Difference 2	+ 20.00
Min read amount	103.00	Max difference	- 70.00
Significant chars	xxxxxx	Cardholder amount	223.45
Courtesy amount	1?7.18	Difference 1	+ 26.27
Max read amount	197.18	Difference 2	+ 116.27
Min read amount	107.18	Max difference	+ 116.27

#### Key

x - Significant character position

# - Ignore character in this position

? - Unknown digit

See Chapter 2.1, “A - Card Read State” passage, for details of CIM86 verify codes returned in a Transaction Request message.

Once decrypted, the eight bytes returned by a CIM86 verify have the following meaning:

Byte 1	Contains information related to the MM quality of a Euro Cheque card
Byte 2	Holds the release number (version) of the CIM86
Byte 3	Internal serial number - High Byte
Byte 4	Internal serial number - Low Byte
Byte 5	Number of card validations since power-up/reset - Low Byte

## Transaction Request Messages

### Transaction Request Messages

Byte 6	Number of card validations since power-up/reset - High Byte
Byte 7	Number of power-ups/resets since CIM86 was programmed - Low Byte
Byte 8	Number of power-ups/resets since CIM86 was programmed - High Byte

When the Transaction Request message is sent in reply to an Interactive Transaction Response, it differs from the above description in that it consists of the following fields only:

- 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  
1 or 2 Field Separators
- v MAC Data

Chapter 3.2

# Status Messages

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Solicited Status Messages	3.2-1
Introduction	3.2-1
Status Descriptor Field	3.2-1
Status Information Field	3.2-1
Message Format	3.2-1
Status Information	3.2-3
Specific Command Reject	3.2-3
Terminal State	3.2-6
Send Configuration Information	3.2-7
Hardware Configuration - Sub-Field 'g4'	3.2-12
Send Supply Counters	3.2-16
Send Tally Information	3.2-20
Send Error Log Information	3.2-21
Send Date/Time Information	3.2-23
Send Configuration ID	3.2-24
EKC Retrieve Hallmark Key	3.2-24
3.2-24	
Hardware Configuration Data	3.2-25
Supplies Data	3.2-27
Fitness Data	3.2-28
Tamper And Sensor Status Data	3.2-30
Software ID And Release Number Data	3.2-31
Local Configuration Option Digits	3.2-32
Device Fault - Native Mode	3.2-32
Transaction Reply Commands With Associated Device Fault	
Status Messages	3.2-33
Device Fault Status Information Field	3.2-33
Device Fault - Diebold Emulation Mode	3.2-36
Device Fault Status Information Field	3.2-36
Device ID - Sub-Field 'g1'	3.2-36
Device Status - Sub-Field 'g2'	3.2-37
Status Bits To Graphic Conversion Table	3.2-38
Unsolicited Status Messages	3.2-39
Introduction	3.2-39
Message Format	3.2-40

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Software Management Installation Status Messages	3.2-40
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# Solicited Status Messages

## Introduction

In this passage we give you information on the format and 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 that Exits can also send Solicited Status Messages. These are of the same format as standard Solicited Status Messages, but the content of the Status Descriptor and Status Information fields depends on the Exit.

### 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 tallies, logs, 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. See the following passages for more details.

## 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.

## Status Messages

### Solicited Status Messages

Field	Number of Characters	Mandatory/Optional	Description
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. See <i>NDC+ Supervisor's Reference Manual</i> for details.
FS	1	M	Field Separator.
FS	1	M	Field Separator.
e	8	See Notes1, 2	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 Note 1	Field Separator.
f	1	M	Status Descriptor. Describes the status message as follows:
		‘8’	<b>Device Fault</b> - This indicates that a terminal device is reporting abnormal status. This value is also used in a configuration ID status message.
		‘9’	<b>Ready</b> - This indicates that the instruction was completed successfully.
		‘A’	<b>Command Reject</b> - 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.  See Chapter 4.6, “Message Exception Handling” passage, for more information.
		‘B’	<b>Ready</b> - 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’	<b>Specific Command Reject</b> - 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.

Field	Number of Characters	Mandatory/Optional	Description
		'F'	<b>Terminal State</b> - This is sent in response to Terminal Commands requesting tallies, logs, supply counters, terminal configuration information, hallmark key or the date and time.
FS	1	See Note 3	Field Separator.
g	Var	See Note 3	Status Information. Additional status information is sent only when the status descriptor contains '8', 'C' or 'F' .
FS	1	See Notes 1, 2	Field Separator.
h	8	See Notes 1, 2	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.

**Note:** 1. This is not transmitted unless Message Authentication is in use, and has been selected for solicited status messages. See Chapter 4.2, "Message Authentication Field Selection Load" passage, for details.

**Note:** 2. This is not transmitted if the Status Descriptor field contains '9' or 'B' .

**Note:** 3. This is not transmitted unless the Status Descriptor field contains '8', 'C' or 'F' .

## Status Information

In this passage we tell you what 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 Chapter 4.6, "Message Exception Handling".

Field	Number of Characters	Mandatory/Optional	Description
g1	1	M	<p>Status Value. Gives the reason for rejecting the command. Values are:</p> <ul style="list-style-type: none"> <li>‘1’ - MAC Failure. Result of MAC verification did not equal the MAC field in the message.</li> <li>‘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.</li> <li>‘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.</li> <li>‘A’ - Message Format error.</li> </ul> <p>(g2) Status Qualifier:</p> <ul style="list-style-type: none"> <li>01 Message length error.</li> <li>02 Field Separator missing/unexpectedly found.</li> <li>03 Transaction Reply message has too many print groups.</li> <li>04 Group Separator missing/unexpectedly found.</li> <li>05 Too many DPM Write Lists or Write and Confirm Lists in the Transaction Reply message.</li> </ul> <p>‘B’ - Field Value error.</p> <p>(g2) Status Qualifier:</p> <ul style="list-style-type: none"> <li>01 Illegal Message Class.</li> <li>02 Illegal Message Sub-Class or Identifier.</li> <li>03 Illegal Load Key Message Modifier.</li> <li>04 Illegal Terminal Command Code.</li> <li>05 Illegal Terminal Command Modifier.</li> <li>06 Illegal Transaction Reply Function Identifier.</li> <li>07 Data field contains non-decimal digit.</li> <li>08 Data field value out of range.</li> <li>09 Invalid Message Co-ordination number.</li> <li>10 Illegal FIT number.</li> <li>11 Too many notes in a dispense function.</li> <li>13 Unrecognised Document Destination.</li> </ul>

Field	Number of Characters	Mandatory/Optional	Description
		14	Too many coins in a dispense function
		15	Unrecognised Buffer Identifier.
		16	Buffer Identifier 'E' Missing.
		17	Document Name Error.
		18	The screen identifier in an Override Reserved Screen Command is not the range 'D0000' - 'D0010'.
		19	Insufficient screen pool memory to store screen. May not be number of screens, but their size that creates this error  '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, clear SOH Level 2 or clear SOH Level 3 in progress
		03	Message not accepted while in Out-of-Service or Supply mode
		04	Message not accepted while in In-Service mode
		05	Message not allowed while configured for NCR status message mode
		06	Message not allowed while configured for Diebold status message mode
		07	Reserved
		08	EKC initialisation command not accepted. The EKC is already in a legal state
		09	Reserved
		10	Message not accepted while processing a Transaction Reply.
		11	Document is not present in the DPM.
		12	Cannot process a document while a statement print function is being carried out. Reported on the 5665 only.
		13	Cannot perform a statement print function while processing a document. Reported on the 5665 only.
		14	Cannot perform a DPM envelope deposit while processing a document.

Field	Number of Characters	Mandatory/Optional	Description
			15 Cannot perform a Communication Encryption Key Change during a cardholder transaction, or while the terminal is in suspend mode, or while the operator is initiating the execution of supervisory / settlement transactions.
			'D' - Hardware Failure.
			(g2) Status Qualifier:
		01	Encryption failure during key change message
		02	Time-of-Day Clock failure or invalid data sent, during Date/Time Set command
		03	Reserved
		04	EKC initialisation command not accepted due to encryption failure during initialisation
		05	Reserved
		06	Insufficient disk space.
			'E' - Not Supported.
			(g2) Status Qualifier:
		01	Function not supported by software
		02	Required device not configured. Sideways print on the receipt is requested and the option is not available.
		03	Reserved
		04	Reserved
		05	Journal printer backup inactive
g2	2	O	Status Qualifier. Present for status values 'A' - 'E'. (See preceding text)

## Terminal State

In this passage we describe what information can be contained in the Status Information field, field 'g', 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. See Chapter 4.1, "Terminal Commands", for details of terminal commands. The remaining sub-fields contain the status information requested by that command, as shown in the following tables.

The status information will vary according to which of the following terminal commands has been received by the terminal:

Terminal Command	Sub-Field 'g1'
Send configuration information	1
Send supply counters	2
Send tally information	3
Send error log information	4
Send date/time information	5
Send configuration ID	6
EKC retrieve hallmark key	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 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). See Chapter 4.1, "Terminal Commands", for details.

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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 sent to the terminal from Central. (0000-9999).
FS	1	M	Field Separator.

## Status Messages

## Solicited Status Messages

Field	Number of Characters	Mandatory/Optional	Description
g3	22 or 38	M	Hardware Fitness. Contains one byte per device or major device resource.
The significance of each character is:			
			Character    Contents
			0       Time-of-Day Clock *
			1       High Order Communications
			2       System Disk
			3       Magnetic Card Reader/Writer *
			4       Cash Handler *
			5       Depository *
			6       Receipt Printer *
			7       Journal Printer *
			8       Reserved
			9       Enhanced Thermal Statement Printer (SDC+)
			10      Night Safe Depository *
			11      Encryptor *
			12      Security Camera *
			13      Door Access *
			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 *
			22      Signage Display (**)
			23      Reserved
			24      Coin Dispenser
			25      System Display (**)
			26      Media Entry Indicators (**)

Field	Number of Characters	Mandatory/Optional	Description
			27      Envelope Dispenser * (**)
			28      Document Processing Module (**)
			29      Coin Dispensing Module Tamper Indication (**)
			30      Document Processing Module Tamper Indication (**)
			31      Reserved
			32      Digital Audio Service *(**)
			33.2-37    Reserved (**)
<p>* Native mode status messages can be received for these devices. The relationship between the Device Identification Graphic (DIG) in the status message and the offset in the Fitness table is:</p> <p>offset = DIG - 41 hex.</p>			
<p>(**) These fields are only returned if the command modifier '6' is used. See Chapter 4.1, "Terminal Commands", for details.</p>			
<p>Each byte is encoded with an error severity value indicating the current fitness of the device:</p>			
Code	Severity		
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		
<p>Routine, Warning and Fatal conditions can only be cleared by local supervisor functions.</p>			
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. See "Hardware Configuration - Sub-Field 'g4'" passage following this table for details.
FS	1	M	Field Separator.
g5	23 or 26	M	Supplies Status. Contains one character per type of media container.

## Status Messages

## Solicited Status Messages

Field	Number of Characters	Mandatory/Optional	Description
The significance of each character is:			
	Character	Contents	
	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 *	
	8-9	Not used (= 0)	
	10	Night Safe	
	11-14	Not used (= 0)	
	15	Type 1 Currency Cassettes	
	16	Type 2 Currency Cassettes	
	17	Type 3 Currency Cassettes	
	18	Type 4 Currency Cassettes	
	19-20	Not used (= 0)	
	21	Statement Paper	
	22	Statement Ribbon	
	23	Reserved (**)	
	24	Reserved (**)	
	25	Envelope Dispenser (**)	

\* If journal printing is configured for dual mode, supplies data for the physical journal printer only will sent.

(\*\*) These fields are only returned if the command modifier '6' is used. See Chapter 4.1, "Terminal Commands", for details.

Each character is coded as follows:

Code	Description
0	Not configured

Field	Number of Characters	Mandatory/Optional	Description
			<p>1      Good state</p> <p>2      Media low</p> <p>3      Media out</p>
			4      Overfill
			A 'Not Configured' status on currency bins indicates that no cassettes of that type were installed on 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.
FS	1	M	Field Separator.
g6	5 or 12	M	<p>Sensor Status. Contains one character per sensor and is identical to the information reported in characters 2-13 of the Sensors status message included later in this chapter.</p> <p>As in the status messages, TI sensors are only reported if the TI feature is configured.</p> <p>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.</p>
FS	1	O	Field Separator.
g7	6	O	<p>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 Note for details.</p> <p>For example, 060000 is release 06.00.00</p>
FS	1	O	Field Separator.
g8	9	O	<p>NDC+ Software ID. Contains the NDC+ Software ID. The field takes the following values:</p> <p>G530-0205 (NDC+ Native mode) G530-0206 (NDC+ Diebold Emulation mode)</p> <p>If the NDC+ Software ID is unavailable, this field contains nine blanks. See Note for details.</p> <p><b>Note:</b> Fields 'g7' and 'g8' are only included if the appropriate message mode option is set. This is 6c in Native mode and 10c in Diebold Emulation mode. See <i>NDC+ Supervisor's Reference Manual</i> for details.</p>

## Hardware Configuration - Sub-Field 'g4'

The configuration of each device is reported as two hex characters representing a byte of configuration information. The following table gives details of the hex value or bit significance of each byte as appropriate.

Byte	Device	
	Product	Class
0	Product	Class
0E	5663	
0F	5674	
10	5675	
11	5684	
12	5685	
13	5688	
14	5665	
15	5670	
16	<i>personaS<sup>75</sup></i>	
17	<i>personaS<sup>88</sup></i>	
18	<i>personaS<sup>40</sup></i>	
19	<i>personaS<sup>70</sup></i>	
1A	<i>personaS<sup>74</sup></i>	
1B	<i>personaS<sup>84</sup></i>	
1C	<i>personaS<sup>85</sup></i>	
1	7F	No configuration
2	System Disk	
	00	Hard disk present
	02	Reserved
3	Magnetic Card Reader/Writer *	
	01	Track 2 (read only)
	03	Track 1/2/3 MCRW (write on track 3 only)
	05	Low Cost 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 2/3 Dip MSR
	0C	Track 1/2/3 CIM 86 MCRW
	10	Track 1/2 Dip MSR
	11	Track 1/2 Swipe reader
	1D	MIMIC Smart Card Dip Reader
	Note that all other values are reserved.	

Byte	Device
4	Cash Handler *
	00 Standard cash handler not configured
	01 Standard cash handler configured
	02 Angel spray dispenser configured
5	Depository *
	00 Not configured
	01 Reserved
	02 PPD
	03 Reserved (third generation ADM)
	04 DPM envelope depository (non-5665 SSTs only)
6	Receipt Printer *
	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
7	Journal Printer *
	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
	01 Configured
9	Reserved
	00 Not configured
	01 Configured
10	Night Safe Depository *
	00 Not configured
	01 Configured
	02 Reserved

Byte	Device
11	Encryptor *
00	Not configured
01	NBS encryptor
02	Reserved
03	Reserved
04	Reserved
05	EKC encryptor
06	Reserved
12	Security Camera *
00	Not configured
01	Fixed format (for instance, 3M)
02	Variable format (for instance, D/A)
03	Reserved
04	Digital
13	Door Access *
00	Not configured
01	Configured
14	Flex Disk
00	Not configured
01	1.44 MB flex disk connected
02	2.88 MB flex disk connected
15	Tamper Indicating Bins * Not DPM or CDM
00	No TI bins present
01	Secure cash, insecure cards, insecure PPD deposits or no PPD
02	Secure cash, insecure cards, secure PPD deposits
03	Secure cash, cards and PPD or no PPD
16	Cardholder Keyboard
00	Reserved
01	Standard (BAPE) Keyboard
02	EKC Keyboard
17	Operator Keyboard
00	Not configured
01	Standard keyboard (Basic)
02	Keyboard plus FDKs (Enhanced)

Byte	Device																						
18	Cardholder Display/Voice <table> <tr> <td>BIT 0</td><td>0 - (always)</td></tr> <tr> <td>BIT 1</td><td>0 - (always)</td></tr> <tr> <td>BIT 2</td><td>0 - Voice not supported</td></tr> <tr> <td>BIT 2</td><td>1 - Voice supported if digital audio present</td></tr> <tr> <td>BIT 3</td><td>0 - Standard FDKs</td></tr> <tr> <td>BIT 3</td><td>1 - Touch screen</td></tr> <tr> <td>BIT 4</td><td>0 - VGA</td></tr> <tr> <td>BIT 4</td><td>1 - VGM Translator</td></tr> <tr> <td>BIT 5</td><td>0 - (always)</td></tr> <tr> <td>BIT 6</td><td>0 - (always)</td></tr> <tr> <td>BIT 7</td><td>0 - (always)</td></tr> </table>	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 - VGA	BIT 4	1 - VGM Translator	BIT 5	0 - (always)	BIT 6	0 - (always)	BIT 7	0 - (always)
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 - VGA																						
BIT 4	1 - VGM Translator																						
BIT 5	0 - (always)																						
BIT 6	0 - (always)																						
BIT 7	0 - (always)																						
19	7F      No configuration																						
20	7F      No configuration																						
21	Statement Printer * <table> <tr> <td>00</td><td>Not configured</td></tr> <tr> <td>01</td><td>Configured</td></tr> <tr> <td>02</td><td>Reserved</td></tr> <tr> <td>03</td><td>Reserved</td></tr> <tr> <td>05</td><td>5665 DPM statement printer</td></tr> <tr> <td>09</td><td>Enhanced thermal statement printer (SDC+)</td></tr> </table>	00	Not configured	01	Configured	02	Reserved	03	Reserved	05	5665 DPM statement printer	09	Enhanced thermal statement printer (SDC+)										
00	Not configured																						
01	Configured																						
02	Reserved																						
03	Reserved																						
05	5665 DPM statement printer																						
09	Enhanced thermal statement printer (SDC+)																						
22	Signage Display (**) <table> <tr> <td>00</td><td>Not Configured</td></tr> <tr> <td>01</td><td>Configured</td></tr> </table>	00	Not Configured	01	Configured																		
00	Not Configured																						
01	Configured																						
23	Reserved (**)																						
24	Coin Dispenser <table> <tr> <td>00</td><td>None</td></tr> <tr> <td>01</td><td>RMX</td></tr> <tr> <td>02</td><td>S4</td></tr> </table>	00	None	01	RMX	02	S4																
00	None																						
01	RMX																						
02	S4																						
25	System Display (**) <table> <tr> <td>00</td><td>Not Configured</td></tr> <tr> <td>01</td><td>2 x 40 Display</td></tr> <tr> <td>02</td><td>Enhanced Display (16 × 32)</td></tr> </table>	00	Not Configured	01	2 x 40 Display	02	Enhanced Display (16 × 32)																
00	Not Configured																						
01	2 x 40 Display																						
02	Enhanced Display (16 × 32)																						
26	Media Entry Indicators																						

Byte	Device
00	Not Configured
01	Configured
27	Envelope Dispenser * (**)
00	Not configured
01	Configured
02	Reserved
03	Reserved
28	Document Processing Module * (**)
00	Not configured
01	5665 DPM Configured
02	DP-ATM Configured
29	Coin Dispensing Module Tamper Indication (**)
00	Not configured
01	Present
30	Document Processing Module Tamper Indication (**)
00	Not configured
01	Present
31	Reserved (**)
32	Digital Audio Service * (**)
00	Not configured
01	Present
33.2-	Reserved (**)
37	

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\* Native mode status messages can be received for these devices. The relationship between DIG and configuration table offset is:

offset = 2 x (DIG - 41 hex)

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(\*\*) These fields are only returned if the command modifier '6' is used. See Chapter 4.1, "Terminal Commands", for details.

### Send Supply Counters

This Solicited Status message is sent to Central in response to a Send Counters Terminal Command message (a command code of '4'). See Chapter 4.1, "Terminal Commands", for details.

Field	Number of Characters	Mandatory/Optional	Description
g1	1	M	Message Identifier. This message has identifier '2'.
g2	4	M	Transaction Serial Number. 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 Cassette. 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.
g5	20	M	Notes Rejected. Consists of four five-digit decimal counts of the total number of notes moved to the reject bin from cassettes 1, 2, 3 and 4.  Although fields 'g4' and 'g5' may not be totally accurate, the sum of these counts for a particular cassette 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 cassettes 1, 2, 3 and 4. These counts are 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.
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.

## Status Messages

## Solicited Status Messages

Field	Number of Characters	Mandatory/Optional	Description
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' .  If a DP-ATM is being used, this count will only reflect deposits made using Function Command 'T' (DP-ATM Deposit Envelope).  This count will not include any documents moved to the Envelope/Reject Bin using Function Command 'S' (Process Document With Cash), during the Close state or following a power supply interruption when a DPM is present.
g10	5	M	Camera Film Remaining. The meaning of this field depends on the type of camera installed. A <b>film camera</b> returns a count of the number of frames remaining. The <b>Digital Camera System</b> returns a number which, when multiplied by 7, is the number of pictures which can be stored in the space remaining on its optical disk. If the camera does not support this feature, the field contains zeroes.
g11	5	M	Last Envelope Serial Number. The last envelope serial number is always 00000.
GS	1	See Note 1	Group Separator.
g20	0	O	Reserved for 3rd generation ADM fields.
GS	1	See Note 1	Group Separator.
g30	0	O	Reserved for 3rd generation CDM fields.
GS	1	See Note 1	Group Separator.
g40	0	O	Reserved for future use.
GS	1	See Note 1	Group Separator.
g50	5	O See Note 2	DPM Documents Deposited into Pocket A. Contains a count of the documents deposited into the DPM's Pocket A. The valid range is 0-65535. If more than 65535 documents are deposited into this pocket without the count being cleared, it will 'roll over' to zero. The count may be cleared using supervisor functions 'Clr Depos' or 'Clr Bins' .
g51	5	O See Note 2	DPM Documents Deposited into Pocket B. Contains a count of the documents deposited into the DPM's Pocket B. The valid range is 0-65535. If more than 65535 documents are deposited into this pocket without the count being cleared, it will 'roll over' to zero. The count may be cleared using supervisor functions 'Clr Depos' or 'Clr Bins' .

Field	Number of Characters	Mandatory/Optional	Description
g52	5	O See Note 2	DPM Documents Deposited into Pocket C. This count only applies to 5665 SSTs. Contains a count of the documents deposited into the DPM's Pocket C. The valid range is 0-65535. If more than 65535 documents are deposited into this pocket without the count being cleared, it will 'roll over' to zero. The count may be cleared using supervisor functions 'Clr Depos' or 'Clr Bins'.
g53	5	O See Note 2	DPM Documents Deposited into the Envelope/ Reject Bin (Bin 1). Contains a count of the documents deposited into the DPM's Envelope/ Reject Bin (Bin 1). The valid range is 0-65535. If more than 65535 documents are deposited into this pocket without the count being cleared, it will 'roll over' to zero. The count may be cleared using supervisor functions 'Clr Depos' or 'Clr Bins'.  If a DP-ATM is being used, this count will only reflect deposits made using Function Command 'S' (Process Document With Cash).  This count will also include any documents moved to the Envelope/ Reject Bin during the Close state, during the DPM Document Accept state or following a power supply interruption when a DPM is present.
GS	1	See Note 1	Group Separator.
g60	20	O See Note 3	Coins Remaining. Consists of four five-digit decimal counts of the total number of coins remaining in coin hoppers 1, 2, 3 and 4. These 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 contains 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 that has not been set.
g61	20	O See Note 3	Coins Dispensed. Consists of four five-digit decimal counts of the total number of coins dispensed from hoppers 1, 2, 3 and 4. These counts are consistent with coin 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 coins dispensed up to the time of power failure.
g62	20	O See Note 3	Last Transaction Coins Dispensed. Consists of four five-digit decimal counts 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.

**Note:** 1. The optional group separators will be included if any field is included after them within the message.

**Note:** 2. Fields ‘g50’ - ‘g53’ form a group and will only be present if a DPM is present. Otherwise, fields ‘g50’ - ‘g53’ will not be included.

**Note:** 3. Fields ‘g60’ - ‘g62’ form a group and will only be present if a CDM is present. Otherwise, fields ‘g60’ - ‘g62’ will not be included.

### Send Tally Information

This Solicited Status message is sent to Central in response to a Send Tally Group Terminal Command message (a command code of ‘5’). See Chapter 4.1, “Terminal Commands”, for details.

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. Contains the date and time the tallies were last cleared at the terminal and has 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.
g4	6	M	Tally Data. This field is a six-digit counter ('000000' - '999999') containing the data for one tally. It is repeated for each tally present within the group. The ordering of tallies within the message corresponds to the order in which tallies are displayed or printed at the terminal in local diagnostics reading from top to bottom, left to right.  The maximum number of tallies per group is limited to 64 by the message length, although in practice each group contains significantly fewer. While tally groups are the same length, there are not always the same number of fourth generation tallies within a group. See Chapter 4.6, “IBM 3600 Loop Messages” passage, for details of differences when using the IBM Loop communications protocol.  : The tally data is repeated for the number of tallies specified by the group number.

## Send Error Log Information

This Solicited Status message is sent to Central in response to a Send Error Log Group Terminal Command message (a command code of '6'). See Chapter 4.1, "Terminal Commands", for details.

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' - Processor or System 'B' - Communications 'C' - SST devices.
g3	2	M	New Entries. The number of new entries on the log since last read. If this is greater than log entries reported, it indicates that log entries have been missed.
g4	12	M	Date Last Cleared. The date and time the log was last cleared, 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.
g5	2	M See Note 5	Month. Month log entry made (01-12).
g6	2	M See Note 5	Day. Day log entry made (01-31).
g7	2	M See Note 5	Hour. Hour log entry made (00-23).
g8	2	M See Note 5	Minute. Minute log entry made (00-59).
g9	1	M See Note 5	Device Identification Graphic. This field identifies the device for which the log entry was made. This is the Device Identification Graphic used in all Native mode status reporting.  For system log, this contains a value of 'A'. For communication log, this contains a value of 'B'. For SST device log, this contains a value of 'C' or greater. For a repeat log entry, this contains a value of '?' .

## Status Messages

## Solicited Status Messages

Field	Number of Characters	Mandatory/Optional	Description
g10	2	M See Note 5	Maintenance Status. This consists of a two character decimal value (00-99). For a repeat log entry, this is the number of times the log entry is repeated. See <i>NCR 4th Generation Terminal M-Status Reference Manual</i> for details.  <b>Note:</b> A maintenance status code may exceed 99. However, for values over 99 only the last two digits are reported. For example, an M-Status of 92 hex (146 decimal) will mean that this field contains the value 46.
g11	1	M See Note 5	Severity. Severity of the log entry (1-4).
g12	1	M See Note 5	Part Number. Part number of the component of the device (0-4).
g13	Var (23)	M See Note 5	Maintenance Data. Maintenance data consisting of a string of hexadecimal characters (0-9, A-F). Each pair of characters represents the binary value of a single byte of detailed maintenance data.  The information reported is identical to the information contained in the local error log.  For a repeat log entry, this data field is empty.
FS	1	See Note 1	Field Separator.

**Note:** 1. Fields 'g5' - 'g13' are repeated for each log entry present. The field separator is not present after the last log entry. In the case of a repeat log, there are two entries. The first acts as a header indicating the time of the most recent entry and the number of times repeated. The following log entry contains the information which has been repeatedly logged by the system, with the time of the first entry.

**Note:** 2. The most recent log entry is reported first.

**Note:** 3. The number of log entries reported is limited by the maximum message length of 400 bytes. Although the terminal holds all the entries, NDC+ can only obtain a limited number of entries, and then send them according to message length. The number of entries accessible by NDC+ are:

Group 'A' - 5

Group 'B' - 10

Group 'C' - 25

The maximum length guarantees at least 10 entries.

**Note:** 4. The log can be cleared locally.

**Note:** 5. If there are no logs to be reported, these fields are omitted.

### **Send Date/Time Information**

This Solicited Status message is sent to Central in response to a Send Date And Time Terminal Command message (a command code of '8'). See Chapter 4.1, "Terminal Commands", for details.

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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.

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## 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’). See Chapter 4.1, “Terminal Commands”, for details.

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.

## EKC Retrieve Hallmark Key

This Solicited Status message is sent to Central in response to an EKC Retrieve Hallmark Key Terminal Command message (a command code of ‘=’). See Chapter 4.1, “Terminal Commands”, for details.

Field	Number of Characters	Mandatory/Optional	Description
g1	1	M	Message Identifier. This message has identifier ‘F’.
g2	1	M	EKC Status. Contains the EKC status and has the following values: ‘0’ - The EKC is operating normally ‘1’ - The EKC has reported a routine error ‘2’ - The EKC has reported a warning condition ‘3’ - The EKC has reported a suspend condition ‘4’ - The EKC has reported a fatal error ‘5’ - The EKC has not been initialised and does not contain a Hallmark key ‘6’ - The EKC cannot perform DEA2 block encryption. If an error is reported, the remaining fields are set to ‘0’.
g3	4	M	Authentication Block Length. This field defines the length of the block sent to Central. The length is comprised of two bytes, which are expanded to four hex ASCII values. These allow the length of the block to be transmitted as ASCII characters - the length value 00A1 is transmitted as 30 hex, 30 hex, 41 hex, 31 hex.

Field	Number of Characters	Mandatory/Optional	Description
g4	144	M	<p>Authentication Block Data. This field contains the block data generated from the encryptor. This data includes an encrypted version of the Hallmark key, generated when the EKC was initialised.</p> <p>The block is built up in the following way:</p> <ol style="list-style-type: none"> <li>1. A MAC is performed over the public key block.</li> <li>2. A message containing the Hallmark key, the above MAC and the serial number is built.</li> <li>3. The message is encrypted using the Hallmark key. It is formatted so that the most significant bit is non-zero, and it is padded with zeros.</li> </ol> <p>Each byte of the data generated (up to 72 maximum) is expanded to two hex ASCII values - FF hex is represented by 46 hex, 46 hex in the transmitted message.</p>

## Hardware Configuration 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 '1'). See Chapter 4.1, "Terminal Commands", for details.

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.
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:

## Status Messages

## Solicited Status Messages

Field	Number of Characters	Mandatory/Optional	Description
			'0E' - 5663 '0F' - 5674 '10' - 5675 '11' - 5684 '12' - 5685 '13' - 5688 '14' - 5665 '15' - 5670 '16' - <i>personaS</i> <sup>75</sup> '17' - <i>personaS</i> <sup>88</sup> '18' - <i>personaS</i> <sup>40</sup> '19' - <i>personaS</i> <sup>70</sup> '1A' - <i>personaS</i> <sup>74</sup> '1B' - <i>personaS</i> <sup>84</sup> '1C' - <i>personaS</i> <sup>85</sup>
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 Note 1		Device Identifier. This identifies the device to which the following hardware configuration data applies. See Appendix N, "Device Identifiers", for details.
Var	O See Note 1		Hardware Configuration. This contains information for each device indicating which variant of the device is configured and any other configuration data available. See Appendix N, "Device Identifiers", for details.
1	O See Note 2		Group Separator.
1	O See Note 2		Device Identifier.
Var	O See Note 2		Hardware Configuration.

Field	Number of Characters	Mandatory/Optional	Description
g5	1	O See Note 3	Field Separator.
	1	O See Note 3	Data Identifier.
Var	0 See Note 3		Data.

**Note:** 1. 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.

**Note:** 2. 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.

**Note:** 3. These fields are provided 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'). See Chapter 4.1, "Terminal Commands", for details

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	0 See Note 1		Device Identifier. This identifies the device to which the following supplies status data applies. See Appendix N, "Device Identifiers", for details.
Var	0 See Note 1		Supplies Status. This contains information for each device indicating the condition of the device's replenishables. See Appendix N, "Device Identifiers", for details.

Status Messages  
Solicited Status Messages

Field	Number of Characters	Mandatory/Optional	Description
			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 Note 2		Group Separator.
1	O See Note 2		Device Identifier.
Var	O See Note 2		Supplies Status.
g3	1	O See Note 3	Field Separator.
	1	O See Note 3	Data Identifier.
Var	O See Note 3		Data.

**Note:** 1. 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.

**Note:** 2. 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.

**Note:** 3. These fields are present 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'). See Chapter 4.1, "Terminal Commands", for details.

Field	Number of Characters	Mandatory/Optional	Description												
g1	1	M	Message Identifier. This message has identifier 'J' .												
g2	1	M	<p>Hardware Fitness Identifier 'A' .</p> <p>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.</p> <p>Note : if dual mode journal printing is active, the fitness data for the physical journal device only will be sent.</p>												
	1	O See Note 1	<p>Device Identifier. This identifies the device to which the following fitness data applies. See Appendix N, "Device Identifiers", for details.</p>												
Var	1	O See Note 1	<p>Fitness. Each fitness character is encoded with one of the following error severity values, indicating the current fitness of the device:</p> <table> <thead> <tr> <th>Char</th><th>Severity</th></tr> </thead> <tbody> <tr> <td>'0'</td><td>No error/not supported</td></tr> <tr> <td>'1'</td><td>Routine errors have occurred</td></tr> <tr> <td>'2'</td><td>Warning conditions have occurred - investigation is required</td></tr> <tr> <td>'3'</td><td>Suspend. The terminal is currently in the suspend state due to suspected tampering with this device</td></tr> <tr> <td>'4'</td><td>Fatal error condition exists on this device</td></tr> </tbody> </table> <p>Routine, warning and fatal errors can only be cleared by local Supervisor functions.</p> <p>See Appendix N, "Device Identifiers", for details.</p>	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
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														
	1	O See Note 2	Group Separator.												
	1	O See Note 2	Device Identifier.												
Var	1	O See Note 2	Fitness.												
g3	1	O See Note 3	Field Separator.												
	1	O See Note 3	Data Identifier.												
Var	1	O See Note 3	Data.												

**Note:** 1. 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.

**Note:** 2. 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.

**Note:** 3. These fields are present for future expansion.

### 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'). See Chapter 4.1, "Terminal Commands", for details.

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. See Chapter 3.5, "Sensors (Unsolicited)" passage, for details.
	1	M	Field Separator.
g3	1	M	Tamper Indicator Identifier 'B' .
	Var	M	Tamper Status. This field represents the condition of the TI sensors. If the TI feature is not configured, this field, with the buffer identifier, will not be present.
			The first seven characters of the tamper status data are identical to the information reported in bytes 7-13 of the Sensors Status message. See Chapter 3.5, "Sensors (Unsolicited)" passage, for details.
The contents of the tamper status data field are as follows:			
Char	Description		
1-7	Identical to bytes 7-13 of the Sensors Status message. See Chapter 3.5, "Sensors (Unsolicited)" passage, for details.		
8	'0' - Coin dispenser out '1' - Coin dispenser in		

Field	Number of Characters	Mandatory/Optional	Description
	9		'0' - Coin dispenser hopper 1 out '1' - Coin dispenser hopper 1 in
	10		'0' - Coin dispenser hopper 2 out '1' - Coin dispenser hopper 2 in
	11		'0' - Coin dispenser hopper 3 out '1' - Coin dispenser hopper 3 in
	12		'0' - Coin dispenser hopper 4 out '1' - Coin dispenser hopper 4 in
	13		'0' - DPM pockets open '1' - DPM pockets closed
			If a device is not configured, any associated TI byte will take the value '0'.
			<b>Note:</b> The 5665 DPM does not support tamper reporting.
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.

### 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'). See Chapter 4.1, "Terminal Commands", for details.

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, 060000 is release 06.00.00.
FS	1	M	Field Separator.
g3	1	M	Software ID Identifier 'B'.
	Var (9)	M	NDC Software ID. Contains the NDC+ Software ID.

Field	Number of Characters	Mandatory/Optional	Description
For this release, the field takes the following values:			
G530-0205 (NDC+ Native mode) G530-0206 (NDC+ Diebold Emulation mode)			
If the 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'). See Chapter 4.1, "Terminal Commands", for details.

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. See <i>NDC+ Supervisor's Reference Manual</i> for details.
			Each character is an ASCII representation of the associated Option Digit.
g3	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.

### Device Fault - Native Mode

In this passage we tell you what information is contained in the Status Information field when the Status Descriptor is '8' - Device Fault, and the terminal is using Native mode device status reporting. See Chapter 3.5, "Device Fault Status Information - Native Mode", for specific details.

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 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. See Appendix N, "Device Identifiers", for details.

### **Transaction Reply Commands With Associated Device Fault Status Messages**

The following table shows the Solicited Device Fault status messages which may be returned for each Transaction Reply command.

Transaction Reply Command	Device Faults
Deposit and Print	Depository
Dispense and Print	Cash Handler or CDM
Display and Print	CDM
Print Immediate	None
Set Next State and Print	None
Night Safe Deposit and Print	None
Card Before Cash (Native mode only)	Card Reader/Writer, Cash Handler or CDM
Fast Cash	Cash Handler or CDM
Card Before Parallel Dispense and Print (Native mode only)	Card Reader/Writer, Cash Handler or CDM
Print Statement and Wait	Statement Printer and Receipt in sideways mode
Print Statement and Set Next State	Statement Printer and Receipt in sideways mode
Process Document With Cash (Native mode only)	Cash Handler, CDM or DPM
DPM Deposit Envelope (Native mode only)	DPM Depository

### **Device Fault Status Information Field**

When the Status Descriptor is '8' - Device Fault, the following information is present in the Status Information field:

## Status Messages

## Solicited Status Messages

Field	Number of Characters	Mandatory/Optional	Description												
g1	1	M	Device Identification Graphic.												
g2	Var (17)	O	Transaction Status. Contains information required to make a transaction completion decision. The length of the field is different for each device but each device will always send the same number of characters. See Chapter 3.5, "Device Fault Status Information - Native Mode", for detailed descriptions for each device.												
FS	1	See Note 1	Field Separator.												
g3	Var (14)	O	Error Severity. Contains information required to make a 'shut down' or 'continue to use' decision. The length of the field is one character, with the exception of currency handler which sends five characters and DPM which sends 14. Each character is always coded in the same way: <table> <thead> <tr> <th>Code</th><th>Description</th></tr> </thead> <tbody> <tr> <td>'0'</td><td>No Error. Continue to use - no error has occurred. Diagnostic information follows.</td></tr> <tr> <td>'1'</td><td>Routine. Continue to use - a routine error has occurred and diagnostic information follows.</td></tr> <tr> <td>'2'</td><td>Warning. Continue to use, but it is recommended that the network operator be informed of the error or exception condition. Diagnostic information follows.</td></tr> <tr> <td>'3'</td><td>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.</td></tr> <tr> <td>'4'</td><td>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.</td></tr> </tbody> </table>	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.	'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.
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.														
'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 Note 1	Field Separator.												
g4	Var	O	Diagnostic Status. Used for logging errors. The length of the field is variable and may be omitted if there is no error condition to be reported. See Note 2. The field will always be present if preceded by an Error Severity field with a value of 1 or greater. There are certain rules which are followed by all devices:												

Field	Number of Characters	Mandatory/Optional	Description
			<p>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.</p> <p>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.</p> <p>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.</p>
FS	1	See Note 1	Field Separator.
g5	Var (8)	O	<p>Supplies Status. Contains information related to the state of supplies (paper, currency, magnetic cards, envelopes, inkwells, documents) in the terminal. This field contains one character for each supplies container managed by the device. Each character is always coded in the same way:</p> <ul style="list-style-type: none"> <li>'0' No New State. The state of the container can be assumed to be unchanged.</li> <li>'1' Good State. The state of the container is known to be good, for example, not low, empty or overfilled.</li> <li>'2' Media Low.</li> <li>'3' Media Out.</li> <li>'4' Overfill. The container has sensed a full condition and should be emptied.</li> </ul> <p>If this field is omitted, it can be assumed that there is 'no new state' on any container.</p>

**Note:** 1. A field separator is included if any of the subsequent fields are present.

**Note:** 2. The Diagnostic Status field is defined as having a variable length. This is because the field is hardware-dependent.

Variance may also be seen when comparing the field from a third generation device with that of its equivalent fourth generation device.

This does not affect Central packages that determine the field length by searching for the field separator characters. Central packages should not attempt to analyse these fields by allocating fixed lengths per device, as they may change with the hardware being used.

## Device Fault - Diebold Emulation Mode

In this passage we tell you what information is contained in the Status Information field when the Status Descriptor is '8' - Device Fault, and the terminal is using Diebold Emulation mode device status reporting.

NDC mechanisms operate in a different way from their equivalent Diebold mechanisms, and for this reason it is not possible to have the same interpretation on every status bit. Status bits which are only used for detailed fault isolation are not used.

In the following tables we specify the meaning of NDC-SST device status codes and show how the relevant status bits correspond to the Diebold recommended status handling procedures at Central.

### Device Fault Status Information Field

The following table shows the format of field 'g' in Solicited Status messages:

Sub-Field	Contents	Mandatory/ Optional	Number of Characters
g1	Device ID.	M	1
g2	Device Status.	M	Var
Group Separator. See Note.			
g3	Device ID. See Note.		
g4	Device Status. See Note.		Var

**Note:** These fields are present only in a response to a Send Configuration ID Terminal Command, when 911 option (byte 8) is set.

#### Device ID - Sub-Field 'g1'

The Device ID in sub-field 'g1' identifies which device is reporting the solicited status information.

Device ID	Device	Sent In Response To Function ID	Function Requested
2	Journal or Acknowledgement Printer	1, 2, 3, 4, 5, 6, 7, 8, 9, B, C, P and Q	Print See Note
3	Night Safe Depository	6	Night Safe Deposit and Print
4	Cash Handler	2 or B	Dispense (910/920)
6	Depository	1	Deposit (910/920)
8	Cash Handler	8 or C	Dispense (911/921)
:	Depository	7	Deposit (911/921)
<	Configuration ID	Terminal Command Message	Send Configuration ID
B	911 Hardware Configuration	Terminal Command Message	Send Configuration ID
O	Reserved		
P	Statement Printer	P or Q	Statement Print

### Device Status - Sub-Field 'g2'

Before the status bits are transmitted to Central, each four-bit nibble is padded to the left with a value of 3 hex, to create the ASCII code for a graphic character. If transmission is in EBCDIC, an ASCII to EBCDIC code translation is then performed. Status byte 0 is transmitted first, and each status byte is transmitted with the most significant nibble first.

For example:

If status bits 0, 4, 6 and 7 are set in byte 0

hex value = D1

ASCII codes = 3D, 31

EBCDIC codes = 7E, F7

graphics = '='

### Status Bits To Graphic Conversion Table

BITS 7 6 5 4 3 2 1 0	Hex Value	Transmitted ASCII Code	Transmitted EBCDIC Code	Transmitted Graphic	Journal Printer Graphic
0 0 0 0	0	30	F0	0	0
0 0 0 1	1	31	F1	1	1
0 0 1 0	2	32	F2	2	2
0 0 1 1	3	33	F3	3	3
0 1 0 0	4	34	F4	4	4
0 1 0 1	5	35	F5	5	5
0 1 1 0	6	36	F6	6	6
0 1 1 1	7	37	F7	7	7
1 0 0 0	8	38	F8	8	8
1 0 0 1	9	39	F9	9	9
1 0 1 0	A	3A	7A	:	A
1 0 1 1	B	3B	5E	;	B
1 1 0 0	C	3C	4C	<	C
1 1 0 1	D	3D	7E	=	D
1 1 1 0	E	3E	6E	>	E
1 1 1 1	F	3F	6F	?	F

**Note:** A solicited device fault status message with Device ID = 2 does not require Central to send a Transaction Reply command. The terminal will complete the transaction as if no exception had occurred.

## Unsolicited Status Messages

### Introduction

In this passage we give you information on the format and content of Unsolicited Status messages, in both Native and Diebold Emulation modes.

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.

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. See *NDC+ Supervisor's Reference Manual* Appendix A for details
- Errors in the Courtesy Amount Verification state, DPM Document Accept state or Close state.

Note that 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.

Device fault status information varies according to whether Native or Diebold Emulation mode status reporting is used. In later

passages of this chapter we provide the Device fault status information for both modes.

## 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 Note	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.
f	Var	M	Trailer. Protocol-dependent.

**Note:** On a Diebold Emulation mode Power-Up Status message, this field is omitted. In a Native mode Power-Up Status message, it is included. The field contains either the LUNO that has been previously downloaded, or ‘000’ .

## Software Management Installation Status Messages

The following three messages are generated by NDC+ relating to the Software Management (SM) installation activity. Depending upon the setting of the TPA Informed of SM Activity Option, see

Chapter 2.6, they are transmitted to the Host. Their structure is shown:

Field	Number of Characters	Mandatory/Optional	Description
b	1	M	Message Class. The message class is '4'.
c	1	M	Message Sub-Class. The message Sub-Class is '1' - Software Management 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 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.
e	1	M	SM Installation Activity. This one byte entry outlines the SM installation activity. It can be one of the following values: '0' - SM installation pending '1' - SM installation complete '2' - SM installation cancelled.

Status Messages

**Software Management Installation Status Messages**

Chapter 3.3

## Exit to Host Messages

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Exit To Host Messages	3.3-1
Introduction	3.3-1
Message Format	3.3-2

[Table of Contents](#)

[Exit to Host Messages](#)

## Exit To Host Messages

### Introduction

In this passage we tell you about the format and content of Exit to Host Messages.

NDC+, acting as a communications gateway, can send messages on behalf of an Exit to the host via High Order Comms.

Exits are free to use these messages for any purpose. Any Exit may send a message of this class to the Host. 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 `SendUnformattedData`, which is supplied in the DLL file *EXUTIL.DLL*. 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 `SendUnformattedData`, which is included as message field f.

For further information about Exits and Virtual Controllers, please read the manual *Using NDC+ Exits*.

## 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 3.4

## EJ Upload Message

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Upload EJ Data Message	3.4-1
Introduction	3.4-1
Message Format	3.4-1

[Table of Contents](#)  
[EJ Upload Message](#)

# Upload EJ Data Message

## Introduction

In this passage we give you information on the format and content of the Upload EJ Data message.

The terminal sends an Upload EJ Data message to Central in response to an EJ Command. The electronic journal data is taken from the file EJDATA.LOG on the C:\SYSTEM directory of the SST's hard drive. A pointer is maintained in NVRAM to indicate the location of the next block of data to be uploaded. 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. The SST will continue to upload EJ data blocks as long as an acknowledgment message is received from Central for each message sent. If an acknowledgement is not received, the SST will re-send the current block up to the maximum number of re-tries set in the EJ Options and Timers message. When all EJ data is uploaded, the data is deleted from the EJDATA.LOG file.

See Chapter 4.5, 'EJ Commands' for details of EJ Options and Timers and acknowledgment messages.

The SST will send an Upload EJ Data message when in Out-of-Service mode or in 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.

The Supervisor function INIT EJRNL should not be performed during EJ upload. See Chapter 3, 'Replenish Menu' in the *NDC+ Supervisor Reference Manual* for details.

## Message Format

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.

Field	Number of Characters	Mandatory/Optional	Description
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 note.
h	6	M	Last Char This Block. Range 000000 to 999999. See note.  The SST compares the Last Character Received field in the acknowledgment 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 acknowledgment message is ignored. See Chapter 4.5, 'EJ Commands' for more details. The Last Character Previous Block field can be used by the host for checks on message received.
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 size.
j	1-350	M	Response Data. Upload data consists of ASCII text with carriage return (CR) at the end of each line. Lines are a maximum of 40 characters.

**Note:** 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 NVRAM is preserved.

Chapter 3.5

# Device Fault Status Information - Native Mode

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Introduction	3.5-1
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Device Status Information	3.5-2
Time-Of-Day Clock (Unsolicited)	3.5-2
Power Failure (Unsolicited)	3.5-2
Card Reader/Writer (Solicited/Unsolicited)	3.5-3
Cash Handler (Solicited/Unsolicited)	3.5-5
Depository (Solicited/Unsolicited)	3.5-8
DP-ATM Envelope Depository (Solicited/Unsolicited)	3.5-9
Receipt Printer (Solicited/Unsolicited)	3.5-10
Journal Printer (Unsolicited)	3.5-11
Electronic Journal Printer (Unsolicited)	3.5-13
Night Safe Depository (Solicited/Unsolicited)	3.5-14
Encryptor (Unsolicited)	3.5-15
Camera (Unsolicited)	3.5-16
Door Access (Unsolicited)	3.5-16
Sensors (Unsolicited)	3.5-17
Touch Screen Keyboard (Unsolicited)	3.5-19
Supervisor Keys (Unsolicited)	3.5-20
Statement Printer (Solicited/Unsolicited)	3.5-21
Coin Dispenser (Solicited/ Unsolicited)	3.5-23
Envelope Dispenser (Unsolicited)	3.5-26
Document Processing Module (Solicited/ Unsolicited)	3.5-27
DPM Transaction/Device Status - Field 'e2/g2'	3.5-28
DPM Error Data - Sub-Field 'e203/g203'	3.5-33
Digital Audio Service (Unsolicited)	3.5-35

Table of Contents

**Device Fault Status Information - Native Mode**

# Introduction

The following table shows the structure of the Status Information field in Unsolicited Status messages sent in Native mode.

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 or 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 Note	Field Separator.
e3	Var (14)	O	Error Severity. As 'g3' in Solicited messages.
FS	1	See Note	Field Separator.
e4	Var	O	Diagnostic Status. As 'g4' in Solicited messages.
FS	1	See Note	Field Separator.
e5	Var (8)	O	Supplies Status. As 'g5' in Solicited messages.

**Note:** This field separator is included if any of the following optional fields are included.

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 produce an Unsolicited Status.

## Device Status Information

In the following passages we describe the status information for each device when Native mode status reporting is used.

### 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 to service.

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.

Field	Number 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.

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:		
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	'6'	CIM86 malfunction.		
U	'7'	Error in track data.		
U	'8'	Communications error with CIM86.		
U	'9'	CIM interface PCB malfunction.		
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. When CIM86 is configured, the first character indicates the MCRW severity and the second indicates the CIM86 error severity. As the two severities are not dependent on each other, only one of them is current for the status message, the other being the last value sent. For transaction statuses 0-4, the MCRW severity character is current; for 6-9, the CIM86 severity character is current.		
The value of the CIM86 severity character varies according to the following rules:				

Value	Description
'0'	Last CIM86 verification was good.
'1'	CIM86 verification caused the status message to be sent when the previous severity value was '0'.

## Device Status Information

Field	Number of Characters	Content								
	'2'	CIM86 verification caused the status message to be sent when the previous severity value was '1'.								
	'4'	CIM86 verification caused the status message to be sent when the previous severity value was '2' or '4'.								
		When enhanced configuration option 21 is downloaded as '0', the terminal will attempt to use the CIM86 optical sensor when accepting a card.								
		When enhanced configuration option 21 is downloaded as '1', the terminal will increment the error count as before. However, the optical sensor will be disabled when the error severity reaches fatal, that is, more than two consecutive CIM86 verify faults. The CIM86 severity will not be reset to 'good' until Supervisor mode is exited.								
		When enhanced configuration option 21 is downloaded as '1' and the FIT has specified that CIM86 sensor checking is required, the verify will not be performed if the device has gone faulty and resulted in the optical sensor being disabled. If specified, the terminal will send the initialised CIM86 buffer values of a good verify (zero) and blank encryption data (eight zeros) to Central in a Transaction Request State message. Central is then responsible for ignoring this data if it has already been sent a status message indicating that the CIM86 is 'fatal'.								
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. See <i>NCR 4th Generation Terminal M-Status Reference Manual</i> for details.								
g5/ e5	1	Supplies Status. This is a single character field indicating the state of the card capture bin.  <table> <thead> <tr> <th>Code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>'0'</td> <td>No new state</td> </tr> <tr> <td>'1'</td> <td>No overflow condition (capture bin)</td> </tr> <tr> <td>'4'</td> <td>Overflow condition (capture bin)</td> </tr> </tbody> </table>	Code	Description	'0'	No new state	'1'	No overflow condition (capture bin)	'4'	Overflow condition (capture bin)
Code	Description									
'0'	No new state									
'1'	No overflow condition (capture bin)									
'4'	Overflow condition (capture bin)									

**Note:** In the event of an SDC link failure occurring to the MCRW, an unsolicited status message is reported indicating that the MCRW has a fatal severity and that the device is inoperative.

**Cash Handler**  
**(Solicited/Unsolicited)**

This message gives details of a dispense operation in response to a Transaction Reply Command message.

Field	Number of Characters	Content		
g1/e1	1	Device Identification Graphic 'E' .		
g2/e2	Var (17)	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.		
S	'2'	No notes dispensed.		
S	'3'	Faulty dispense. Notes dispensed unknown. 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.		
U	'5'	Some notes have been retracted following a Present and Notes Not Taken time-out. The number of notes retracted is unknown.		
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			

## Device Status Information

Field	Number of Characters	Content																
<p>The optional characters 10-17 contain notes presented counts for the Angel Spray dispenser. Each pair of characters represents a two-digit decimal value in the range 00-99 for a particular cassette type.</p> <p>The default message format does not include these characters. The extra fields are enabled in Native Mode Option 4C, see the <i>NDC+ Supervisor's Reference Manual</i>.</p>																		
<table> <thead> <tr> <th>Characters</th><th>Cassette Types</th></tr> </thead> <tbody> <tr> <td>10-11</td><td>1</td></tr> <tr> <td>12-13</td><td>2</td></tr> <tr> <td>14-15</td><td>3</td></tr> <tr> <td>16-17</td><td>4</td></tr> </tbody> </table>			Characters	Cassette Types	10-11	1	12-13	2	14-15	3	16-17	4						
Characters	Cassette Types																	
10-11	1																	
12-13	2																	
14-15	3																	
16-17	4																	
<p>Note that the maximum dispense for the Angel Spray dispenser is 70 notes, not 40 as for standard dispensers.</p>																		
g3/ e3	5	<p>Error Severity. Used to make a shut-down decision.</p> <table> <tbody> <tr> <td>Character '0'</td><td>Severity information related to complete device</td></tr> <tr> <td>Character '1'</td><td>Severity related to cassette type 1</td></tr> <tr> <td>Character '2'</td><td>Severity related to cassette type 2</td></tr> <tr> <td>Character '3'</td><td>Severity related to cassette type 3</td></tr> <tr> <td>Character '4'</td><td>Severity related to cassette type 4</td></tr> </tbody> </table> <p>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.</p>	Character '0'	Severity information related to complete device	Character '1'	Severity related to cassette type 1	Character '2'	Severity related to cassette type 2	Character '3'	Severity related to cassette type 3	Character '4'	Severity related to cassette type 4						
Character '0'	Severity information related to complete device																	
Character '1'	Severity related to cassette type 1																	
Character '2'	Severity related to cassette type 2																	
Character '3'	Severity related to cassette type 3																	
Character '4'	Severity related to cassette type 4																	
g4/ e4	Var	Diagnostic Status (M-status plus M-data). The M-status describes the main error found and occupies two characters. See <i>NCR 4th Generation Terminal M-Status Reference Manual</i> for details.																
g5/ e5	5	<p>Supplies Status. Indicates the state of the currency cassettes and reject bin.</p> <table> <tbody> <tr> <td>Character '0'</td><td>state of reject bin</td></tr> <tr> <td>Character '1'</td><td>state of cassette type 1</td></tr> <tr> <td>Character '2'</td><td>state of cassette type 2</td></tr> <tr> <td>Character '3'</td><td>state of cassette type 3</td></tr> <tr> <td>Character '4'</td><td>state of cassette type 4</td></tr> </tbody> </table> <p>Codes for characters 1 to 4 are:</p> <table> <thead> <tr> <th>Code</th><th>Description</th></tr> </thead> <tbody> <tr> <td>'0'</td><td>No new state (cassette not accessed or state unknown because of fatal hardware malfunction).</td></tr> <tr> <td>'1'</td><td>Sufficient notes.</td></tr> </tbody> </table>	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	Code	Description	'0'	No new state (cassette not accessed or state unknown because of fatal hardware malfunction).	'1'	Sufficient notes.
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																	
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.	
<b>Note:</b> If an attempt is made to dispense notes from a cassette type that is not installed, a supplies status code of '3' is returned.		

## Depository (Solicited/Unsolicited)

This message gives details of a deposit operation in response to a Transaction Reply Command message.

Field	Number of Characters	Content																		
g1/ e1	1	Device Identification Graphic 'F' .																		
g2/ e2	1	Transaction/Device Status. Gives details of a deposit operation in response to a Transaction Reply Command message. The values are:																		
		<table> <thead> <tr> <th>Sol/ Unsol</th> <th>Code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>U</td> <td>'0'</td> <td>Successful operation, but an exception condition occurred and is detailed in the following field.</td> </tr> <tr> <td>S</td> <td>'1'</td> <td>Time-out on cardholder deposit.</td> </tr> <tr> <td>S</td> <td>'2'</td> <td>Failure to enable mechanism for a deposit.</td> </tr> <tr> <td>S</td> <td>'3'</td> <td>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.</td> </tr> <tr> <td>S</td> <td>'4'</td> <td>Envelope/document jam or envelope/document deposit failed. The cardholder does not have access.</td> </tr> </tbody> </table>	Sol/ Unsol	Code	Description	U	'0'	Successful operation, but an exception condition occurred and is detailed in the following field.	S	'1'	Time-out on cardholder deposit.	S	'2'	Failure to enable mechanism for a deposit.	S	'3'	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.	S	'4'	Envelope/document jam or envelope/document deposit failed. The cardholder does not have access.
Sol/ Unsol	Code	Description																		
U	'0'	Successful operation, but an exception condition occurred and is detailed in the following field.																		
S	'1'	Time-out on cardholder deposit.																		
S	'2'	Failure to enable mechanism for a deposit.																		
S	'3'	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.																		
S	'4'	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. See <i>NCR 4th Generation Terminal M-Status Reference Manual</i> for details.																		
g5/ e5	1	Supplies Status. Indicates the state of the deposit bin. States reported are:																		
		<table> <thead> <tr> <th>Code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>'0'</td> <td>No envelope deposited</td> </tr> <tr> <td>'1'</td> <td>No overfill condition</td> </tr> <tr> <td>'4'</td> <td>Overfill detected</td> </tr> </tbody> </table>	Code	Description	'0'	No envelope deposited	'1'	No overfill condition	'4'	Overfill detected										
Code	Description																			
'0'	No envelope deposited																			
'1'	No overfill condition																			
'4'	Overfill detected																			

## DP-ATM Envelope Depository (Solicited/Unsolicited)

When the envelope depository present is a DP-ATM envelope depository, this message gives details of the error responses which may be returned in response to function command 'T' .

Field	Number of Characters	Content		
g1/ e1	1	Device Identification Graphic 'F' .		
g2/ e2	1	Device Status. This may take one of the following values:		
Sol/ Unsol	Code	Description		
U	'0'	Good operation, but some exception occurred as detailed in the diagnostic status.		
S	'1'	Time-out on cardholder deposit: 1. The cardholder did not enter a document within the specified time. 2. The cardholder pressed the cancel key and did not insert a document. 3. The cardholder failed to insert an acceptable document and it was taken when it was ejected.		
S	'2'	Depository failure. The diagnostic status field contains more information.		
S/U	'3'	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.		
S/U	'4'	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. See <i>NCR 4th Generation Terminal M-Status Reference Manual</i> for details.		
g5/ e5	1	Supplies Status. This may take one of the following values:		
Code	Description			
'0'	No new state or state not determined			
'1'	Good			
'4'	Overfill			

**Receipt Printer  
 (Solicited/Unsolicited)**

This message indicates whether or not a print operation has been successfully completed.

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.		
	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. See <i>NCR 4th Generation Terminal M-Status Reference Manual</i> for details.		
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	

Field	Number of Characters	Content
		<p>When a 'paper exhausted' condition is detected, the status message is:</p> <p>Transaction Status = 0  Error Severity = 4  Supplies Status = 3111</p> <p>(Ribbon, print-head and knife are OK).</p>

**Journal Printer (Unsolicited)** This message indicates whether or not a print operation has been completed successfully.

Field	Number of Characters	Content																																							
e1	1	Device Identification Graphic 'H' .																																							
e2	1 or 25 See Notes	Transaction/Device Status. Indicates whether or not the print was successfully completed.																																							
		<table> <thead> <tr> <th>Sol/ Unsol</th> <th>Code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>U</td> <td>'0'</td> <td>Successful print</td> </tr> <tr> <td>U</td> <td>'1'</td> <td>Print operation not successfully completed</td> </tr> <tr> <td>U</td> <td>'2'</td> <td>Device not configured</td> </tr> <tr> <td>U</td> <td>'6'</td> <td>Journal printer backup activated</td> </tr> <tr> <td>U</td> <td>'7'</td> <td>Journal printer backup and reprint terminated</td> </tr> <tr> <td>U</td> <td>'8'</td> <td>Journal printer backup reprint started</td> </tr> <tr> <td>U</td> <td>'9'</td> <td>Journal printer backup halted</td> </tr> <tr> <td>U</td> <td>:</td> <td>Journal printer backup log security error</td> </tr> <tr> <td>U</td> <td>;</td> <td>Journal printer backup reprint halted</td> </tr> <tr> <td>U</td> <td>&lt;</td> <td>Journal printer backup tamper state entered</td> </tr> <tr> <td>U</td> <td>=</td> <td>Journal in dual mode print operation successful</td> </tr> <tr> <td>U</td> <td>&gt;</td> <td>Journal in dual mode print operation not successful</td> </tr> </tbody> </table>	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	U	=	Journal in dual mode print operation successful	U	>	Journal in dual mode print operation not successful
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																																							
U	=	Journal in dual mode print operation successful																																							
U	>	Journal 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). The M-status describes the main error found. See <i>NCR 4th Generation Terminal M-Status Reference Manual</i> for details.																																							
e5	4	Supplies Status. Indicates the status of the printer paper, ribbon and print-head.																																							

## Device Status Information

Field	Number of Characters	Content		
		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

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).

**Note 1 :** 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 of the form \*XXX\*dd/mm/yy\*hh:mm\*YYYY, where XXX is the last printed Security Trace Number, dd/mm/yy hh:mm is the record date and time, and YYYY is the record number relative to the last printed Security Trace Number.

**Note 2 :** If Enhanced Configuration Parameters Load option 35 is set to 001 (report EJ in dual mode unsolicited errors) or 002 (report EJ and hardcopy backup in dual mode unsolicited errors), and both the journal printer and the EJ are in error, two unsolicited errors will be reported i.e. one for the physical device and one for the EJ. If the option is set to the default of 000, the physical device only will be reported. Physical device only reporting also occurs when in dual mode journal printing, if you are using a Diebold Emulation terminal.

## Electronic Journal Printer (Unsolicited)

This message indicates whether or not a print operation has been completed successfully.

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	
See note	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 M-status describes the main error found. See <i>NCR 4th Generation Terminal M-Status Reference Manual</i> for mapping of electronic journal errors to paper journal errors.		
e5	1	Supplies Status. Indicates the status of the electronic journal.		
	Char	Code	Description	
	0	'1'	E/Journal log space OK	
		'2'	E/Journal log space low	
		'3'	E/Journal log full	
	1	'1'	Value always '1'	
	2	'1'	Value always '1'	
	3	'1'	Value always '1'	

**Note :** If Enhanced Configuration Parameters Load option 35 is set to 001 (report EJ in dual mode unsolicited errors) or 002 (report EJ and hardcopy backup in dual mode unsolicited errors), and both the journal printer and the EJ are in error, two unsolicited errors will be reported i.e. one for the physical device and one for the EJ. If the option is set to the default of 000, the physical device only will be reported. Physical device only reporting also occurs when in dual mode journal printing, if you are using a Diebold Emulation terminal.

## 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.

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 Note.		
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). We recommend 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. See <i>NCR 4th Generation Terminal M-Status Reference Manual</i> for details.				
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			

**Note:** 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 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. See *NDC+ Supervisor's Reference Manual* Appendix A for details. 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, we recommend that you attempt to re-enter the local encryption keys. We also recommend that you check for SOH messages, and if there are any, clear them first.

Field	Number of Characters	Content
e1	1	Device Identification Graphic ‘L’ .
e2	1	Device Status. ‘1’      Encryptor error. ‘2’      Encryptor not configured. ‘3’      EKC tampering detected. See Note. ‘4’      EKC keyspace set-up is illegal. See Note. ‘5’      EKC communications failure. See Note.
e3	1	Error Severity. Warning or fatal.
e4	Var	Diagnostic Status (M-status plus M-data). The M-status describes the main error found. See <i>NCR 4th Generation Terminal M-Status Reference Manual</i> for details.
e5	-	Not used.

**Note:** These device status codes are only reported if an EKC is configured. They do not report Error Severity or Diagnostic Status.

## Camera (Unsolicited)

A film camera sends this message if it runs out of film. The Digital Camera System sends this message if it runs out of space on its optical disk.

Field	Number of Characters	Content						
e1	1	Device Identification Graphic 'M' .						
e2	1	Device Status. Always '0' .						
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. See <i>NCR 4th Generation Terminal M-Status Reference Manual</i> for details.  <b>Note:</b> The M-data information only applies to certain types of camera.						
e5	1	Supplies Status. Indicates the status of the camera film.  <table> <thead> <tr> <th>Code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>'1'</td> <td>Film OK</td> </tr> <tr> <td>'3'</td> <td>No film</td> </tr> </tbody> </table>	Code	Description	'1'	Film OK	'3'	No film
Code	Description							
'1'	Film OK							
'3'	No film							

## Door Access (Unsolicited)

This message is sent if vestibule access could be inhibited because of a faulty door access mechanism.

Field	Number of Characters	Content
e1	1	Device Identification Graphic 'N' .
e2	1	Device Status. Always '1', indicating that access is possibly inhibited.
e3	1	Error Severity. Always '2', indicating a warning. Local intervention required.
e4	Var	Diagnostic Status (M-status plus M-data). The M-status describes the main error found. See <i>NCR 4th Generation Terminal M-Status Reference Manual</i> for details.
e5	-	Not present

## Sensors (Unsolicited)

This message is sent on Supervisor mode entry and exit, tamper indicating bin in/out conditions and alarm conditions.

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
	'4'	In Service Supervisor change
	'5'	Full TI and full 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 = '4', In Service Supervisor change, the next byte gives details of the current state:

- |   |     |                                  |
|---|-----|----------------------------------|
| 2 | '0' | In Service Supervisor mode exit  |
|   | '1' | In Service Supervisor mode entry |

Bytes 3-13 are omitted.

For example, 'P41' means In Service 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 |     | Not applicable                                   |
| 3 | '0' | Vibration and/or heat sensor inactive. See Note. |
|   | '1' | Vibration and/or heat sensor active              |
| 4 | '0' | Door contact sensor inactive. See Note.          |
|   | '1' | Door contact sensor active                       |

**Device Status Information**

Field	Number of Characters	Content
	5	'0'      Silent signal sensor inactive. See Note. '1'      Silent signal sensor active
	6	'0'      Electronics enclosure sensor inactive. See Note. '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 following sensors:

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	
	19	'0'	DPM pockets open
		'1'	DPM pockets closed
e3	Not present		
e4	Not present		
e5	Not present		

**Note:** 1. If the terminal is not configured with the Tamper Indicating feature, a code of '1' is never returned and bytes 7-19 are omitted from all messages.

**Note:** 2. If a device is not configured, the associated tamper byte will take the value zero.

**Note:** 3. There is no TI reporting on the DPM contained in a 5665 SST.

## Touch Screen Keyboard (Unsolicited)

This message indicates that the keyboard has detected an error.

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. See <i>NCR 4th Generation Terminal M-Status Reference Manual</i> for details.
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.

Field	Number of Characters	Content																																				
e1	1	Device Identification Graphic 'R' .																																				
e2	Var (4 max)	<p>Device Status.</p> <table> <thead> <tr> <th>Char</th><th>Code</th><th>Description</th></tr> </thead> <tbody> <tr> <td>1-2</td><td>'00' - '98'</td><td>Key selection from Select menu.</td></tr> </tbody> </table> <p><b>Note:</b> Code '29' represents In Service Supervisor function.          Code '99' is not reported.</p> <p>or</p> <table> <tbody> <tr> <td>1</td><td>'0'</td><td>Select menu</td></tr> <tr> <td></td><td>'1'</td><td>Replenishment menu</td></tr> <tr> <td></td><td>'2'</td><td>Configure menu</td></tr> <tr> <td></td><td>'3'</td><td>Access menu</td></tr> <tr> <td></td><td>'4'</td><td>In Service Supervisor menu</td></tr> <tr> <td></td><td>'7'</td><td>Exit menu</td></tr> <tr> <td></td><td>'8'</td><td>Exit menu</td></tr> <tr> <td>2-3</td><td>'00' - '98'</td><td>Menu item selected</td></tr> </tbody> </table> <p><b>Note:</b> Code '99' is not reported.</p> <p>or</p> <table> <tbody> <tr> <td>1-2</td><td>'00' - '98'</td><td>Host menu</td></tr> <tr> <td>3-4</td><td></td><td>Host function                      See NCR publication <i>Using NDC+ Exits</i></td></tr> </tbody> </table>	Char	Code	Description	1-2	'00' - '98'	Key selection from Select menu.	1	'0'	Select menu		'1'	Replenishment menu		'2'	Configure menu		'3'	Access menu		'4'	In Service Supervisor menu		'7'	Exit menu		'8'	Exit menu	2-3	'00' - '98'	Menu item selected	1-2	'00' - '98'	Host menu	3-4		Host function See NCR publication <i>Using NDC+ Exits</i>
Char	Code	Description																																				
1-2	'00' - '98'	Key selection from Select menu.																																				
1	'0'	Select menu																																				
	'1'	Replenishment menu																																				
	'2'	Configure menu																																				
	'3'	Access menu																																				
	'4'	In Service Supervisor menu																																				
	'7'	Exit menu																																				
	'8'	Exit menu																																				
2-3	'00' - '98'	Menu item selected																																				
1-2	'00' - '98'	Host menu																																				
3-4		Host function See NCR publication <i>Using NDC+ Exits</i>																																				
e3		Not present																																				
e4		Not present																																				
e5		Not present																																				

## 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.

Field	Number of Characters	Content		
		Sol/ Unsol	Code	Description
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.
		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. See <i>NCR 4th Generation Terminal M-Status Reference Manual</i> for details.
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
		1	'1'	Ribbon OK
			'2'	Ribbon replacement recommended
			'3'	Ribbon replacement mandatory

## Device Status Information

Field	Number of Characters	Content
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

**Note:** 1. If the message mode option digit 3c is set, the Cancel key on the cardholder keyboard is enabled during Print Statement And Wait functions. See *NDC+ Supervisor's Reference Manual* Appendix A for details. 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.

**Note:** 2. 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. See *NDC+ Supervisor's Reference Manual* for details.

## Coin Dispenser (Solicited/ Unsolicited)

This message includes information returned from the CDM. It is able to report sub-device severities and actual coins dispensed.

Field	Number of Characters	Content		
		Sol/ Unsol	Code	Description
g1/ e1	1			Device Identification Graphic 'Y' .
g2/ e2	Var (9)			Transaction/Device Status. The first character of this field can take one of the following values:
		S/U	'0'	Good operation. All coins were successfully dispensed but some exception occurred as detailed in the accompanying diagnostic status.
		S	'1'	The coin low thresholds for each hopper were not set during the configuration off the machine. No coins have been dispensed.
		S	'3'	The coin dispense operation was not started for one of the following reasons:  1. A requested hopper was either fatal or out 2. The coin dispenser was in a position where coins cannot be dispensed to the cardholder. 3. The low condition has been reached and there are insufficient coins to perform the dispense.  No coins have been dispensed.
		S	'4'	The coin dispense operation has failed due to a problem other than a jam. Some coins may have been dispensed.
		S	'9'	The coin dispense operation has failed due to a jam in the hopper. Some coins may have been dispensed.
		S	'.'	The coin dispense operation 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 operation. No coins have been dispensed.
		S	'<'	A coin dispense operation was attempted while the severity of the CDM was fatal. No coins have been dispensed.
		S	'='	Tampering was detected during the coin dispense operation. The coin dispense has failed due to the module being accessed during the dispense. Some coins may have been dispensed.

## Device Status Information

Field	Number of Characters	Content
		The remaining characters represent the number of coins dispensed during the coin dispense operation. This information may be used to facilitate a transaction reversal or correction if required. This data refers to the coins which have been dispensed from the associated coin hopper.
	Char	Description
	2, 3	Decimal representation of the coins dispensed from hopper 1.
	4, 5	Decimal representation of the coins dispensed from hopper 2.
	6, 7	Decimal representation of the coins dispensed from hopper 3.
	8, 9	Decimal representation of the coins dispensed from hopper 4.
g3/ e3	Var (5)	Error Severity. Holds the severity information of the CDM and the four coin hoppers.
	Char	Description
	1	CDM - Core components
	2	Hopper 1
	3	Hopper 2
	4	Hopper 3
	5	Hopper 4
Each character may take one of the following values:		
	Value	Description
	'0'	No error
	'1'	Routine
	'2'	Warning
	'3'	Suspend (Core only)
	'4'	Fatal
g4/ e4	Var (10)	Diagnostic Status (M-status plus M-data). The M-status describes the main error found. See <i>NCR 4th Generation Terminal M-Status Reference Manual</i> for details.

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Field	Number of Characters	Content
g5/ e5	Var (4)	Supplies Status. Represents the replenishable condition of each of the four hoppers.
Char	Description	
1	Hopper 1	
2	Hopper 2	
3	Hopper 3	
4	Hopper 4	
The supplies statuses which may be returned for each character are as follows:		
Value	Description	
'0'	State not determined during this operation	
'1'	Good	
'2'	Hopper low - the sensor associated with this hopper has indicated low	
'3'	Hopper empty - the sensor associated with this hopper has indicated low and the coin out limit has been reached	

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## Envelope Dispenser (Unsolicited)

The envelope dispenser reports unsolicited status messages in Native mode depending on the value of the enhanced configuration option 23. See Chapter 4.2, “Enhanced Configuration Parameters Load” passage, for details. 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 enhanced configuration option 23. Solicited status messages are never sent for the envelope dispenser, regardless of the value of enhanced configuration option 23.

Messages detailing fitness, configuration and supplies information are sent to the host in response to the ‘send configuration data’ terminal command.

Field	Number of Characters	Content									
e1	1	Device Identification Graphic ‘\’.									
e2	1	Device Status. Indicates whether the last operation was successful.  <table><thead><tr><th>Sol/ Unsol</th><th>Code</th><th>Description</th></tr></thead><tbody><tr><td>U</td><td>‘0’</td><td>Envelope presented satisfactorily.</td></tr><tr><td>U</td><td>‘1’</td><td>Failure - envelope not presented or retracted.</td></tr></tbody></table>	Sol/ Unsol	Code	Description	U	‘0’	Envelope presented satisfactorily.	U	‘1’	Failure - envelope not presented or retracted.
Sol/ Unsol	Code	Description									
U	‘0’	Envelope presented satisfactorily.									
U	‘1’	Failure - envelope not presented or retracted.									
e3	1	Error Severity. Standard code.									
e4	8	Diagnostic Status (M-status plus M-data). The M-status describes the main error found. See <i>NCR 4th Generation Terminal M-Status Reference Manual</i> for details.									
e5	1	Supplies Status Indicates the replenishment status of the bin containing envelopes to be dispensed.  <table><thead><tr><th>Code</th><th>Description</th></tr></thead><tbody><tr><td>‘1’</td><td>Sufficient envelopes.</td></tr><tr><td>‘2’</td><td>Envelopes low.</td></tr><tr><td>‘3’</td><td>Envelopes exhausted.</td></tr></tbody></table>	Code	Description	‘1’	Sufficient envelopes.	‘2’	Envelopes low.	‘3’	Envelopes exhausted.	
Code	Description										
‘1’	Sufficient envelopes.										
‘2’	Envelopes low.										
‘3’	Envelopes exhausted.										

## Document Processing Module (Solicited/ Unsolicited)

This message includes information returned from the DPM.

Field	Number of Characters	Content												
e1/ g1	1	Device Identification Graphic ']'.												
e2/ g2	Var (154 max)	Transaction/Device Status. This field gives details of a DPM operation in response to a Transaction Reply Command or a DPM operation during the Courtesy Amount Verification, DPM Document Accept and Close states.  The field is divided into several sub-elements. The structure of the field is shown in the following passage, "DPM Transaction/Device Status".												
e3/ g3	Var (14)	Error Severity. Each of the characters in this field may take one of the following error severity values:  <table> <thead> <tr> <th>Value</th><th>Description</th></tr> </thead> <tbody> <tr> <td>'0'</td><td>No error</td></tr> <tr> <td>'1'</td><td>Routine</td></tr> <tr> <td>'2'</td><td>Warning</td></tr> <tr> <td>'3'</td><td>Suspend (Core severity only)</td></tr> <tr> <td>'4'</td><td>Fatal</td></tr> </tbody> </table>	Value	Description	'0'	No error	'1'	Routine	'2'	Warning	'3'	Suspend (Core severity only)	'4'	Fatal
Value	Description													
'0'	No error													
'1'	Routine													
'2'	Warning													
'3'	Suspend (Core severity only)													
'4'	Fatal													
		The characters within this field have the following significance:												
Char		Description												
1		DPM core and DPU core components (incorporating SCSI/TCM interface, DPU firmware, front camera, transport)												
2		DPU rear camera												
3		DPU front printer												
4		DPU rear printer												
5		DPU encoder												
6		DPM magnetic ink detector												
7		DPU recognition board (incorporating omnifont, handprint and CAV capabilities)												
8		DPM statement printer interface (only significant on 5665 - always 'no error' on DP-ATM)												
9		DPM reject/envelope bin (Bin 1)												

**Device Status Information**

Field	Number of Characters	Content
	10	DPM pocket A
	11	DPM pocket B
	12	DPM pocket C (only significant on 5665 - always 'no error' on DP-ATM)
	13	DPM escrow (only significant on 5665 - always 'no error' on DP-ATM)
	14	DPM double document detect (not supported - always 'no error' )
e4/ g4	Var (20)	Diagnostic Status (M-status plus M-data). The M-status describes the main error found. See <i>NCR 4th Generation Terminal M-Status Reference Manual</i> for details.
e5/ g5	Var (8)	Supplies Status. Indicates the status of the DPM replenishable items. Each character in this field may take one of the following status values:
	Value	Description
	'0'	No new state/state not determined during this operation
	'1'	Good
	'2'	Low (ink/ribbon supply is low)
	'3'	Empty (ink/ribbon is exhausted)
	'4'	Overfill (bin/pocket is full)
	The characters in this field have the following significance:	
	Char	Description
	1	DPU encoder ribbon
	2	DPU front printer inkwell
	3	DPU rear printer inkwell
	4	DPM statement printer capture bin
	5	DPM reject/envelope bin (Bin 1)
	6	DPM pocket A
	7	DPM pocket B
	8	DPM pocket C (only significant on 5665 - always 'good' on DP-ATM)

**DPM Transaction/Device Status - Field 'e2/g2'**

Fields numbered '210' - '213', '220' - '223' and '230' - '233' are generally referred to as Document Candidate groups.

In certain cases, the DPM will be unable to identify a document uniquely and may return up to three candidates, where the first is the most likely. The presence of multiple candidates in the message

will be indicated by a multiple candidates error code. See the description of field '200'.

When the message contains multiple candidates, it may hold two or three Document Candidate groups but the Current Document Definition will remain unchanged. However, if the error code does not indicate that multiple candidates are present, fields '210' - '213' may still be present. In this case, it will report the information relating to the Current Document Definition.

The Current Document Definition may have been set automatically by the DPM by performing an identification on the document. In this case, all the fields '210' - '213' will be present.

If the Current Document Definition has been explicitly set by Central in a Transaction Reply command, the Orientation, Enable Code and Class Name fields will only be present if Central was confirming a previously suggested candidate.

---

Sub-Element	Number of Characters	Content		
		Sol/ Unsol	Code	Description
e200/ g200	1			Error Code. This field describes the error that has occurred and may take any of the following values:
		U	'0'	Good operation but some exception occurred as detailed in the accompanying data.
		S/U	'1'	Time-out on cardholder entry of a document for one of the following reasons: <ul style="list-style-type: none"> <li>1. The cardholder did not make a deposit</li> <li>2. The cardholder was unable to insert a correctly oriented document within the specified number of retries</li> <li>3. The cardholder inserted a document which was unable to progress beyond the front transport and has retrieved it.</li> <li>4. The document has been returned due to error recovery from within the Document Accept state.</li> </ul>
		S/U	'2'	DPM failure
		S/U	'3'	Document jam. The cardholder has access or access is unknown.
		S/U	'4'	Document jam. The cardholder does not have access.
		S/U	'5'	Unacceptable document inserted - the document is not within the expected tolerances.

## Device Status Information

Sub-Element	Number of Characters	Content
	S/U	'6'
		Acceptable document not taken - document has been retracted into the DPU.
		<b>Note:</b> The document may be incorrectly oriented or not appropriate for successful imaging.
	-	'7'
		Reserved
	S/U	'8'
		Communications error between the terminal and the DPM
	S/U	'9'
		No magnetic flux detected on the document when flux was a prerequisite.
	-	:
		Reserved
	-	:
		Reserved
	S/U	'<'
		The document present in unknown or the document name supplied by Central does not exist in the DDF
	S/U	'='
		The document has a 'dog-ear'
	-	'>'
		Reserved
	S/U	'?'
		A parameter error has been detected during a DDF access. The DDF may be incorrectly specified or the actions expected of it are not valid.
	S/U	'@'
		The document is not in a position which allows the command to be performed
	S/U	'A'
		Magnetic flux is detected on a document when the absence of flux was a prerequisite
	S/U	'B'
		The command issued is unable to be performed at this time
	S/U	'C'
		The document cannot be uniquely identified. Fields '210' - '233' supply the candidates.
	-	'D'
		Reserved
	S/U	'E'
		The document read operation has resulted in a misread
	S/U	'F'
		A 'clear' attempt has been made for one of the following reasons:
		1. The cardholder has failed to take a document which was physically unable to enter beyond the DPM's front transport.
		2. A document was found in the Close state.
	S	'G'
		Image archive failure. No space is left to archive images.
	U	'H'
		Image archive space is nearly full (more than 90%)

Sub-Element	Number of Characters	Content		
		S/U	'I'	Zone verification has detected at least one blank zone when all zones were expected to be filled.
		S/U	'J'	Zone verification has detected at least one filled zone when all zones were expected to be blank.
e201/ g201	1	Error Position This field corresponds to the position in the Process Document with Cash function or the DPM Document Accept state where the error occurred. Its purpose is to allow Central to identify what error recovery operation is required and what the error data in field '203' pertains to. It may have the following values:		
		Value	Description	
		'A'	<u>Archiving Error</u> The error occurred during the archiving of the specified images.	
		'C'	<u>Courtesy Amount Verification Error</u> The error occurred during the processing of the Courtesy Amount Verification state.	
		'D'	<u>Destination (Pocket/Bin/Close state) Error</u> The error occurred during the moving of the document to the destination specified in the Transaction Reply. This value may also indicate that the error has occurred outside the Transaction Request state, DPM Document Accept state and Courtesy Amount Verification state, for instance, in the Close state or on return from Local Out-of-Service.	
		'E'	<u>Entry/Re-entry (Enable Code) Error</u> The error occurred during the early stages of accepting a document, that is, from the point when the DPM was enabled until the point before rear/front images were lifted.	
		'F'	<u>Full Image Lifting</u> The error occurred during an attempted lift of the full front/ rear images.	
		'I'	<u>Identify Error</u> The error occurred during identification or when the current document definition was being set.	
		'L'	<u>Lift Image List Error</u> The error occurred during the lifting of images specified in the Image List.	
		'O'	<u>Orientation Error</u> The error occurred during an attempt to return an incorrectly oriented document to the cardholder.	

## Device Status Information

Sub-Element	Number of Characters	Content								
	'R'	<u>Read Error</u>  The error occurred during the reading of the zones specified in the read list.								
	'V'	<u>Verification Error</u>  The error occurred during zone verification or when the magnetic flux was checked.								
	'W'	<u>Write (and Write and Confirm) Error</u>  The error occurred during the writing of data to the document.								
e202/ g202	1	Magnetic Flux Detected. This field informs Central if magnetic flux has or has not been detected on the document. It may take one of the following values:  <table> <thead> <tr> <th>Value</th><th>Description</th></tr> </thead> <tbody> <tr> <td>'0'</td><td>No magnetic flux detector present/ check not carried out</td></tr> <tr> <td>'1'</td><td>No magnetic flux detected on the document</td></tr> <tr> <td>'2'</td><td>Magnetic flux detected on the document</td></tr> </tbody> </table>	Value	Description	'0'	No magnetic flux detector present/ check not carried out	'1'	No magnetic flux detected on the document	'2'	Magnetic flux detected on the document
Value	Description									
'0'	No magnetic flux detector present/ check not carried out									
'1'	No magnetic flux detected on the document									
'2'	Magnetic flux detected on the document									
e203/ g203	Var (31)	Error Data. This field contains further information which may be used to facilitate what error recovery possibilities exist. Its contents should be analysed in association with the Error Code (field '200') and the Error Position (field '201').  Normally the field will be null. However, see the following passage, "Error Data", for details of when it will be present.								
GS	1	Group Separator								
e210/ g210	1	Candidate 1 Orientation/Current Document Definition Orientation. This indicates the orientation of the document described by the following Enable Code, Class Name and Document Name fields. It can take the following values:  <table> <thead> <tr> <th>Value</th><th>Description</th></tr> </thead> <tbody> <tr> <td>'0'</td><td>The document is oriented correctly</td></tr> <tr> <td>'1'</td><td>The document is upside down</td></tr> <tr> <td>'?'</td><td>The orientation of the document is unknown</td></tr> </tbody> </table> If Central has explicitly set the document name and it is not a previously suggested candidate, the Current Document Orientation will take the value '?'.	Value	Description	'0'	The document is oriented correctly	'1'	The document is upside down	'?'	The orientation of the document is unknown
Value	Description									
'0'	The document is oriented correctly									
'1'	The document is upside down									
'?'	The orientation of the document is unknown									
e211/ g211	5	Candidate 1 Enable Code/Current Document Definition Enable Code. This five-character field represents the Enable Code associated with the document described by the following Class Name and Document Name fields. If the document does not have an associated Enable Code, the field will take the value '?????'.								

Sub-Element	Number of Characters	Content
e212/ g212	Var (16)	Candidate 1 Class Name/Current Document Definition Class Name. This is an ASCII string of up to 16 characters, which represents the class name of the document. If Central has explicitly set the document name and it is not a previously suggested candidate, this field will be null.
GS	1	Group Separator
e213/ g213	Var (16)	Candidate 1 Document Name/Current Document Definition Document Name. This is an ASCII string of up to 16 characters, which represents the name of the document.
GS	1	Group Separator
e220/ g220	1	Candidate 2 Orientation. This is defined as for field '210' .
e221/ g221	5	Candidate 2 Enable Code. This is defined as for field '211' .
e222/ g222	Var (16)	Candidate 2 Class Name. This is defined as for field '212' .
GS	1	Group Separator
e223/ g223	Var (16)	Candidate 2 Document Name. This is defined as for field '213' .
GS	1	Group Separator
e230/ g230	1	Candidate 3 Orientation. This is defined as for field '210' .
e231/ g231	5	Candidate 3 Enable Code. This is defined as for field '211' .
e232/ g232	Var (16)	Candidate 3 Name. This is defined as for field '212' .
GS	1	Group Separator
e233/ g233	Var (16)	Candidate 3 Document Name. This is defined as for field '213' .

### **DPM Error Data - Sub-Field 'e203/g203'**

The Error Data field contains information which may be used to facilitate error recovery possibilities. It should be analysed in association with the Error Code and the Error Position. Normally the field will be null, but it will be present in the following conditions:

Error Position	Error Code	Error Data Field Length	
'A'	'G'	17	See Appendix O, "DPM Error Data During Archive" passage, for details  Otherwise, the field is null
'C'	'?'	1	See Appendix O, "DPM Parameter Error Data" passage, for details  Otherwise, the field is null
'D'	'?'	1	See Appendix O, "DPM Parameter Error Data" passage, for details  Otherwise, the field is null
'E'	'?'	1	See Appendix O, "DPM Parameter Error Data" passage, for details  Otherwise, the field is null
'F'	'?'	1 or 10	See Appendix O, "DPM Parameter Error Data" passage, for details  '=' 20 See Appendix O, "DPM Dog-Eared Document Error Data" passage, for details  Otherwise, the field is null
'T'	'?'	1	See Appendix O, "DPM Parameter Error Data" passage, for details  Otherwise, the field is null
'L'	'?'	1 or 10	See Appendix O, "DPM Parameter Error Data" passage, for details  '=' 20 See Appendix O, "DPM Dog-Eared Document Error Data" passage, for details  Otherwise, the field is null
'O'	Always null		
'R'	'?'	1 or 10	See Appendix O, "DPM Parameter Error Data" passage, for details  '2' or 'E' 1-10 See Appendix O, "DPM Error Data During Read" passage, for details  Otherwise, the field is null

Error Position	Error Code	Error Data Field Length	
'V'	'?'	1 or 10	See Appendix O, "DPM Parameter Error Data" passage, for details
	'='	1-10	See Appendix O, "DPM Dog-Eared Document Error Data" passage, for details
			Otherwise, the field is null
'W'		31	See Appendix O, "DPM Error During Position 'W'" passage, for details

## Digital Audio Service (Unsolicited)

This message includes information returned from the DAS.

Field	Number of Characters	Content
e1	1	Device identification graphic 'a'
e2	Var (1)	Device Status. '1' if an error is reported
e3	Var (1)	Error severity. Standard code.
e4	Var (2)	Diagnostic Status
e5	Var (0)	Supplies Status



Chapter 3.6

# Device Fault Status Information - Diebold Emulation Mode

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Introduction	3.6-1
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Device Status Information	3.6-2
Journal and Acknowledgement Printers (Sol/Unsol)	3.6-2
Status Codes Sent	3.6-3
Recommended Actions	3.6-4
Cash Handler - 910/920 Emulation (Solicited)	3.6-4
Status Codes Sent	3.6-6
Recommended Actions	3.6-7
Cash Handler - 911/921 Emulation (Solicited)	3.6-8
Status Codes Sent	3.6-9
Recommended Actions	3.6-10
Depository - 910/920 Emulation (Solicited)	3.6-11
Status Codes Sent	3.6-12
Recommended Actions	3.6-12
Depository - 911/921 Emulation (Solicited)	3.6-13
Status Codes Sent	3.6-13
Recommended Actions	3.6-13
Card Reader (Unsolicited)	3.6-14
Status Codes Sent	3.6-14
Recommended Actions	3.6-15
Emulated Vandal Guard Error Reporting	3.6-15
Card Writer (Unsolicited)	3.6-15
Status Codes Sent	3.6-16
Recommended Actions	3.6-16
Alarm (Unsolicited)	3.6-16
Status Codes Sent	3.6-16
Emulated Vandal Guard Error Reporting	3.6-17
Supervisor And Supply Switch (Unsolicited)	3.6-17
Configuration ID (Solicited)	3.6-18
Tamper Indication (Unsolicited)	3.6-19
Night Safe Depository (Solicited)	3.6-19
Status Codes Sent	3.6-20
Recommended Actions	3.6-20
Door Access (Unsolicited)	3.6-20
Status Codes Sent	3.6-21

## Table of Contents

### Device Fault Status Information - Diebold Emulation Mode

Recommended Action	3.6-21
Time-of-Day Clock/ Encryptor/Camera (Unsolicited)	3.6-21
Status Codes Sent	3.6-21
Statement Printer (Solicited/Unsolicited)	3.6-22
Status Codes Sent	3.6-23
Recommended Action	3.6-24
911 Hardware Configuration (Solicited)	3.6-25
Emulated Vandal Guard (Unsolicited)	3.6-25

## Introduction

The following table shows the structure of the Status Information field in Unsolicited Status messages sent in Diebold Emulation mode.

Field	Number of Characters	Mandatory/ Optional	Description																								
e1	1	M	<p>Device ID. This identifies the device reporting the unsolicited status information:</p> <table> <tr> <td>DID</td><td>Device</td></tr> <tr> <td>1</td><td>Power Failure</td></tr> <tr> <td>2</td><td>Alarm</td></tr> <tr> <td>3</td><td>Supervisor/Supply Switch</td></tr> <tr> <td>4</td><td>Journal or Acknowledgement Printer</td></tr> <tr> <td>5</td><td>Card Reader</td></tr> <tr> <td>6</td><td>Time-of-Day Clock/ Encryptor/Camera</td></tr> <tr> <td>7</td><td>Card Writer</td></tr> <tr> <td>C</td><td>Tamper Indication</td></tr> <tr> <td>D</td><td>Door Access</td></tr> <tr> <td>J</td><td>Reserved</td></tr> <tr> <td>P</td><td>Statement Printer</td></tr> </table>	DID	Device	1	Power Failure	2	Alarm	3	Supervisor/Supply Switch	4	Journal or Acknowledgement Printer	5	Card Reader	6	Time-of-Day Clock/ Encryptor/Camera	7	Card Writer	C	Tamper Indication	D	Door Access	J	Reserved	P	Statement Printer
DID	Device																										
1	Power Failure																										
2	Alarm																										
3	Supervisor/Supply Switch																										
4	Journal or Acknowledgement Printer																										
5	Card Reader																										
6	Time-of-Day Clock/ Encryptor/Camera																										
7	Card Writer																										
C	Tamper Indication																										
D	Door Access																										
J	Reserved																										
P	Statement Printer																										
e2	1	O	<p>Device Status. In the following passages we describe the status information for each device when Diebold Emulation mode status reporting is used.</p> <p><b>Note:</b> No status information is supplied with a power failure status (DID = 1).</p>																								

## Device Status Information

In the following passages we define the status information for each device.

### Journal and Acknowledgement Printers (Sol/Unsol)

If the Electronic Journal is active, then the paper low and paper out status bits refer to the amount of journal disk space available. If the Electronic Journal is active, the journal printer fatal bit will be set if there is no journal disk space available or if a fatal Input/Output disk error occurs.

When in dual mode journal printing on a Diebold Emulation terminal, unsolicited error messages for the physical journal device only are reported.

The acknowledgement printer supports the printing of mini-statements in sideways mode. While in this mode, if the message mode option 12b is set, the Cancel key on the cardholder keyboard is enabled during Print Statement and Wait functions. If the cardholder presses the Cancel key during a sideways receipt print, an unsolicited status message is sent to Central. If this option is used, the Central application must be changed to recognise the new status message.

Byte	Bit	Description
0	7-2	Not applicable
	1	Acknowledgement printer requires attention. Byte 1 contains further information.
	0	Journal printer requires attention. Byte 2 contains further information.
1	7	Acknowledgement paper low.
	6	Not applicable.
	5	Acknowledgement paper out.
	4	Not applicable.
	3	Failed to see black mark. An attempt has been made to deliver and cut a long receipt.
	2	Not applicable.

Byte	Bit	Description
	1	Cancel key pressed during sideways receipt print.
	0	Acknowledgement printer fatal error.
2	7	Journal paper low.
	6	Not applicable.
	5	Journal paper out.
	4-1	Not applicable.
	0	Journal printer fatal error.

A solicited printer status message is equivalent to a 'Ready' status with supplementary error information.

If an exception condition is detected on both printers while processing a Transaction Reply command, a solicited receipt printer status message is sent followed by an unsolicited journal printer status message.

### **Status Codes Sent**

Graphic Status	Acknowledgement				Journal		
	Paper Out	Paper Low	Fatal Error	Black Mark Error	Paper Out	Paper Low	Fatal Error
010001							X
010021						X	
010080							X
020100					X		
022000	X						
022100	X			X			
020800					X		
020900					X	X	
028000					X		

## Recommended Actions

Graphic Status	Take Printer Out-Of-Service		Replenishment Required		Read Local H/W Error Log		Note Bad Customer Service
	Ack'ment	Journal	Ack'ment	Journal	Ack'ment	Journal	
010001	X				X		
010021	X		X				
010080			X - (RS)				
020100	X				X		X
022000	X						
022100	X				X		X
020800							X
020900	X						X
028000			X - (RS)				

RS = Replenish Soon

## Cash Handler - 910/920 Emulation (Solicited)

Byte	Bit	Description
0 (High Side)	7	Good Dispense. This bit is set if Bit 5 is NOT set. This bit is NOT set if a dispense error occurs on the high side. Byte 2 contains the number of notes dispensed.
	6	Not applicable.
	5	This bit is set if the number of high notes dispensed is not equal to the number of notes requested or if the number of notes dispensed is unknown.
	4	Not applicable.
	3	High side low.

Byte	Bit	Description
	2	Not applicable.
	1	This bit is set and bit 5 is set if the number of notes dispensed is unknown. Byte 2 contains number of notes requested.
	0	Fatal error on high side. Cash handler requires attention. Remote relay and remote status indicators will indicate that intervention is required. See <i>NDC+ Supervisor's Reference Manual</i> for details of remote relay and remote status indicators.

When message mode option 15b is set, only the first occurrence of cash low is reported to Central once a low condition is set. Subsequent low detections are not reported until after a good dispense, when once again only the first occurrence is reported to Central. See *NDC+ Supervisor's Reference Manual* for details.

Byte	Bit	Description
1 (Low Side)	0-7	As Byte 0 above for second currency type.
2	0-7	Number of high notes (type 1) dispensed successfully.
3	0-7	Number of low notes (type 2) dispensed successfully.
4	0-7	Not applicable.
5	0-7	Not applicable.
6	7	This bit is set when high side out if Diebold emulation option digit 0 = 3.
	0-6	Not applicable.
7	7	This bit is set when low side out if Diebold emulation option digit 0 = 3.
	0-6	Not applicable.
Bytes 8 - 11 are included in the status message if field 'i' is included in the Transaction Reply Command.		
8	0-7	As for Byte 0 for third currency type.

Byte	Bit	Description
9	0-7	Number of notes (type 3) dispensed successfully.
10	0-7	As for Byte 0 for fourth currency type.
11	0-7	Number of notes (type 4) dispensed successfully.

### Status Codes Sent

The status codes generated by the dispenser are affected by the Diebold emulation options. See *NDC+ Supervisor's Reference Manual* for details.

Status (Bytes 0, 1, 8 & 10)	Dispense Error	Notes Low	Fatal Error	Good Dispense	Note Counts Inaccurate
20	X				
21	X		X		
28	X	X			
29	X	X	X		
80				X	
81			X	X	
88		X		X	
23	X		X		X
2;	X	X	X		X
22	X				X
2:	X	X			X

**Note:** Dispensing can continue when the notes are low. A notes out condition is flagged by a 'Notes Low' and 'Fatal Error' status (29).

## Recommended Actions

Graphic Status	Inhibit Dispensing From Cassette Affected	Replenishment Required	Read Local H/W Error Log	Continue (Good Dispense)	Check No. Notes Dispensed
20 See Note					X
21	X		X		X
28 See Note		X			X
29	X	X	X		X
80					X
81	X				X
88		X			X
23	X		X		
2; See Note	X	X	X		
22 See Note			X		
2:		X	X		

If status code = 22, 2;, 23, or 2;:, the counts contain requested values, but the cardholder may not have received the correct amount.

**Note:** These status graphics will not be sent when the default value of 0 for emulation option digit 2 is used. If the Central application is able to follow the recommended actions for these graphics, you should select a value of 2 or 3 for option digit 2.

The inaccurate count and unknown dispense status may also be sent after a cash retract or auto purge, if the local configuration option 11a is set. See *NDC+ Supervisor's Reference Manual* for more details of configuration options.

## Cash Handler - 911/921 Emulation (Solicited)

Byte	Bit	Description
0 (High Side)	7	Good Dispense. This bit is NOT set if a dispense error occurs on the high side. Byte 2 contains the number of notes dispensed.
	6	Not applicable.
	5	Not applicable.
	4	High side low.
	3	High side out.
	2	Reject bin full.
	1	This bit is set if the number of notes dispensed is unknown. Byte 2 contains number of notes requested.
	0	Fatal error on high side. Cash handler requires attention. Remote relay and remote status indicators will indicate that intervention is required. See <i>NDC+ Supervisor's Reference Manual</i> for details of remote relay and remote status indicators.

When message mode option 15b is set, only the first occurrence of cash low is reported to Central once a low condition is set. Subsequent low detections are not reported until after a good dispense, when once again only the first occurrence is sent to Central.

Byte	Bit	Description
1 (Low Side)	0-7	As Byte 0 above for second currency type.
2	0-7	Number of high notes stacked/presented successfully.
3	0-7	Number of low notes stacked/presented successfully.
4	0-7	Not applicable.
5	0-7	Not applicable.

Byte	Bit	Description
6	0	This bit is set when low side out and Diebold emulation option digit 0 = 3.
	1	This bit is set when high side out and Diebold emulation option digit 0 = 3.
	2-7	Not applicable.
7	0-7	Not applicable.
Bytes 8 - 11 are included in the status message if field 'i' is included in the Transaction Reply Command.		
8	0-7	As for Byte 0 for third currency type.
9	0-7	Number of notes (type 3) dispensed successfully.
10	0-7	As for Byte 0 for fourth currency type.
11	0-7	Number of notes (type 4) dispensed successfully.

### Status Codes Sent

The status codes generated by the dispenser are affected by the Diebold emulation options. See *NDC+ Supervisor's Reference Manual* for details.

Status (Bytes 0, 1, 8 & 10)	Dispense Error	Notes Low	Notes Out	Fatal Error	Good Dispense	Note Counts Inaccurate	Reject Bin Full
00	X						
01	X			X			
10	X	X					
11	X	X		X			
15	X	X		X			X
19	X	X	X	X			
80					X		
81				X	X		
90		X			X		
03	X			X		X	
05	X			X			X
07	X			X		X	X

# Device Fault Status Information - Diebold Emulation Mode

## Device Status Information

Status (Bytes 0, 1, 8 & 10)	Dispense Error	Notes Low	Notes Out	Fatal Error	Good Dispense	Note Counts Inaccurate	Reject Bin Full
13	X	X		X		X	
17	X	X		X		X	X
1;	X	X	X	X		X	
02	X					X	
12	X	X				X	
1:	X	X	X			X	
1=	X	X	X	X			X
98		X	X				
18	X	X	X				

## Recommended Actions

Graphic Status	Inhibit Dispensing From Cassette Affected	Replenishment Required	Read Local H/W Error Log	Continue (Good Dispense)	Check No. Notes Dispensed
00 See Note					X
01	X		X		X
10 See Note		X			X
11	X	X	X		X
15	X	X	X		X
19	X	X	X		X
80				X	
81	X			X	
90		X		X	
03	X		X		
05	X	X	X		X
07	X	X	X		X
13	X	X	X		

Graphic Status	Inhibit Dispensing From Cassette Affected	Replenishment Required	Read Local H/W Error Log	Continue (Good Dispense)	Check No. Notes Dispensed
17	X	X	X		X
1; See Note	X	X	X		
02			X		
12		X	X		
1:		X	X		
1=	X	X	X		X
98	X	X			
18	X	X			X

If status code = 03, 07, 13, 17 or 1;, the counts contain requested values, but the cardholder may not have received the correct amount.

**Note:** These status graphics will not be sent when the default value of 0 for emulation option digit 2 is used. If the Central application is able to follow the recommended actions for these graphics, you should select a value of 2 or 3 for option digit 2.

The unknown dispense status may also be sent after a cash retract or auto purge, if the local configuration option 11a is set. See *NDC+ Supervisor's Reference Manual* for more details of configuration options.

## Depository - 910/920 Emulation (Solicited)

Byte	Bit	Description
0	7	Overfill condition. Depository requires attention.
	6	Envelope jam. Depository requires attention.
	5	Not applicable.
	4	Deposit not done by cardholder within the configured time limit.
	3	Not applicable.
	2	Device malfunction. Depository requires attention.

Byte	Bit	Description
	1	Not applicable.
	0	Not applicable.
1	0-7	Not applicable.

## Status Codes Sent

Graphic Status	Overflow	Envelope Jam	Card Holder Time-Out	Device Malfunction
80 00	X			
40 00		X		
10 00			X	
04 00				X

## Recommended Actions

Graphic Status	Assume Incomplete Deposit	Take Depository Out-Of-Service	Read Local H/W Error Log	Clear Depository
80 00	X	X		X
40 00	X	X		X
10 00	X			
04 00	X	X	X	

**Note:** If a non-fatal error condition is detected and the cardholder either has not deposited the envelope or still has access to the envelope, a ‘time-out’ status is returned.

If a non-fatal error condition is detected but the cardholder does not have access to the envelope, no error is reported. These actions ensure maximum device availability and prevent shut-down due to intermittent errors or cardholder tampering.

## Depository - 911/921 Emulation (Solicited)

Byte	Bit	Description
0	7	Not applicable.
	6	Envelope jam. Depository requires attention.
	5	Not applicable.
	4	Deposit not done by cardholder within the configured time limit.
	3	Not applicable.
	2	Device malfunction. Depository requires attention.
	1	Overfill condition. Depository requires attention.
	0	Not applicable.
1	0-7	Not applicable.

### Status Codes Sent

Graphic Status	Overfill	Envelope Jam	Card Holder Time-Out	Device Malfunction
40 00		X		
10 00			X	
04 00				X
02 00	X			

### Recommended Actions

Graphic Status	Deposit Unsuccessful	Take Depository Out-Of-Service	Read Local H/W Error Log	Clear Depository
40 00	X	X		X
10 00	X			
04 00	X	X	X	
02 00	X	X		X

**Note:** Non-fatal error conditions are handled in the same way as for the 910 depository.

## Card Reader (Unsolicited)

Byte	Bit	Description
0	7	Always set ON.
	6	Track 1 Read Error.
	5	Track 2 Read Error.
	4	Track 3 Read Error.
	3	Not applicable.
	2	Not applicable.
	1	Fatal Error. Card reader is disabled and requires attention.
0	0	Card Captured.

A read error threshold is maintained per track. This is incremented on each unsuccessful read and cleared by a successful read. When the threshold is reached, a graphic status of '90', ':0' or '<0' is returned, indicating that the track was unsuccessfully read and the threshold reset. The status is sent each time the threshold is reached. In addition, an overall read error threshold is maintained. This is incremented on a read error on any track and cleared by a successful read on any track. If this threshold is reached, a status message is sent, indicating that the last track was unsuccessfully read ('92', ':2' or '<2'). A fatal error that prevents proper card handling is reported by status code 82. In the event of an SDC link failure occurring to the MCRW, status code 82 is reported when the terminal is put In-Service.

## Status Codes Sent

Graphic Status	Fatal Error	Capture	Read Error Threshold
82	X		
81		X	
X0			X
83	X	X	

X = ‘9’, ‘:’ or ‘<’ indicating the last track read

where ‘9’ = Track 3, ‘:’ = Track 2, ‘<’ = Track 1.

### **Recommended Actions**

We recommend that you perform diagnostics on the terminal for all errors. If a fatal error is reported, the card reader will be disabled, and we recommend that Central returns a shut-down command to display the Out-of-Service screen to the cardholder. Card capture can be due to an eject failure, or if the cardholder fails to take his card (if the option is selected). You should treat eject failure as an error.

### **Emulated Vandal Guard Error Reporting**

If the terminal is configured to report Vandal Guard errors using the card reader device ID, the following status bits will be reported:

The following bits are always cleared since the 56XX series does not have vandal guards fitted.

Byte	Bit	Description
0	2	This bit is always cleared, indicating that there is no fault on the Vandal Guard.
	1	This bit is always cleared, indicating that there is no failure to open or close.

---

### **Card Writer (Unsolicited)**

---

Byte	Bit	Description
0	7-2	Not applicable.
	1	The card write error threshold has been reached or Track 1, 2 or 3 data was sent to a terminal without a Track 1, 2 or 3 write capability.
	0	The Track 3 data buffer does not contain start and end sentinels. The ‘no write attempted next state’ exit is taken from the card write state.

**Note:** If Track 3 is not read correctly and no update is received from Central, a card writer status is NOT transmitted.

## Status Codes Sent

Graphic Status	Error Threshold Reached	No Start And End Sentinels
01		X
02	X	

## Recommended Actions

Graphic Status	Take Card Write Out-Of-Service	Read Local H/W Error Log	Check Central Generation Of Track 3 Buffer
01			X
02	X	X	

## Alarm (Unsolicited)

Byte	Bit	Description
0	7-3	Not applicable.
	2	Silent Signal Alarm (Anti-Ambush).
	1	Door Open.
	0	Vibration and/or Heat (Burglary).

## Status Codes Sent

Graphic Status	Silent Alarm	Door Open	Vibration/Heat
01			X
02		X	
04	X		

## **Emulated Vandal Guard Error Reporting**

If the terminal is configured to report Vandal Guard errors using the Alarm device ID, the following additional significance is given to the status bits.

The following bits are always cleared, since the 56XX and *personas* series do not have vandal guards fitted.

Byte	Bit	Description
0	7	This bit is always cleared, indicating that there is no fault on the Vandal Guard.
	6	This bit is always cleared, indicating that there is no failure to open or close.

---

### **Supervisor And Supply Switch (Unsolicited)**

This message is sent on entry to or exit from Supervisor mode. It reports the simulated state of the Diebold supervisor and supply switches. It is also sent if a change of state of the simulated switches is induced by functions 0-3 on the supervisor Select menu.

Byte	Bit	Description
0	7	Not applicable.
	6	Set if the simulated Diebold supervisor switch is on.
	5	Set if the simulated Diebold supply switch is on.
	4-0	Not applicable.

Graphic Status	Supervisor Switch	Supply Switch
00	Off	Off
20	Off	On
40	On	Off
60	On	On

## Configuration ID (Solicited)

Byte	Bit	Description
0-1		Four-digit Configuration ID number (0000-9999). Each nibble contains a binary-coded decimal value in the range 0-9.
2	7	A value of 0000 indicates that a download of customisation data is required.
2	6	'1' if 911 Configuration (option byte 8) is set '0' otherwise
2	5	This bit is set if the simulated Diebold Supervisor switch is on.
2	4-0	This bit is set if the simulated Diebold Supply switch is on.
3	7-1	Not applicable.
3	0	Not applicable.
		This bit is set if the terminal is NOT in the In-Service mode but has received a Start-Up command.

For example:

Graphic Status	Configuration ID	Supply	Supervisor	In-Service
99994001	9999	Off	On	No

## Tamper Indication (Unsolicited)

Byte	Bit	Description	
0	7	Not used.	
	6	On	Bottom Cassette (4) removed.
		Off	Bottom Cassette (4) inserted.
	5	On	3rd Cassette (3) removed.
		Off	3rd Cassette (3) inserted.
	4	On	2nd Cassette (2) removed.
		Off	2nd Cassette (2) inserted.
	3	On	Top Cassette (1) removed.
		Off	Top Cassette (1) inserted.
	2	On	Cash Reject Bin removed.
		Off	Cash Reject Bin inserted.
	1	On	56XX Depository/Card Capture Bin removed.
		Off	56XX Depository/Card Capture Bin inserted.
	0	On	56XX Deposit Bin removed.
		Off	56XX Deposit Bin inserted.

A secure 56XX has a hardware configuration code 01. Card bin state is reported by bit 1.

## Night Safe Depository (Solicited)

Byte	Bit	Description
0	7-4	Not applicable.
	3	This bit is set if the bag detection mechanism was clear when the deposit door was unlocked.
	2	This bit is always 0, indicating that no deposit was detected.
	1	This bit is set if the bag detection mechanism was blocked when the deposit door was unlocked.
	0	Not applicable.

## Status Codes Sent

Graphic Status	No Deposit Detected	Detection Mechanism Blocked
08	X	
02	X	X

## Recommended Actions

---

### Graphic Status

---

08 - Continue to use but record undetected deposit.

---

02 - Shut down if positive confirmation of all deposits is important. Clear possible jam.

---

A message mode option allows the status 02 to be sent before the deposit door is unlocked. See *NDC+ Supervisor's Reference Manual* for details. In this case, the Night Safe Depository must be shut down, since this cannot be overridden. We recommend that Central should return a response indicating to the cardholder that the deposit cannot be completed, and it should refuse all further requests until the condition is cleared.

---

## Door Access (Unsolicited)

Byte	Bit	Description
0	7-3	Not applicable.
	2	This bit is set if a card read error threshold has been reached, indicating a faulty door access card reader.
	1	This bit is set if the door access mechanism has failed to unlock the vestibule door after receiving a command from the terminal.
0		This bit is set if communications between the door access unit and the terminal are lost or unusable.

## Status Codes Sent

Graphic Status	Card Read Error	Failure To Unlock Door	Comms Lost
04	X		
02		X	
01			X

## Recommended Action

If any error is reported, local investigation of the problem is required.

---

### Time-of-Day Clock/ Encryptor/Camera (Unsolicited)

Byte	Bit	Description
0	7-0	Not applicable.
1	7	This bit is set if an encryptor error has occurred.
	6	This bit is set if the Encryptor is inoperative.
	5-4	Not applicable.
	3	This bit is set if a Time-of-Day Clock error has occurred.
	2	This bit is set if the security camera is inoperative.
	1	Not applicable.
	0	This bit is set if the security camera is out of film.

## Status Codes Sent

Graphic Status	Fatal Error	Transaction Failure	Replenishment Required	Read Local H/W Error Log	Attn Reqd
0080		X		X	
00<0	X	X		X	X
0008	X				X

Graphic Status	Fatal Error	Transaction Failure	Replenishment Required	Read Local H/W Error Log	Attn Reqd
0005	X		X	X	X
0004	X			X	X
0001			X		

## Statement Printer (Solicited/Unsolicited)

If the message mode option 12b is set, the Cancel key on the cardholder keyboard is enabled during 'Print Statement And Wait' functions. See *NDC+ Supervisor's Reference Manual* for details. If the cardholder presses the Cancel key, an unsolicited status message is sent to Central. If you use this option, you must ensure that the Central application recognises the new status message.

The statement print that is being executed when the cardholder presses the Cancel key is unaffected and is completed as normal.

Byte	Bit	Description
0	7	Not applicable.
	6	Transport sensor error. Either failed to see paper or failed to clear.
	5	Statement being printed at power failure/reset. It is not known if the cardholder received it.
	4	Failed to see black mark. The printer has tried to feed/burst and deliver a long statement.
	3	Busy or jammed. The printer has been switched off or disconnected, or the print-head may be jammed.
	2	Out of ribbon.
	1	Out of paper.
	0	The printer requires attention.
1	7-3	Not applicable.
	2	Cardholder pressed Cancel during a 'print statement and wait' function.
	1	Ribbon low.
	0	Paper low.

## Status Codes Sent

Graphic Status See Note 1	Paper Out	Ribbon Out	Paper Low	Ribbon Low	Busy/ Jammed	Black Mark Error	Tran Sensor Error	Statement Returned	Attn Reqd	Cancel Key
000Y			(X)	(X)						
010Y			(X)	(X)					X	
030Z	X		X	(X)					X	
050V		X	(X)	X					X	
0703	X	X	X	X					X	
090Y			(X)	(X)	X				X	
110Y			(X)	(X)		X			X	
130Z	X		X	(X)		X			X	
150V		X	(X)	X		X			X	
1703	X	X	X	X		X			X	
2000								X		
400Y			(X)	(X)			X			
410Y			(X)	(X)			X		X	
430Z	X		X	(X)			X		X	
450V		X	(X)	X			X		X	
4703	X	X	X	X			X		X	
0004										X

**Note:** 1. Y, Z and V represent the possibility of paper/ribbon low reporting when this may be variable.

Y = 0 to 3.

Z = 1 or 3.

V = 2 or 3.

**Note:** 2. If a graphic status 0100 is received, it may also be due to a capture bin overfill condition having occurred.

### Recommended Action

Graphic Status	Take Printer Out-Of-Service	Replenishment Required	Read Local H/W Error Log	Note Bad Customer Service
010Y	X	(X)	X	
030Z	X	X		
050V	X	X		
0703	X	X		
090Y	X	(X)	X	X
110Y	X	(X)	X	X
130Z	X	X	X	X
150V	X	X	X	X
1703	X	X	X	X
2000	See Note 2			X
400Y		(X)	X	X
410Y	X	(X)	X	X
430Z	X	X	X	X
450V	X	X	X	X
4703	X	X	X	X
0004	Stop the current statement print sequence.			

**Note:** 1. If Y = 1, 2, or 3, replenishment is required.

**Note:** 2. A partially printed statement may be in the transport. If the printer is kept in-service, this statement could be delivered to another cardholder.

## **911 Hardware Configuration (Solicited)**

If the 911 configuration option is set, this status is sent in the same message as the Configuration ID (after a group separator), in response to the Send Configuration ID terminal command. See *NDC+ Supervisor's Reference Manual* for details.

Byte	Bit	Description
0	7-1	Not applicable.
	0	This bit is set on.
1-4		Not applicable (0).
5	7-5	Not applicable.
	4	Value of MAC Flag 1.
	3-1	Not applicable.
	0	Value of MAC Flag 2.
6		Not applicable.

## **Emulated Vandal Guard (Unsolicited)**

This status is sent if the terminal is configured to report specific Vandal Guard statuses using DID = 'J'. See Chapter 4.2, "Enhanced Configuration Parameters Load" passage for details.

The following bits are always cleared, since the 56XX series and *personas* do not have vandal guards fitted.

Byte	Bit	Description
0	7	This bit is always cleared, indicating that there is no fault on the Vandal Guard.
	6	This bit is always cleared, indicating that there is no failure to open or close.



Section 4

## Central to Terminal Messages

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Chapter 4.1

Terminal Commands

---

Chapter 4.2

Customisation Data Commands

---

Chapter 4.3

Host to Exit Messages

---

Chapter 4.4

Transaction Reply Commands

---

Chapter 4.5

EJ Commands

---

Chapter 4.6

Other Messages

## Table of Contents

## Overview

# Central To Terminal Messages

In this section we identify and discuss the messages that Central sends to the terminal. These messages fall into the following categories:

- Terminal commands
- Customisation Data commands
- Transaction Reply commands
- EJ Commands
- Messages from Host to Exits

We describe the format and content of each type of command.

If you are a programmer creating the Central control application to support an NDC+ system, we recommend that you refer to this section in order to understand the format of the messages that Central sends to the terminal. You will then be able to design your application to code these messages correctly.

We describe the format of each type of message. The messages are fixed in format and include a protocol-dependent header and trailer. Only the protocol-independent message text between the header and trailer is described in this section.

The terminal performs validation checks on all messages received from Central. We include a chapter in this section with information on messages that are valid but are received when the terminal is in the wrong operational mode.

To find the location of specific messages quickly, see Appendix D, “Quick Reference To Message Types”.

**Note:** For details of TM-Alert messages sent from Central, see the NCR publication, *TM-Alert Reference Manual*.



Chapter 4.1

## Terminal Commands

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Terminal Commands

4.1-1

[Table of Contents](#)

[\*\*Terminal Commands\*\*](#)

# Terminal Commands

These commands are sent by Central to start up or shut down the terminal, or to request configuration, counter, tally, error log, or date and time information.

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)		
2	Go out-of-service (shut-down)		
3	Send configuration ID		
4	Send supply counters		
5	Send tally information		
6	Send error log information		
7	Send configuration information		
8	Send date and time information		
9	Reserved		
:	Reserved		

Field	Number of Characters	Mandatory/ Optional	Description
		;	Reserved
		=	Retrieve hallmark key from EKC and send it to Central
		<	Reserved
		>	Enable FREE JDATA
		?	Enable image dumping
1			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.
2			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			The Send Configuration ID command asks the terminal to send the Config ID number to Central. In Diebold Emulation mode this causes the Diebold 'Config ID' status to be returned. In Native mode the Native 'Config ID' status is returned.
4			The Send Supply Counters command asks the terminal to send the state of the supply counters to Central.
5			The Send Tally Information command asks the terminal to send the tallies group, identified by the Command Modifier field 'g', to Central.
6			The Send Error Log command asks the terminal to send the error log group, identified by the Command Modifier field 'g', to Central.
7			The Send Configuration Information command asks the terminal to send the following configuration information data, identified by the Command Modifier field 'g', to Central:  - Configuration ID - Hardware Fitness * - Hardware Configuration * - Supplies Status * - Sensor Status

Field	Number of Characters	Mandatory/ Optional	Description																						
			* These categories return information for a subset of possible devices.																						
8			The Send Date and Time Information command asks the terminal to send the locally held date and time to Central.																						
9			Reserved.																						
:			Reserved.																						
:			Reserved.																						
=			Retrieve the Hallmark key from the EKC and send it to Central.																						
<			Reserved.																						
>			The Enable FREE JDATA command is accepted in Out-of-Service and Supervisor mode. It enables the FREE JDATA option in the Access menu. The terminal will disable the FREE JDATA option on exit from Supervisor mode.																						
?			The Enable Image Dumping command allows Central to control operator access to the 'Dump Images' function in the Supervisor Replenish menu. The message will be accepted in all operational modes except when the terminal is processing a transaction.																						
			The command code must be followed by a command modifier or the message will be rejected. See field 'g' for details.																						
g	1	0	Command Modifier. Must be present when the Command Code is 5, 6, 7 or ?. It specifies the tallies, error log, configuration information or image dumping information to send to Central as follows:																						
			<table> <thead> <tr> <th>Code</th><th>Tally (Command Code = 5)</th></tr> </thead> <tbody> <tr> <td>'A'</td><td>Processor and system</td></tr> <tr> <td>'B'</td><td>High order communications</td></tr> <tr> <td>'C'</td><td>System disk</td></tr> <tr> <td>'D'</td><td>Card reader/writer</td></tr> <tr> <td>'E'</td><td>Cash handler</td></tr> <tr> <td>'F'</td><td>Depository</td></tr> <tr> <td>'G'</td><td>Receipt printer</td></tr> <tr> <td>'H'</td><td>Journal printer</td></tr> <tr> <td>'I'</td><td>Reserved</td></tr> <tr> <td>'J'</td><td>Reserved</td></tr> </tbody> </table>	Code	Tally (Command Code = 5)	'A'	Processor and system	'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
Code	Tally (Command Code = 5)																								
'A'	Processor and system																								
'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																								

## Terminal Commands

### Terminal Commands

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Field	Number of Characters	Mandatory/ Optional	Description
		'K'	Night safe
		'L'	Encryptor
		'M'	Camera
		'N'	Door access
		'O'	Off-line disk
		'V'	Statement printer
		'Y'	CDM
		'\\'	Envelope dispenser
		'J'	DPM
This code is equivalent to the 'DIG' code in Native mode status messages.			
<b>Code      Error Log (Command Code = 6)</b>			
		'A'	Processor and system
		'B'	High order communications
		'C'	SST devices
<b>Code      Configuration Information (Command Code = 7)</b>			
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
If the command modifier is not within the range '1' - '7', the message will be rejected. If the specific command reject option is set, a Specific Command Reject will be returned.			
<b>Note:</b> Command modifiers '1' - '7' are not supported in Diebold Emulation mode.			

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Field	Number of Characters	Mandatory/ Optional	Description
		Code	Image Dumping Information (Command Code = ?)
		'0'	Do not allow access to 'Dump Images'
		'1'	Allow access to 'Dump Images'
			On a 'cold start', no access will be permitted to the 'Dump Images' function.
			The state of access is maintained over a power supply interruption through the use of NVRAM.
			This field can also be used when the Command Code is 2, to specify the Out-of-Service screen to be displayed. The values are as follows:
		Code	Description
		'0'	Standard Out-of-Service screen displayed
		'1'	'Temporary' Out-of-Service screen displayed
			Defaults to zero if: - Any value other than zero/one is sent - The field is empty
h	Var	M	Trailer. Protocol-dependent.



Chapter 4.2

## Customisation Data Commands

Introduction	4.2-1
State Tables Load	4.2-2
Screen/Keyboard Data Load	4.2-4
Control Of Associations And Keyboard Data	4.2-6
Configuration Parameters Load	4.2-8
Timer Descriptions	4.2-11
Timer 00	4.2-11
Timer 01	4.2-11
Timer 02	4.2-12
Timer 03	4.2-12
Timer 04	4.2-12
Timer 05	4.2-12
Timer 06	4.2-12
Timer 07	4.2-13
Timer 08	4.2-13
Timer 09	4.2-13
Timer 10	4.2-13
Timer 82	4.2-13
Timer 83	4.2-13
Timer 86	4.2-14
Timer 87	4.2-14
Timers 88 - 90	4.2-14
Timer 91	4.2-14
Timer 92	4.2-14
Timer 93	4.2-14
Timer 94	4.2-15
Timer 95	4.2-15
Timer 96	4.2-15
Timer 97	4.2-15
Timers 98 - 99	4.2-15

---

Enhanced Configuration Parameters Load	4.2-16
FIT Data Load	4.2-26
Configuration ID Number Load	4.2-29
Diebold PIN Information Load	4.2-30
Message Authentication Field Selection Load	4.2-31
Date And Time Load	4.2-37
Encryption Key Load	4.2-38
Initialise EKC	4.2-41
Override Reserved Screens Command	4.2-43

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# Introduction

Central can use twelve Customisation Data commands to download various 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
- Diebold PIN Information Load
- MAC Field Selection Load
- Date and Time Load
- Encryption Key Load
- Initialise EKC
- Override Reserved Screens Command.

In the following table we show the message class, sub-class and identifier for each command.

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	Diebold PIN Information Load
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	3	1-9	Encryption Key Load
3	1	F	Initialise EKC
3	1	G	Override Reserved Screens Command

## 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.

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 decimal number from 000 to 254 or 256 to 750. 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. Legal values are: A, B, C, D, E, F, G, H, I, J, K, L, M, N, P, Q, R, S, T, V, W, X, Y, Z, b, d, e, f, g, i, k,_. The following characters are associated state data.
FS	1	O	Field Separator.
	3	O	State Number.
	Var (25)	O	State Table Data.

Field	Number of Characters	Mandatory/ Optional	Description
:			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 Note	Field Separator.
j	8	See Note	Message Authentication Code (MAC) Data. Contains the value transmitted for authentication of this message.
k	Var	M	Trailer. Protocol-dependent.

**Note:** The field separator and field 'j' are only used when the Data Security feature is selected and the flags are correct. See *NDC+ Supervisor's Reference Manual* for details.

## Screen/Keyboard Data Load

This message is used to download screen and/or keyboard data into the terminal.

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 or 5	See Note 1	Screen Number. Identifies the screen data being transmitted. See Chapter 2.2, "Screen Data", for details.  <b>Note:</b> The numbering for DPM, error message and SOH 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 Note 1	Screen Data Field. Represents the data to be displayed on the CRT screen or printer. This field always follows a screen number field and is always followed by a field separator or protocol-dependent trailer. See Chapter 2.2, "Screen Data", for details.
GS	1	See Note 1	Group Separator

Field	Number of Characters	Mandatory/Optional	Description
j1	Var	See Note 3	Keyboard Number and Keyboard Data. Identifies the physical keyboard data being transmitted. It must have a minimum of three characters that are used to specify the keyboard number to be processed. The normal valid range for these three characters is 000-999 but 000-099 are reserved for use as defaults. The remaining characters make up a variable length data field that defines the keyboard layout. This data is made up of sets of four characters, two for the position code and two for the return code. See Chapter 2.3, "Defining A Keyboard" passage, for details.
GS	1	See Note 3	Group Separator
j2	Var	See Note 3	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. See Chapter 2.3, "Defining A Keyboard" passage, for details.
			You can calculate the co-ordinates of the touch area manually or use the NDC+ Keyboard Tool. See Appendix Q, "Calculating Touch Screen Positions", or the <i>NDC+ Keyboard Tool, User's Guide</i> .
GS	1	See Note 3	Group Separator
j3	3	See Note 3	Nested Keyboard Data. A nested keyboard is identified by a three-digit number. This is repeated for each nested keyboard used to build up the new keyboard definition.  <b>Note:</b> When nested screens are in use, only the highest level screen is used to provide association to a keyboard layout.
	:		The nested keyboard data is repeated for the number of nested keyboards required. If the data is not a multiple of three, the excess digits are ignored. See Chapter 2.3, "Nested Keyboards" passage, for details.
GS	1	See Note 3	Group Separator
j4	Var	See Note 3	Miscellaneous Keyboard Data This field is reserved for future expansion.
k	Var	M	Trailer. Protocol-dependent.

**Note:** 1. 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.

**Note:** 2. Fields 'h' - 'j4' may be repeated any number of times, subject to the maximum message size defined by the comms protocol limit. The field separator preceding field 'h' must be repeated for each additional screen and/or keyboard definition.

**Note:** 3. 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.

**Note:** 4. The maximum length of a single Screen/Keyboard Data Load message is 2000 bytes.

---

## Control Of Associations And Keyboard Data

It is possible to add, delete and change keyboard layouts and associations between screens and layouts. This passage gives examples of how this is done.

- a To add or update a keyboard definition alone:

```
<gs>
<keyboard no.> <keyboard data>

<gs>
<touch data>

<gs>
<nested data>
```

- b To delete a keyboard and any associations to it:

```
<gs>
<keyboard no.>
```

- c To replace existing screens without changing any associations:

```
<screen no.> <screen data>

<fs>

<screen no.> <screen data>
```

- d To delete screens and any associations with them:

```
<screen no.>

<fs>

<screen no.>
```

- e To delete a screen and delete a keyboard layout, destroying any other associations to that layout:

```
<screen no.>  
<fs>  
<keyboard no.>
```

- f To send a new screen and its associated keyboard details in one message:

```
<screen no> <screen data>  
<gs>  
<keyboard no.> <keyboard data>  
<gs>  
<touch data>  
<gs>  
<nested data>
```

- g To send a new screen and specify an associated keyboard that will be provided elsewhere:

```
<screen no.> <screen data>  
<gs>  
<keyboard no.>
```

It is possible to define screens and keyboards locally without downloading the Screen Data Load command from Central again. This is done by editing a data file in your Diskbuild/2 disk suite. See Appendix K, “NDC+ Diskbuild/2 Requirements”, for more information.

## Configuration Parameters Load

This message downloads the Logical Unit Number (LUNO), parameters and timers into the terminal. This is a Diebold-compatible message and does not allow for the configuration of certain options available on NDC. If you want to exercise these options, you should use the Enhanced Configuration Parameter Load Message which we describe in the next passage.

If this message is received by the terminal, Tamper Indication reporting is inhibited, automatic voice is enabled, and all date reporting is in Month/Day/Year format.

As this message defines the LUNO and communication timers, we recommend that it is the first message downloaded after a power-up.

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 Note 1	Camera Control Option. Tells the terminal whether automatic picture taking is on or off:

Field	Number of Characters	Mandatory/Optional	Description								
			<p style="text-align: center;"><b>Code      Automatic Picture-Taking</b></p> <table style="margin-left: auto; margin-right: auto;"> <tr><td>'0'</td><td>Yes</td></tr> <tr><td>'1'</td><td>Yes</td></tr> <tr><td>'2'</td><td>No</td></tr> <tr><td>'3'</td><td>No</td></tr> </table> <p>Automatic picture-taking occurs with a time and date picture when a card is in position within the card reader, but before the read conditions are validated. A machine number and transaction serial number picture is taken after a Transaction Reply command is received by the terminal.</p>	'0'	Yes	'1'	Yes	'2'	No	'3'	No
'0'	Yes										
'1'	Yes										
'2'	No										
'3'	No										
i	3	See Note 1	Card Reader Error Threshold. Contains the limit of consecutive read errors that can occur before a read error status message is sent to Central (Diebold emulation only). The maximum value is 255. A value of zero or not specified will cause a status to be sent after each error.								
j	3	See Note 1	Reserved. These fields are not used and are ignored by the terminal, although they must be present in the message if the field is included.								
k	3	See Note 1	Reserved. As field 'j' .								
l	3	See Note 1	Track Write Error Threshold. Contains the limit of consecutive track write errors that can occur before a write error status message is sent to Central (Diebold Emulation only). Maximum value is 255. A value of zero or not specified causes the default of 3 to be used.								
m	3	O	<p>Supply, Ready and Amount Buffer Options. Designates the active Supply, Ready and Amount buffer options. These are combined as follows:</p> <table style="margin-left: auto; margin-right: auto;"> <tr><td>'000'</td><td>No option selected</td></tr> <tr><td>'001'</td><td>Separate Ready ('B') status sent in response to a Transaction Reply command</td></tr> <tr><td>'002'</td><td>Automatic return to previous mode from Supply mode</td></tr> <tr><td>'008'</td><td>Amount buffer length of twelve digits</td></tr> </table> <p>The value to be downloaded is formed by adding the values for the three options. For example, if you have selected the Ready and Amount buffer options, the value to download is 001+000+008 = 009. A value of 000 for any option is the default for that option.</p>	'000'	No option selected	'001'	Separate Ready ('B') status sent in response to a Transaction Reply command	'002'	Automatic return to previous mode from Supply mode	'008'	Amount buffer length of twelve digits
'000'	No option selected										
'001'	Separate Ready ('B') status sent in response to a Transaction Reply command										
'002'	Automatic return to previous mode from Supply mode										
'008'	Amount buffer length of twelve digits										
n	9	O	Reserved. Must be 000 000 000.								
FS	1	See Note 2	Field Separator.								

Customisation Data Commands  
Configuration Parameters Load

Field	Number of Characters	Mandatory/Optional	Description
o	3	O	LUNO. Logical Unit Number to insert in Transaction request, solicited status and unsolicited status messages transmitted to Central by the terminal. This number tells Central which terminal transmitted the message. If this field is not present, the LUNO defaults to 000 or a previously downloaded value held by the terminal.
FS	1	See Note 2	Field Separator. Must be present if the following fields are present.
p	2	O See Note 3	<p>Timer Number. Contains the timer number. The use of the timers is as follows:</p> <ul style="list-style-type: none"> <li>'00' Keyboard entry time-out</li> <li>'01' Cardholder response to time-out screen time-out</li> <li>'02' Close state screen time-out</li> <li>'03' Communications response time-out</li> <li>'04' Envelope/document insertion time-out</li> <li>'05' Cash retract time-out</li> <li>'06' Poll/select time-out</li> <li>'07' Present time-out</li> <li>'08' Night safe deposit time-out</li> <li>'09' Card removal time-out</li> <li>'10' Additional present time-out</li> <li>'82' Camera Delay Period</li> <li>'83' File Expiry Mechanism</li> <li>'86' Settlement time-out</li> <li>'87' DPM document captured screen time-out</li> <li>'88' Reserved</li> <li>'89' Reserved</li> <li>'90' Reserved</li> <li>'91' EJ inspection time-out</li> <li>'92' SOH/TM-Alert cyclical display time-out</li> <li>'93' SOH/TM-Alert next/ previous time-out</li> <li>'94' Document/envelope eject time-out</li> <li>'95' Statement retract time-out</li> <li>'96' Statement present time-out</li> </ul>

Field	Number of Characters	Mandatory/Optional	Description
			'97'      Door access open time-out
			'98'      Reserved
			'99'      Reserved
q	3	O	Number of 800 Millisecond Ticks per Timer Field. Determines the time-out intervals for the timers in 800 millisecond ticks. The number of ticks can be 000-255. This gives a time-out range of up to 204 seconds.
			<b>Note</b> Timer '83' the File Expiry Mechanism timer has a range of 000--999 days.
			:
			The timer number and ticks are repeated. The data for each timer is down-line loaded 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.

**Note:** 1. Fields 'h' to 'n' may be omitted. The omitted fields assume a value of zero.

**Note:** 2. This field separator must be present if any of the later fields in the message are present.

**Note:** 3. Unless otherwise stated in the timer descriptions which follow, specifying a given time-out interval as 000 causes the time-out interval of the associated timer to be infinite, and if a timer is not configured it takes a value of 30 ticks.

## Timer Descriptions

In this passage we describe each of the timers.

### 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 terminal 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 CRT 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 terminal 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 time expires, close state exit is delayed until timer 09 expires (inducing a capture) or until the card is taken. A time-out interval of 000 is not permitted for timer 02.

## **Timer 03**

Communication message timeout interval. When the terminal is ready to transmit a Transaction Request to Central, the terminal starts timer 03. If the terminal does not receive a Transaction Reply command before timer 03 expires, the terminal exits the Transaction Request state specified in the Transaction Request state table.

## **Timer 04**

Envelope/document insertion response time. When a screen is displayed which prompts the cardholder to insert an envelope or document into a depository, the cardholder must respond within the time-out interval specified by timer 04, otherwise the terminal enters the Time-Out state. The keyboard beeper sounds while this timer is active.

## **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 000 is not permitted for timer 05. If the terminal 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 terminal is configured to inhibit cash retract.

## **Timer 06**

Communications off-line time-out interval. This timer is started each time the terminal receives a poll or select sequence from Central. If the terminal has not been polled or selected within the interval specified for timer 06, the terminal proceeds to the off-line mode (out-of-service to cardholders) and displays CRT screen ‘C01’. A time-out interval of less than 002 is not permitted for timer 06. If this timer is not configured, it takes a value of 255 ticks.

## 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 Card Before Cash or Parallel Dispense/Print and Eject Transactions on a terminal configured to inhibit cash retract. A time-out interval of 000 is not permitted for timer 07.

## 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 terminal 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, a 'card capture' attempt is made. 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. Timer 09 defaults to 30 ticks on power-up. A time-out interval of 000 is not permitted for timer 09.

## Timer 10

This timer, if configured, is added to the present time-out (timer 07). It is supported to achieve Diebold compatibility. The Diebold terminal sounds the beeper when timer 10 is active to prompt the cardholder to remove his money. This prompt is not necessary on the NDC SST, therefore the beeper is not sounded. If a time-out interval of 000 is configured, timer 07 is not affected.

## Timer 82

Camera Delay Period timer. This timer controls the period between the camera taking the picture and the camera being checked to ensure it is still working correctly. It is configurable only on the Digital Camera System. The valid range of this timer is 001 to 050 tenths of a second. The default is one tenth of a second. The recommended setting is 030, three seconds.

## Timer 83

File Expiry Mechanism timer. If this timer is set to a non-zero value, pictures on the DCS optical disk older than the number of days specified by the timer will be deleted from the disk automatically.

The default value of this timer is 000, which means that no file deletion takes place. A value between 001 and 999 specifies a time in days. For security reasons, this value cannot be set in supervisor mode.

### **Timer 86**

Settlement time-out. When the rear settlement mode is active, the rear keyboard is activated to take operator input. This timer controls how long this period should be. A value of 000 is used to determine an infinite wait for operator time-out. The default value for this timer is 18, each unit being equal to ten times the normal tick period. The maximum value is 65. Values greater than this are set to 65.

### **Timer 87**

DPM document captured screen time-out. When a document is captured due to error recovery in the Close state or in the DPM Document Accept state, a 'document captured' screen will be displayed for the time specified by this timer. A value of 0 is not permitted for timer 87. The default value is 30 ticks.

### **Timers 88 - 90**

Reserved timers. These timers have no effect on the system.

### **Timer 91**

In Service inspection time-out. This timer is used during In Service inspection of the EJ. If the Cancel key is pressed, or no further key is pressed within the time-out interval specified by timer 91, the terminal will return to the state it was in prior to EJ inspection. The default value is 0 ticks.

### **Timer 92**

SOH/TM-Alert cyclical display time-out. This timer is used during the SOH/TM-Alert display. It defines the amount of time each entry is displayed for. The default is five ticks.

### **Timer 93**

SOH/TM-Alert next/previous time-out. This timer is a multiplier for timer 92. They form a combined timer which is started when the operator selects the next/previous entry by using an FDK. If the operator fails to make a selection within the interval specified by multiplying timer 92 and timer 93, the display reverts to the cycle mode. If you select a value of zero, the next/previous selection is disabled. The default value is six. (Six multiplied by timer 92 default = 30 ticks).

### Timer 94

Document/envelope eject time-out. When a document is returned to the cardholder, using the DPM, this timer gives the length of time it remains accessible to the cardholder before it is retracted. If the cardholder takes the document before the timer expires, the timer is cancelled. Values less than 010 are not permitted and will be set to 10 ticks by the application. The default value is 30 ticks. Values greater than 120 ticks will be set to 120.

If the terminal is configured to sound the beeper while the document waits to be taken, this timer gives the maximum length of time the beeper will sound. The beeper (if enabled) will sound the slow beep until the cardholder takes the document or until only 10 ticks remain. The beeper will then sound the fast beep until the cardholder takes the document or until the timer expires.

### 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 ticks, and is used if you supply a value of zero.

This timer is also used when a Function Command ID of 'S' (Process Document With Cash) is received in a Transaction Reply message and a statement is lying in the shared entry/exit slot of a 5665 SST. The timer will be started when this condition is detected. If the timer expires before the cardholder has taken the statement, the statement is captured and Function 'S' commences. If the statement is taken before the timer expires, no capture is attempted and Function 'S' commences.

### 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 000 for this timer means 'do not wait'.

### Timer 97

Door access open time-out. This timer is used on systems with the Door Access feature. It defines the time for which the vestibule door is unlocked if the cardholder's card is authorised by the terminal. If this timer is not included, the door is unlocked for 10 ticks. A maximum value of 120 ticks is allowed for this timer.

### Timers 98 - 99

Reserved timers. These timers have no effect on the system.

# Enhanced Configuration Parameters Load

This message supports configuration of options and timers, including options available for Native mode that are not supported in the Configuration Parameters Load message. It does not include options and timers for the Electronic Journal (EJ) Upload feature - these are set in the EJ Options and Timers command. See Chapter 4.5 'EJ Commands', for details.

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.
FS	1	See Note 1	Field Separator. Must be present if any of the following fields are present.
i	2	O	Option Number. Contains a configuration option number.

Field	Number of Characters	Mandatory/Optional	Description																		
j	3	O	<p>Option Code. Defines the option to be exercised for the above option number. Option number and option codes are defined below.</p> <table> <thead> <tr> <th>Option</th><th>Description of Option</th></tr> </thead> <tbody> <tr> <td>0</td><td>           Camera Control option            001 - automatic picture taking on (Default)            002 - automatic picture taking off         </td></tr> <tr> <td>1</td><td>           Ready/Supply/Amount buffer options. As field 'm' in Configuration Parameters Load            Default - '000'         </td></tr> <tr> <td>2</td><td>           Auto voice            001 - auto voice on (Default)            002 - auto voice off         </td></tr> <tr> <td>3</td><td>           Date format for supervisor journal messages and camera. If the values 003 or 004 are sent to a terminal that has a non-DCS camera configured, they are ignored.            001 - MMDD(YY)            002 - DDMM(YY)            003 - YYMMDD            004 - YYDDMM            The default option is 001, MMDD(YY).         </td></tr> <tr> <td>4</td><td>           Roll width. Defines the number of receipt and journal columns used for print messages from Central. An automatic new line occurs if this limit is exceeded. The valid range is 001-040            Default - 025            This option applies to the receipt printer when it used in normal print mode only         </td></tr> <tr> <td>5</td><td>           Left print column. Defines the left most column to be used for receipt and journal messages from Central. The valid range is 001-040.            Default - 008            This option applies to the receipt printer when it is used in normal print mode only         </td></tr> <tr> <td>6</td><td>           Reserved.            A value of 000 or 001.         </td></tr> <tr> <td>7</td><td>           Track 1 format            001 - ISO format (Default)            002 - VISA format            003 - Auto search backwards 004 - Auto search forwards         </td></tr> </tbody> </table>	Option	Description of Option	0	Camera Control option 001 - automatic picture taking on (Default) 002 - automatic picture taking off	1	Ready/Supply/Amount buffer options. As field 'm' in Configuration Parameters Load Default - '000'	2	Auto voice 001 - auto voice on (Default) 002 - auto voice off	3	Date format for supervisor journal messages and camera. If the values 003 or 004 are sent to a terminal that has a non-DCS camera configured, they are ignored. 001 - MMDD(YY) 002 - DDMM(YY) 003 - YYMMDD 004 - YYDDMM The default option is 001, MMDD(YY).	4	Roll width. Defines the number of receipt and journal columns used for print messages from Central. An automatic new line occurs if this limit is exceeded. The valid range is 001-040 Default - 025 This option applies to the receipt printer when it used in normal print mode only	5	Left print column. Defines the left most column to be used for receipt and journal messages from Central. The valid range is 001-040. Default - 008 This option applies to the receipt printer when it is used in normal print mode only	6	Reserved. A value of 000 or 001.	7	Track 1 format 001 - ISO format (Default) 002 - VISA format 003 - Auto search backwards 004 - Auto search forwards
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7	Track 1 format 001 - ISO format (Default) 002 - VISA format 003 - Auto search backwards 004 - Auto search forwards																				

Field	Number of Characters	Mandatory/Optional	Description
	8		Reserved for future use
	9		<p>Diebold status reporting for vandal guard</p> <p>000 - Report vandal guard errors using card reader status (Device ID = '5') (Default)</p> <p>001 - Report vandal guard errors using alarm status (Device ID = '2')</p> <p>002 - Report vandal guard errors using unique status (Device ID = 'J')</p> <p><b>Note:</b> This is retained for NDC compatibility only. No vandal guard errors are reported.</p>
	10		<p>TI control option</p> <p>001 - do not transmit TI status (Default)</p> <p>002 - transmit TI status</p> <p>This applies to Diebold status reporting only. It should be set to 002 if the terminal is configured to send Diebold status messages, and Tamper indicating condition reporting is required.</p>
	11		<p>Extended status control option</p> <p>001 - do not transmit extended status (Default)</p> <p>002 - transmit extended status</p> <p>This applies to Diebold status reporting only. It should be set to 002 if the terminal is configured to send Diebold status messages and extended status reporting is required. Extended statuses are sent for Time-of-Day Clock, Camera, Encryptor, Door Access.</p>
	12		<p>Specific command reject option</p> <p>000 - do not transmit specific command reject statuses (except MAC) (Default)</p> <p>001 - transmit specific command reject statuses</p>
	13		<p>Card reader error threshold. Specifies the limit of consecutive read errors that can occur on the MCRW before an error status message is sent to Central (Diebold emulation only). The valid range is 001-255. Default - 010 If zero is specified, a status will be sent after each read error.</p>
	14		<p>Track 3 write error threshold. Specifies the limit of consecutive Track 3 write errors that can occur on the MCRW before an error status message is sent to Central (Diebold emulation only). The valid range is 000-255. Default - 003 If zero is specified, a status will be sent after each read error.</p>

Field	Number of Characters	Mandatory/Optional	Description
		15	Transaction status information option. Specifies if this information should be appended to Transaction Request messages. 000 - do not append information 001 - append information
See Note 3		16	Journal printer backup time option. Specifies the maximum time in hours journal printer backup is allowed before all journalling is discontinued. Not supported when dual mode journal printing is active. The valid range is 000-255. Default - 000
See Note 3		17	Journal printer backup print operations option. Specifies the maximum number of print operations (in hundreds) to be buffered while the journal printer is fatal. Not supported when dual mode journal printing is active. The valid range is 000-225. Default - 000
		18	Reserved for future use.
		19	Reserved for future use.
		20	Reserved for future use.
		21	Optical sensor option. Determines whether or not the optical sensor is used on the Accept command of the card reader. 000 - do not disable optical sensor on Accept command (Default) 001 - disable optical sensor on Accept command when CIM86 severity is fatal
		22	Journal printer backup log tamper option. Specifies what action is to be taken with a tampered record. 000 and >003 - no action taken. 001 - print tampered record on the journal, bracketed with reserved screen T52 '>>' and T53 '<<' characters. 002 - send last printed Security Trace Number, date, time and record offset as part of transaction data in a journal printer unsolicited status message. 003 - send last printed Security Trace Number, date, time and record offset as part of transaction data in a journal printer unsolicited status message, and copy the tampered record to disk.  This is retrieved by the FREE JDATA option in the Supervisor Access menu, which is enabled by a terminal command sent by Central. For details of the Enable FREE JDATA terminal command, see Chapter 4.1, "Terminal Commands". For details of the FREE JDATA option, see <i>NDC+ Supervisor's Reference Manual</i>

Field	Number of Characters	Mandatory/Optional	Description
	23		<p>Envelope dispenser status option. Determines whether envelope dispenser status messages are sent, remote status indicators set and remote relay activated in Native mode.</p> <p>000 - do not send envelope dispenser status messages, set the remote status indicators or activate the remote relay (Default)</p> <p>001 - send envelope dispenser status messages</p> <p>002 - set the remote status indicators and activate the remote relay</p> <p>003 - send envelope dispenser status messages, set the remote status indicators and activate the remote relay</p>
	24		<p>Enhanced TI/Sensor status option. Allows the Enhanced TI/Sensor Status Unsolicited message to be sent from the terminal when tampering is suspected on devices not supported in the existing TI/Sensor Status Unsolicited message.</p> <p>000 - Do not send the Enhanced TI/Sensor Status Unsolicited message. Continue to send the existing TI/Sensor Status Unsolicited message. (Default)</p> <p>001 - Send the Enhanced TI/Sensor Status Unsolicited message when appropriate. Do not send the existing TI/Sensor Status Unsolicited message.</p>
	25		<p>Media entry indicators flash rate option. Specifies the flash rate of the media entry indicators.</p> <p>000 - 4.0 Hz (Default)      001 - 2.0 Hz      002 - 1.0 Hz      003 - 0.5 Hz      004 - 0.25 Hz      005 - Continuously on</p> <p>This option applies to Native mode only. The media entry indicators flash rate can also be set using the message mode option from the Configure menu in Supervisor mode. See <i>NDC+ Supervisor's Reference Manual</i> for details. 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 was set more recently.</p>

Field	Number of Characters	Mandatory/Optional	Description
	26		<p>Touch screen error reporting option. Determines whether touch screen keyboard status messages are sent, remote status indicators are set and remote relay switched in Native mode.</p> <p>000 - Do not send touch screen keyboard status messages. Do not set the remote status indicators or switch the remote relay. (Default)</p> <p>001 - Send touch screen keyboard status messages. Do not set the remote status indicators or switch the remote relay.</p> <p>002 - Do not send touch screen keyboard status messages. Set the remote status indicators and switch the remote relay.</p> <p>003 - Send touch screen keyboard status messages. Set the remote status indicators and switch the remote relay.</p>
	27		<p>Remote relay option. Determines when the remote relay is active.</p> <p>000 - Remote relay is active when a device condition that needs operator intervention occurs and during Off-Line mode. (Default)</p> <p>001 - Remote relay is only active when the terminal is in service.</p>
	28		<p>TPA Informed of SM Activity Option. Determines whether the Transaction Processing Application (TPA) Host is informed of the SM installation.</p> <p>000 - Do not inform the TPA Host. (Default)</p> <p>001 - Inform the TPA Host.</p>
	30		<p>Include PAN in DCS data. This option determines whether the cardholder's Primary Account Number is included in the data stored with pictures taken by the Digital Camera Service. The default value is 000.</p> <p>000 - Include the PAN</p> <p>001 - Do not include the PAN</p>
	31		<p>Enable Audio Echo of Keyboard. This option turns audible echoing of the cardholder keyboard on and off. The default value is 000.</p> <p>000 - Do not echo the keyboard.</p> <p>001 - Echo the keyboard, except in PIN related states and when keys pressed are displayed as '*'.</p>
	32		<p>Report DAS Errors Option. This option controls whether the terminal will report an error in the Digital Audio Service to the host. The default value is 000.</p> <p>000 - Do not report errors in the Digital Audio Service.</p> <p>001 - Report errors in the Digital Audio Service by sending an unsolicited message to the host.</p>

Field	Number of Characters	Mandatory/Optional	Description
	33		<p>SOH/Fitness Option. This option allows the terminal to recover if the operator exits Supervisor Mode under the following conditions:</p> <ul style="list-style-type: none"> <li>● The safe door is left open</li> </ul> <p>In this case the default setting ensures that, when the operator finally closes the Safe Door outwith Supervisor Mode, the terminal will simulate entry to Supervisor at the earliest opportunity, exercise the device, clear its fitness and simulate exit from Supervisor.</p> <ul style="list-style-type: none"> <li>● The safe door is closed and a fitness problem exists with the Cash Dispenser, or any installed cassette.</li> </ul> <p>In this case, the exercising and clearing of device fitness is also attempted.</p> <p>Refer to section 2.6, “SOH/Fitness Option”, for a more complete description.</p> <p>The default value is 001. Its possible values are:</p> <ul style="list-style-type: none"> <li>● 000 - Do not simulate entry into Supervisor Mode. Do not perform a Dispenser Fitness Test</li> <li>● 001 - Simulate entry into Supervisor Mode. Perform a Dispenser Fitness Test.</li> </ul>
	34		<p>MCN Range. This option controls the range of the Message Coordination Number (MCN). The default is 31(Hex) to 3F(Hex), this parameter allows you to extend the range to 7E(Hex).</p> <p>The possible value of this parameters are:</p> <p>000 = 31H to 3FH (default)</p> <p>001 = 31H to 7EH</p> <p>Any other value will keep the previous MCN range.</p>

Field	Number of Characters	Mandatory/Optional	Description
		35	<p>Report Dual Mode EJ and Hardcopy Backup Unsolicited Messages. This option controls the reporting of dual mode EJ and hardcopy backup unsolicited device status messages to the Host. The possible values are:</p> <p>000 — Do not report either dual mode EJ or hardcopy backup unsolicited error messages to the Host. This is the default setting.</p> <p>001 — Report only dual mode EJ unsolicited error messages to the Host.</p> <p>002 — Report both dual mode EJ and hardcopy backup unsolicited error messages to the Host.</p>
		36	<p>Enhanced EJ backup. This option controls the number of EJ log backup files that are stored for recall. The default mode is standard mode which allows the storage, retrieval and copying of the latest EJ log backup file only. The Enhanced mode allows up to 10 backup files. The two possible values are:</p> <p>000 = Standard mode (default).</p> <p>001 = Enhanced mode.</p>
		37	<p>Print Track 2 to Journal. This option allows data from card track 2 to be automatically printed to the journal printer when a card is read. Supported in both Native and Diebold modes. The possible values are:</p> <p>000 = Do not print data on journal. This is the default mode.</p> <p>001 = Print data on journal.</p>
		38	Reserved.
		39	<p>Non-Magnetic Card Accept. This option allows the SST to be set up to accept non-magnetic cards. The possible values are:</p> <p>000 - Magnetic cards only accepted (default)</p> <p>001 - Magnetic and non-magnetic cards accepted.</p> <p>002 - Non-magnetic cards are only accepted when the Card Read state is not state 0, i.e. accepted only when a magnetic card has already started the transaction.</p>
		40	Reserved.

Field	Number of Characters	Mandatory/Optional	Description
		41	Reserved.
		42	Reserved for Start / End bracketing for SNA.
		50+	Reserved for ATM/E private use.

:

The previous two fields may be repeated if necessary to define different options.

:

FS	1	See Note 1	Field Separator.
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k	2	O See Note 2	Timer Number. Contains the timer number. The use of the timers is as follows:
		'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/document insertion time-out
		'05'	Cash retract time-out
		'06'	Poll/select time-out
		'07'	Present time-out
		'08'	Night safe deposit time-out
		'09'	Card removal time-out
		'10'	Additional present time-out
		'82'	Camera Delay Period Timer
		'83'	DCS File Expiry Timer
		'86'	Rear settlement time-out
		'87'	DPM document captured screen time-out
		'88'	Reserved
		'89'	Reserved
		'90'	Reserved
		'91'	EJ inspection time-out

Field	Number of Characters	Mandatory/Optional	Description
			'92' SOH/TM-Alert cyclical display time-out
			'93' SOH/TM-Alert next/previous time-out
			'94' Document/envelope eject time-out
			'95' Statement retract time-out
			'96' Statement present time-out
			'97' Door access open time-out
			'98' Reserved
			'99' Reserved
1	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.
:			
			The previous two fields 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.
n	8	O	Reserved for future use.

**Note:** 1. This field separator must be present if any of the later fields in the message are present.

**Note:** 2. For details of timers, see the previous passage "Configuration Parameters Load".

**Note:** 3. If the journal printer backup time threshold and the journal printer backup print operations buffer threshold limits (options 16 and 17) are both non-zero, whichever limit is breached first will execute.

## 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. See Chapter 2.7, “Financial Institution Tables”, for more details.

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 40 entries. Those in excess of this are ignored. If fewer than 40 entries are received, zero values are stored.
FS	1	M	Field Separator.
j	3	M See Note 1	FIT Number. As field 'h' .
k	Var	M See Note 1	FIT Data. As field 'i' .
FS	1	See Note 2	Field Separator.
l	8	See Note 2	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.

**Note:** 1. A field separator and fields 'j' and 'k' can be repeated until the maximum length permitted by the protocol is reached.

**Note:** 2. The field separator and MAC Data field 'l' are only present if the Data Security feature is selected and the flag settings are correct. See *NDC+ Supervisor's Reference Manual* for details.

When Central downloads FITs to the terminal, CIM86 and GBP PIN specific bytes must be sent as required. The bytes are located at the end of the FIT.

If GBP PIN verification only is to be performed, the PMMSR field must be present and should have a first digit of 0.

When a FIT Data Load message is received from Central, each FIT is validated across those fields concerned with GBP PIN verification. If any field contains invalid data, the message is rejected with a Command Reject message, or a Specific Command Reject message if this option is set. For a Specific Command Reject message, the status information field indicates a numeric value out of range:

Status value - 'B'

Status qualifier - '08'

The (Specific) Command Reject message is sent if the following two conditions are met:

- The High Order field of PCKLN is 011, indicating GBP PIN verification
- The sum of PANLN and PVBLN is greater than 10 hex.

**Note:** 3. If CIM86 and GBP PIN verification are not used, the FITs are unaffected and will pass the validation check.

FITs read from the system disk on power-up are not validated, as they have already passed the validation checks during the initial download sequence.

# 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.

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: '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.

## Diebold PIN Information Load

This message is used to download data for PIN verification using the Diebold proprietary algorithm when no FITs are used.

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: '4' - Diebold PIN Information
FS	1	M	Field Separator.
h	3	M	Algorithm Locator/Identifier. Locates and identifies the algorithm to use. Values of 000-255 are allowed.
i	21	M	Offset Index Data. Seven fields of offset index data are required. Each provides a different offset location on the card. Values of 000-255 are permitted for each entry.
j	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.

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 (46)	See Note 1	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	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		1	Fields 'b' and 'c'
2		2	Field 'd'
3		3	Reserved
4		4	Field 'e'
5		5	Field 'f'
6		6	Field 'g'
7		7	Field 'h'
8		8	Field 'i'
9		9	Field 'j'
10		10	Field 'k'
11		11	Field 'l'
12		12	Field 'm'
13		13	Field 'n'
14		14	Field 'o'
15		15	Field 'p'
16		16	Fields 'q' and 'r'
17		17	Field 'aa' * - Identified by Data ID 'A' - Reserved
18		18	Field 'ab' * - Identified by Data ID 'B' - Reserved
19		19	Field 'ac' * - Identified by Data ID '6' - CIM86
20		20	Field 'ad' * - Identified by Data ID 'C' - Read Zone 1
21		21	Field 'ae' * - Identified by Data ID 'D' - Read Zone 2
22		22	Field 'af' * - Identified by Data ID 'E' - Read Zone 3
23		23	Field 'ag' * - Identified by Data ID 'F' - Read Zone 4
24		24	Field 'ah' * - Identified by Data ID 'G' - Read Zone 5
25		25	Field 'ai' * - Identified by Data ID 'H' - Read Zone 6
26		26	Field 'aj' * - Identified by Data ID 'I' - Read Zone 7

Field	Number of Characters	Mandatory/ Optional	Description
		27	Field 'ak' * - Identified by Data ID 'J' - Read Zone 8
		28	Field 'al' * - Identified by Data ID 'K' - Read Zone 9
		29	Field 'am' * - Identified by Data ID 'L' - Read Zone 10
		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' - Document Data
		35	Field 'as' * - Identified by Data ID 'R' - CAV Results
		36	Field 'at' * - Identified by Data ID 'S' - Zone Verification Results
		37	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
* Indicates that all the elements present for that field will be MACed (group separators excluded).			
FS	1	M	Field Separator.
i	Var (35)	See Note 1	Transaction Reply Field. This field contains the selection data for the Transaction Reply message.

Field	Number of Characters	Mandatory/ Optional	Description
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:			
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' - 'j4'
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 Note 3.
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' - DPM
22			Field 'af' * - Identified by Data ID 'F' - DPM
23			Field 'ag' * - Identified by Data ID 'G' - Reserved

Field	Number of Characters	Mandatory/ Optional	Description
		24	Field 'ah' * - Identified by Data ID 'H' - Reserved
		25	Field 'ai' * - Identified by Data ID 'T' - Reserved
		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' - Available for use by Exits
		30	Field 'an' * - Identified by Data ID 'N' - Available for use by Exits
		31	Field 'ao' * - Identified by Data ID 'O' - Available for use by Exits
		32	Field 'ap' * - Identified by Data ID 'P' - Available for use by Exits
		33	Field 'aq' * - Identified by Data ID 'Q' - Available for use by Exits
		34	Field 'ar' * - Identified by Data ID 'R' - Available for use by Exits

\* Indicates that all the elements present for that field will be MACed (group separators excluded).

FS	1	M	Field Separator.
j	11	See Note 1	Solicited Status Field. This field contains the MAC selection data for the solicited status message. When field 'g2' of a DPM status message is set to be MACed selectively, any group separators within that field will not be MACed.
FS	1	M	Field Separator.
k	3	See Note 1	Other Messages Field. This field contains the MAC selection data for FIT load, state tables load and terminal state status messages.
FS	1	M	Field Separator.
l	6	See Note 1	Track 1 Field. This field contains the MAC selection data for magnetic card track 1.
FS	1	M	Field Separator.
m	6	See Note 1	Track 2 Field. This field contains the MAC selection data for magnetic card track 2.
FS	1	M	Field Separator.

Field	Number of Characters	Mandatory/ Optional	Description
n	11	See Note 1	Track 3 Field. This field contains the MAC selection data for magnetic card track 3.
FS	1	See Note 2	Field Separator.
o	8	See Note 2	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.
p	Var	M	Trailer. Protocol-dependent.

**Note:** 1. This field may be truncated, that is, trailing characters may be omitted. The omitted characters will take a value of zero.

**Note:** 2. The field separator and MAC are only present when the Data Security feature is selected and the flags are set correctly. See *NDC+ Supervisor's Reference Manual* 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.

**Note:** 3. 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.

## Date And Time Load

This message is used to set the local date and time in the terminal.

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 Load

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 NDC+ release 6.01, it is possible to change the Communication key while 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.

In addition to the Encryption Keys, the operator may change the Message Authentication Key and VISA Key Table. See *NDC+ Supervisor's Reference Manual* for details.

The Encryption Key Load 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 the Host 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.

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 * See Note 1  * The equivalent old key is overwritten.
FS	1	O	Field Separator.

**Encryption Key Load**

Field	Number of Characters	Mandatory/ Optional	Description
h	24 or 288	O	<p>New Key Data. Key data consists of entries of three characters. The valid range of each entry is 000-255.</p> <p>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).</p> <p>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 Note 2.</p>
i	Var	M	Trailer. Protocol-dependent

**Note:** 1. 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.

**Note:** 2. 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.

## Initialise EKC

This message is used to set the EKC to the local state, so that it contains a key for hallmark authentication.

The terminal will only accept this command if the EKC is configured and has not been initialised previously.

Note that EKC is supported in Native Mode only.

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: 'F' - Initialise EKC
FS	1	M	Field Separator.
h	3 - high 3 - low	M	Public DEA2 Key Exponent Bit Length High/Low. Restrictions apply to the values of this field. See <i>EKC Programmer's Reference Manual</i> for details.
FS	1	M	Field Separator.

Field	Number of Characters	Mandatory/ Optional	Description
i	216	M	Public DEA2 Key Exponent. This field defines the exponent of the public key. It contains expanded values, with three bytes of message per byte of actual key value. For example, a key value of FF hex (255) is sent as a message sequence 32 hex, 35 hex, 35 hex.
FS	1	M	Field Separator.
j	3 - high 3 - low	M	Public DEA2 Key Modulus Bit Length High/Low. Restrictions apply to the values of this field. See <i>EKC Programmer's Reference Manual</i> for details.
FS	1	M	Field Separator.
k		M	216 Public DEA2 Key Modulus. This field defines the modulus of the public key. It contains expanded values, with three bytes of message per byte of actual key value. For example, a key value of FF hex (255) is sent as a message sequence 32 hex, 35 hex, 35 hex.
l	Var	M	Trailer. Protocol-dependent.

**Note:** 1. The message is rejected if the EKC is already in the local state. If the specific command reject option is set, the message is rejected with a status of 'C08'. See Chapter 3.2, "Status Information" passage, for details.

**Note:** 2. The message is rejected if the EKC does not allow itself to be initialised. This will happen if a serious error condition is detected. If the specific command reject option is set, the message is rejected with a status of 'D04'. See Chapter 3.2, "Status Information" passage, for details. Once this message is sent to Central the terminal will system escape.

**Note:** 3. If an EKC communications failure occurs, the terminal sends an unsolicited encryptor status message to Central. See Chapter 3.5, "Device Fault Status Information - Native Mode", for details.

If the communications failure is serious the terminal system escapes after sending the unsolicited status message. If it is not serious, the terminal then sends a solicited status message indicating a standard encryptor error. See Chapter 3.2, "Status Information" passage, for details.

# Override Reserved Screens Command

Certain classifications of screens are reserved for use within cardholder transactions. These screens are referred to as reserved screens.

The DPM makes use of a group of reserved screens referred to as ‘Type D’ screens. See Chapter 2.2, “D - DPM” passage, for more information. These reserved screens do not support language selection. However, through the use of this command, ‘Type D’ screens may have all references to them replaced with a reference to a Central-supplied screen, thus allowing language selection.

For guidance on adding Digital Audio Service messages, refer to Appendix R at the end of this publication.

Field	Number of Characters	Mandatory/Optional	Description
a	1	M	Header
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 cub-class is: ‘1’ - Customisation data
g	1	M	Message Identifier. The message identifier is: ‘G’ - Screen override data
FS	1	M	Field Separator

## Override Reserved Screens Command

Field	Number of Characters	Mandatory/Optional	Description
h	5	M	Screen Identifier. This five-character field specifies the screen reference that is to be replaced. The legal values for this field are 'D0000' - 'D0010'. Values outside this range will be rejected.
i	0 or 3	See Note 1	Override Value. This three-character field instructs the terminal which user screen to use in place of the screen defined by the screen identifier. Its valid range is 0-999. If the field is omitted or an illegal value is set, the reference will be set to that specified by the screen identifier field. See Note 2.

**Note:** 1. When the override value field is omitted, the reference provided by the screen identifier field will revert to using the reserved screen with the same name as the reference. This will also result when the override value is in error.

**Note:** 2. A preceding field separator and fields 'h' and 'i' may be repeated up to the length of the message protocol. However, only eleven screens are valid, so any repeated values overwrite earlier ones. When the field separator is present, the screen identifier must also be present.

Chapter 4.3

## Host to Exit Messages

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Host to Exit Messages	4.3-1
Introduction	4.3-1
Message Format	4.3-2

[Table of Contents](#)

[Host to Exit Messages](#)

## Host to Exit Messages

### Introduction

In this passage we tell you about the format and content of Host To Exit Messages.

NDC+ itself 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.

Your Exit may use these messages for any purpose. NDC+ forwards them to the Exit which is listed in the file *MISCONT* as having Point of Use 7. 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 NDC+ detects no support for Exits, the message is rejected with specific reject B01 (if enabled).

For further information about Exits and Virtual Controllers, please read the manual *Using NDC+ Exits*.

## Message Format

Field	Number of Characters	Mandatory/ Optional	Description
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.

Chapter 4.4

## Transaction Reply Commands

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Introduction	4.4-1
Transaction Reply	4.4-2
Message Format	4.4-2
Notes	4.4-18
Functions The Terminal Can Perform To Complete A Transaction	4.4-21
Deposit and Print	4.4-22
Dispense and Print	4.4-23
Display and Print	4.4-24
Print Immediate	4.4-24
Set Next State and Print	4.4-25
Night Safe Deposit and Print	4.4-25
Card Before Cash	4.4-26
Parallel Eject/Dispense and Print (Fast Cash)	4.4-27
Card Before Parallel Dispense and Print	4.4-28
Print Statement and Wait	4.4-29
Print Statement and Set Next State	4.4-29
Process Document With Cash	4.4-30
DP-ATM Deposit Envelope	4.4-31
Interactive Transaction Response	4.4-33

Table of Contents

**Transaction Reply Commands**

## Introduction

In this chapter we give you details of the types of Transaction Reply Command that Central can send to the terminal. These consist of:

- Transaction Reply
- Interactive Transaction Response.

We describe the format and content of each command in the following passages.

## Transaction Reply

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.

### 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 Note 6	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 See Note 4	Next State ID Data. Contains a decimal number from 000-254 or 256-750. This identifies the state number which the terminal should execute after it has completed the specified Transaction Reply command.
FS	1	M	Field Separator.
g	2	See Note 3	Number of Type 1 Notes to Dispense. Contains the number of Type 1 notes to be dispensed. Valid range is from 00 to 40.
h	2	See Note 3	Number of Type 2 Notes to Dispense. Contains the number of Type 2 notes to be dispensed. Valid range is from 00 to 40.
i	2	See Note 3	Number of Type 3 Notes to Dispense. Contains the number of Type 3 notes to be dispensed. Valid range is from 00 to 40.
j	2	See Note 3	Number of Type 4 Notes to Dispense. Contains the number of Type 4 notes to be dispensed. Valid range is from 00 to 40.
GS	1	See Note 8	Group Separator
j1	2	See Note 9	Number of Hopper 1 Coins to Dispense. Contains the number of coins to be dispensed from hopper 1. Valid range is from 00 to 25.
j2	2	See Note 9	Number of Hopper 2 Coins to Dispense. Contains the number of coins to be dispensed from hopper 2. Valid range is from 00 to 25.
j3	2	See Note 9	Number of Hopper 3 Coins to Dispense. Contains the number of coins to be dispensed from hopper 3. Valid range is from 00 to 25.
j4	2	See Note 9	Number of Hopper 4 Coins to Dispense. Contains the number of coins to be dispensed from hopper 4. Valid range is from 00 to 25.
FS	1	M	Field Separator.
k	4	M	<p>Transaction Serial Number. This is the number that Central uses to identify the transaction. It has the following functions:</p> <ul style="list-style-type: none"> <li>- Camera information</li> <li>- Default PPD printing</li> <li>- Transaction number of last transaction processed by the terminal. This can be requested by Central by transmitting a Send Supply Counters Terminal Command to the terminal</li> <li>- Part of the information printed on the journal when an exception status is sent to Central.</li> <li>- Part of the default message associated with document processing using the DPM.</li> </ul> <p>It has a valid range of 0000-9999</p>

Transaction Reply Commands  
Transaction Reply

Field	Number of Characters	Mandatory/ Optional	Description																																		
1	1	M	<p>Function Identifier. Instructs the terminal on what functions are to be performed:</p> <table> <thead> <tr> <th>Function ID</th> <th>Functions Performed</th> </tr> </thead> <tbody> <tr> <td>'1' or '7'</td> <td>Deposit and print</td> </tr> <tr> <td>'2' or '8'</td> <td>Dispense and print. See note 1.</td> </tr> <tr> <td>'3' or '9'</td> <td>Display and print</td> </tr> <tr> <td>'4'</td> <td>Print immediate</td> </tr> <tr> <td>'5'</td> <td>Set next state and print</td> </tr> <tr> <td>'6'</td> <td>Night safe deposit and print</td> </tr> <tr> <td>'A'</td> <td>Eject card and dispense and print (Native mode only: card before cash)</td> </tr> <tr> <td>'B' or 'C'</td> <td>Parallel dispense and print and card eject</td> </tr> <tr> <td>'E'</td> <td>Reserved for NDC RMX. A specific command reject will be sent if this is received.</td> </tr> <tr> <td>'F'</td> <td>Card before parallel dispense/print (Native mode only)</td> </tr> <tr> <td>'O'</td> <td>Reserved</td> </tr> <tr> <td>'P'</td> <td>Print statement and wait. See Note 2.</td> </tr> <tr> <td>'Q'</td> <td>Print statement and set next state. See Note 2.</td> </tr> <tr> <td>'R'</td> <td>Reserved. A specific command reject will be sent if this is received.</td> </tr> <tr> <td>'S'</td> <td>Process document with cash (Native mode only)</td> </tr> <tr> <td>'T'</td> <td>DP-ATM deposit envelope (Native mode only)</td> </tr> </tbody> </table>	Function ID	Functions Performed	'1' or '7'	Deposit and print	'2' or '8'	Dispense and print. See note 1.	'3' or '9'	Display and print	'4'	Print immediate	'5'	Set next state and print	'6'	Night safe deposit and print	'A'	Eject card and dispense and print (Native mode only: card before cash)	'B' or 'C'	Parallel dispense and print and card eject	'E'	Reserved for NDC RMX. A specific command reject will be sent if this is received.	'F'	Card before parallel dispense/print (Native mode only)	'O'	Reserved	'P'	Print statement and wait. See Note 2.	'Q'	Print statement and set next state. See Note 2.	'R'	Reserved. A specific command reject will be sent if this is received.	'S'	Process document with cash (Native mode only)	'T'	DP-ATM deposit envelope (Native mode only)
Function ID	Functions Performed																																				
'1' or '7'	Deposit and print																																				
'2' or '8'	Dispense and print. See note 1.																																				
'3' or '9'	Display and print																																				
'4'	Print immediate																																				
'5'	Set next state and print																																				
'6'	Night safe deposit and print																																				
'A'	Eject card and dispense and print (Native mode only: card before cash)																																				
'B' or 'C'	Parallel dispense and print and card eject																																				
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'S'	Process document with cash (Native mode only)																																				
'T'	DP-ATM deposit envelope (Native mode only)																																				

**Note 1:** If the Dispense and Wait function is used with an Angel Spray dispenser and a motorised card reader configured, the full timeout on cash taken before returning card and then printing will be used.

**Note 2:** 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 '='.

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The action taken on a Print Immediate command depends on when it is received and the contents of the next state ID field.

Field	Number of Characters	Mandatory/ Optional	Description	
		State	Next State Field	Action
		Trans. Request	Included	As next state and print.
		Trans. Request	Omitted	Print and wait for new Transaction Reply command.
		Other	-	See Chapter 4.6, "Message Exception Handling" passage.
m	3	See Note 5	Screen Number. Contains a number from 010 to 999. This number indicates the screen to be displayed on the terminal CRT during execution of the specified function. On a Card Before Cash transaction this screen should contain two nested screen numbers for displaying at different times during the transaction; S0 (screen 1) S0 (screen 2).	
n	Var	O	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. The screen update data is in the format:	
		No. Of Bytes	Content	
		3	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 field 'g' in the Transaction Request message.	
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.	

Transaction Reply Commands  
**Transaction Reply**

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Field	Number of Characters	Mandatory/ Optional	Description
q	1	M See Note 1	<p>Printer Flag Field. Tells the terminal which printer or printers to use.</p> <p>'0' - Do not print</p> <p>'1' - Print on journal printer only</p> <p>'2' - Print on receipt printer only</p> <p>'3' - Print on receipt and journal printer</p> <p>'4' - Print on PPD if the Function ID is '1' or '7' (Deposit and print). Print on DP-ATM envelope depository if the Function ID is 'T' (DP-ATM deposit envelope).</p> <p>'5' - Print on PPD and journal if the Function ID is '1' or '7' (Deposit and print). Print on DP-ATM envelope depository and journal printer if the Function ID is 'T' (DP-ATM deposit envelope).</p> <p>'8' - Print on statement printer only</p> <p>'9' - Reserved</p> <p>':' - Reserved</p> <p>'; - Print on DPM deposited document if the Function ID is 'S' (Process document with cash)</p> <p>'&lt;' - Print on DPM deposited document if the Function ID is 'S' (Process document with cash). Confirm that printing occurred.</p> <p>'=' - Print sideways on the receipt printer if the Function ID is 'P' (Print Statement and Wait) or 'Q' (Print Statement and Set Next State).</p> <p>'&gt;' - Send to the Digital Audio Service for annunciation. See the section 'Understanding the Digital Audio Service' in Appendix R of this manual.</p> <p>If the Function ID is 'B' or 'C' (Parallel dispense, eject and print), we recommend that you use only one journal print data field and one receipt print data field.</p> <p>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/DPM depository.</p> <p>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.</p> <p>Printer flags ';' and '&lt;' will be ignored unless the Function ID is 'S' (Process document with cash).</p>

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Field	Number of Characters	Mandatory/ Optional	Description
			<p>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.</p> <p>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.</p>
r	Var (500)	O	<p>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.</p> <p>Each printer device has its own restrictions:</p> <p>Text sent to print on the PPD or the DP-ATM envelope depository must be 80 characters or less.</p> <p>Text sent to print on the receipt printer must be:</p> <ul style="list-style-type: none"> <li>- 24 lines or less if printing in normal mode</li> <li>- 49 lines or less if message mode option digits 14c (Diebold) and 6b (Native) are selected</li> <li>- 20 lines or less for sideways printing on the receipt.</li> </ul> <p>Sideways printing is not supported for the journal printer.</p> <p>Text sent to be printed sideways on the receipt printer can be up to a maximum width of 80 characters.</p> <p>The statement printer is constrained either to the compressed data length and the overall message length, or to the length of paper.</p> <p>The DPM uses Write or Write and Confirm Lists defined in the DDF to print pre-defined data to specified zones. However, in certain cases it may be required to print to a particular area of a document rather than to rely solely on the lists. This can be done by explicitly including the zone name in the printer data field. If this is done, the zone name should be preceded by the length of the zone name string. The zone name length may take values between 1 and 16 and should be represented by the ASCII characters in the range '1' to '@'. The data printed may be up to 100 characters.</p> <p><b>Note:</b> The zone name must be in uppercase characters.</p>

Transaction Reply Commands  
**Transaction Reply**

Field	Number of Characters	Mandatory/ Optional	Description
			<p>Printer data may also include:</p> <ul style="list-style-type: none"> <li>— Text to be spoken by the Digital Audio Service. For further information, see Appendix R, “Understanding the Digital Audio Service”.</li> <li>— An instruction to print <i>images</i>, which may be either pre-loaded data files or document images lifted by the DPM. For further details of this feature, read the section “Print Graphics” in chapter 2.4.</li> </ul> <p>See Note 12 for details of how printing can be achieved using the DPM function ‘S’ .</p>
GS	1	See Note 1	Group Separator.
s	1	O	Printer Flag. See field ‘q’ .
t	Var (500)	O	Printer Data. See field ‘r’ .
GS	1	See Note 1	Group Separator.
u	1	O	Printer Flag. See field ‘q’ .
v	Var (500)	O	Printer Data. See field ‘r’ .
GS	1	See Note 1	Group Separator
v1	1	O	Printer Flag. See field ‘q’ .
v2	Var (500)	O	Printer Data. See Field ‘r’ .
			:
			GS, ‘v1’ and ‘v2’ may be repeated up to nine further times. See Note 1.
			:
FS	1	See Note 2	Field Separator.
w	1	O	Buffer Identifier. A ‘4’ in this field identifies the following data as Track 3 data.
		See Note 2	
x	Var (106)	O	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.
		See Note 2	
FS	1	See Note 10	Field Separator.

Field	Number of Characters	Mandatory/ Optional	Description																
ae1	1	See Note 10	<p>Buffer Identifier 'E' . Indicates that the following fields control the activities performed on the document as well as how certain potential errors should be handled.</p> <p>Fields 'ae*' are referred to as DPM Secondary Controls</p> <p>At least part of this field must be present when the Function Command ID is 'S' or the message will be rejected.</p>																
ae2	1	See Note 10	<p>Document Destination. Identifies what should happen to the document within the DPM when any processing has taken place.</p> <p>This field is mandatory when Buffer Identifier 'E' is present. If it is not present, the message will be rejected. Similarly, if the pocket specified is not present or the value sent is not an acceptable value, the message will be rejected. The following summarises the values the field may take and the action that will follow:</p> <table> <thead> <tr> <th>Value</th><th>Action</th></tr> </thead> <tbody> <tr> <td>'0'</td><td>Deposit document into the DPM's envelope/reject bin (Bin 1)</td></tr> <tr> <td>'1'</td><td>Deposit document into the DPM's pocket A</td></tr> <tr> <td>'2'</td><td>Deposit document into the DPM's pocket B</td></tr> <tr> <td>'3'</td><td>Deposit document into the DPM's pocket C. This is only available on 5665 SSTs</td></tr> <tr> <td>'D'</td><td>Do not pocket, bin or eject document</td></tr> <tr> <td>'E'</td><td>Eject document after processing</td></tr> <tr> <td>'U'</td><td>Use DDF to decide which pocket the document should be deposited into</td></tr> </tbody> </table> <p>If the document is to be ejected, it will be presented to the cardholder for a specified length of time.</p> <p>If the document is to be moved to a pocket/bin as specified by the DDF, a DPM Solicited Status message will be issued at the point of the attempted deposit under any of the following conditions:</p> <ol style="list-style-type: none"> <li>1. The DDF does not have the bin/pocket information present</li> <li>2. The DDF has an illegal value for the destination</li> <li>3. The DDF has requested a bin/pocket which is not configured</li> </ol>	Value	Action	'0'	Deposit document into the DPM's envelope/reject bin (Bin 1)	'1'	Deposit document into the DPM's pocket A	'2'	Deposit document into the DPM's pocket B	'3'	Deposit document into the DPM's pocket C. This is only available on 5665 SSTs	'D'	Do not pocket, bin or eject document	'E'	Eject document after processing	'U'	Use DDF to decide which pocket the document should be deposited into
Value	Action																		
'0'	Deposit document into the DPM's envelope/reject bin (Bin 1)																		
'1'	Deposit document into the DPM's pocket A																		
'2'	Deposit document into the DPM's pocket B																		
'3'	Deposit document into the DPM's pocket C. This is only available on 5665 SSTs																		
'D'	Do not pocket, bin or eject document																		
'E'	Eject document after processing																		
'U'	Use DDF to decide which pocket the document should be deposited into																		

Transaction Reply Commands  
**Transaction Reply**

Field	Number of Characters	Mandatory/ Optional	Description																											
ae3	2	See Note 10	<p>Lift Front/Rear Image(s). This two-character field is a representation of a 'bitmap' and is used to determine what Full Front and/or Full Rear images are to be lifted from the document. These lifted images may then be displayed or optionally archived. See field 'ae4'.</p> <p>The Rear Image can only be obtained if a Rear Camera is present. If it is not present, the message will be rejected.</p> <p>If the value sent is not within the range 0-3F hex, the message will be rejected.</p> <p>If this field is not present in the message, the terminal will use the previously downloaded value. If no value has been downloaded, the terminal will use a default value of zero - do not lift any front or rear images. The value is maintained through a power supply interruption by NVRAM.</p> <p>This field is mandatory if any of the subsequent fields are present.</p> <p>The following summarises what types of front/rear images may be lifted and to which filename they are 'lifted' to.</p> <table> <thead> <tr> <th>Bit</th><th>Weight</th><th>Resultant Image Filename and Description</th></tr> </thead> <tbody> <tr> <td>0</td><td>1</td><td>FRONTGLF.IMG - Full, Front, Grey-level image (100 dots/inch)</td></tr> <tr> <td>1</td><td>2</td><td>REARGLF.IMG - Full, Rear, Grey-level image (100 dots/inch)</td></tr> <tr> <td>2</td><td>4</td><td>FRONTGLR.IMG - Rescaled 2/3, Front, Grey-level image (100 dots/inch)</td></tr> <tr> <td>3</td><td>8</td><td>REARGLR.IMG - Rescaled 2/3, Rear, Grey-level image (100 dots/inch)</td></tr> <tr> <td>4</td><td>16</td><td>FRONTBIF.IMG - Full, Front, Binary image (200 dots/inch)</td></tr> <tr> <td>5</td><td>32</td><td>REARBIF.IMG - Full, Rear, Binary image (200 dots/inch)</td></tr> <tr> <td>6</td><td>64</td><td>Reserved - must be set to 0</td></tr> <tr> <td>7</td><td>128</td><td>Reserved - must be set to 0</td></tr> </tbody> </table> <p>Lifted Front/Rear images are flushed from the system under any of the following conditions:</p> <ol style="list-style-type: none"> <li>1. Entry to the Card Read and Card Read - PIN Entry Initiation states</li> <li>2. When the DPM has been enabled to accept a document</li> <li>3. In the Close state</li> </ol>	Bit	Weight	Resultant Image Filename and Description	0	1	FRONTGLF.IMG - Full, Front, Grey-level image (100 dots/inch)	1	2	REARGLF.IMG - Full, Rear, Grey-level image (100 dots/inch)	2	4	FRONTGLR.IMG - Rescaled 2/3, Front, Grey-level image (100 dots/inch)	3	8	REARGLR.IMG - Rescaled 2/3, Rear, Grey-level image (100 dots/inch)	4	16	FRONTBIF.IMG - Full, Front, Binary image (200 dots/inch)	5	32	REARBIF.IMG - Full, Rear, Binary image (200 dots/inch)	6	64	Reserved - must be set to 0	7	128	Reserved - must be set to 0
Bit	Weight	Resultant Image Filename and Description																												
0	1	FRONTGLF.IMG - Full, Front, Grey-level image (100 dots/inch)																												
1	2	REARGLF.IMG - Full, Rear, Grey-level image (100 dots/inch)																												
2	4	FRONTGLR.IMG - Rescaled 2/3, Front, Grey-level image (100 dots/inch)																												
3	8	REARGLR.IMG - Rescaled 2/3, Rear, Grey-level image (100 dots/inch)																												
4	16	FRONTBIF.IMG - Full, Front, Binary image (200 dots/inch)																												
5	32	REARBIF.IMG - Full, Rear, Binary image (200 dots/inch)																												
6	64	Reserved - must be set to 0																												
7	128	Reserved - must be set to 0																												

Field	Number of Characters	Mandatory/ Optional	Description																		
ae4	2	See Note 10	<p>Archive Lifted Front/Rear Image(s). This field is similar to field 'ae3' and can hold values in the range 0-3F hex. It represents a 'bitmap' as defined in field 'ae3'. When the appropriate bit is set, the previously lifted image will be archived.</p> <p>If this field is not present in the message, the terminal will use the previously downloaded value. If no value has been downloaded, the terminal will use a default value of zero - do not archive lifted front or rear images. The value is maintained through a power supply interruption by NVRAM.</p> <p>This field is mandatory if any of the subsequent fields are present.</p> <p>The following summarises the values this field may take and the action that will follow:</p> <table> <thead> <tr> <th>Bit</th><th>Resultant Archived Filename and Description</th></tr> </thead> <tbody> <tr> <td>0</td><td>xxxxmmmm.mmA Full, Front, Grey-level image (100 dots/inch)</td></tr> <tr> <td>1</td><td>xxxxmmmm.mmB Full, Rear, Grey-level image (100 dots/inch)</td></tr> <tr> <td>2</td><td>xxxxmmmm.mmC Rescaled 2/3, Front, Grey-level image (100 dots/inch)</td></tr> <tr> <td>3</td><td>xxxxmmmm.mmD Rescaled 2/3, Rear, Grey-level image (100 dots/inch)</td></tr> <tr> <td>4</td><td>xxxxmmmm.mmE Full, Front, Binary image (200 dots/inch)</td></tr> <tr> <td>5</td><td>xxxxmmmm.mmF Full, Rear, Binary image (200 dots/inch)</td></tr> <tr> <td>6</td><td>Reserved - must be set to 0</td></tr> <tr> <td>7</td><td>Reserved - must be set to 0</td></tr> </tbody> </table> <p>'xxxx' is a number that uniquely identifies the archive which took place during the transaction. It has a valid range of 0000-9999 and allows all the images which were archived at that point to be identified. It is incremented every time an attempt is made to archive a group of images. It is set to 0000 on a 'cold start' and maintained in NVRAM. After reaching 9999, it will roll over to 0000.</p> <p>'mmmmmm' is the machine number, which may be entered using Supervisor mode.</p> <p>If an image is marked to be archived but is not found, an error message is issued.</p>	Bit	Resultant Archived Filename and Description	0	xxxxmmmm.mmA Full, Front, Grey-level image (100 dots/inch)	1	xxxxmmmm.mmB Full, Rear, Grey-level image (100 dots/inch)	2	xxxxmmmm.mmC Rescaled 2/3, Front, Grey-level image (100 dots/inch)	3	xxxxmmmm.mmD Rescaled 2/3, Rear, Grey-level image (100 dots/inch)	4	xxxxmmmm.mmE Full, Front, Binary image (200 dots/inch)	5	xxxxmmmm.mmF Full, Rear, Binary image (200 dots/inch)	6	Reserved - must be set to 0	7	Reserved - must be set to 0
Bit	Resultant Archived Filename and Description																				
0	xxxxmmmm.mmA Full, Front, Grey-level image (100 dots/inch)																				
1	xxxxmmmm.mmB Full, Rear, Grey-level image (100 dots/inch)																				
2	xxxxmmmm.mmC Rescaled 2/3, Front, Grey-level image (100 dots/inch)																				
3	xxxxmmmm.mmD Rescaled 2/3, Rear, Grey-level image (100 dots/inch)																				
4	xxxxmmmm.mmE Full, Front, Binary image (200 dots/inch)																				
5	xxxxmmmm.mmF Full, Rear, Binary image (200 dots/inch)																				
6	Reserved - must be set to 0																				
7	Reserved - must be set to 0																				

Transaction Reply Commands  
**Transaction Reply**

Field	Number of Characters	Mandatory/ Optional	Description						
ae5	1	See Note 10	<p>Lift Zones in Image List</p> <p>If this field is not present in the message, the terminal will use the previously downloaded value. If no value has been downloaded, the terminal will use a default value of zero - do not lift zones specified in the image list. The value is maintained through a power supply interruption by NVRAM.</p> <p>This field is mandatory if any of the subsequent fields are present.</p> <p>If the value is not '0' or '1', the message will be rejected.</p> <p>The following summarises the values this field may take and the action that will follow:</p> <table> <thead> <tr> <th>Value</th><th>Action</th></tr> </thead> <tbody> <tr> <td>'0'</td><td>Do not lift zones specified in the image list</td></tr> <tr> <td>'1'</td><td>Lift zones specified in the image list</td></tr> </tbody> </table> <p>Lifted images are flushed from the system under any of the following conditions:</p> <ol style="list-style-type: none"> <li>1. Entry to the Card Read state</li> <li>2. When the DPM has been enabled to accept a document</li> <li>3. When the current document definition changes</li> <li>4. In the Close state</li> </ol>	Value	Action	'0'	Do not lift zones specified in the image list	'1'	Lift zones specified in the image list
Value	Action								
'0'	Do not lift zones specified in the image list								
'1'	Lift zones specified in the image list								
ae6	1	See Note 10	<p>Archive Lifted Image List Zones</p> <p>If this field is not present in the message, the terminal will use the previously downloaded value. If no value has been downloaded, the terminal will use a default value of zero - do not archive lifted image list zones. The value is maintained through a power supply interruption by NVRAM.</p> <p>If there is no image marked to be archived in the image list, this is not treated as an error.</p> <p>This field is mandatory if any of the subsequent fields are present.</p> <p>If the value is not '0' or '1', the message will be rejected.</p> <p>The following summarises the values this field may take and the action that will follow:</p> <table> <thead> <tr> <th>Value</th><th>Action</th></tr> </thead> <tbody> <tr> <td>'0'</td><td>Do not archive lifted image list zones</td></tr> <tr> <td>'1'</td><td>Archive the lifted image list zones</td></tr> </tbody> </table>	Value	Action	'0'	Do not archive lifted image list zones	'1'	Archive the lifted image list zones
Value	Action								
'0'	Do not archive lifted image list zones								
'1'	Archive the lifted image list zones								

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Field	Number of Characters	Mandatory/ Optional	Description								
ae7	1	See Note 10	<p>Check Magnetism</p> <p>If this field is not present in the message, the terminal will use the previously downloaded value. If no value has been downloaded, the terminal will use a default value of zero - do not use magnetism when deciding if a document is acceptable or not. The value is maintained through a power supply interruption by NVRAM.</p> <p>This field is mandatory if any of the subsequent fields are present.</p> <p>If the value is not within the range, the message will be rejected. It will also be rejected if the value is '1' or '2' and there is no magnetic sensor present.</p> <p>The following summarises the values this field may take and the action that will follow:</p> <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Value</th><th>Action</th></tr> </thead> <tbody> <tr> <td>'0'</td><td>Do not use magnetism when deciding whether a document is acceptable to continue processing</td></tr> <tr> <td>'1'</td><td>The document must be non-magnetic to be acceptable. Report as a DPM solicited error.</td></tr> <tr> <td>'2'</td><td>The document must be magnetic to be acceptable. Report as a DPM solicited error.</td></tr> </tbody> </table> <p>You should set this flag to '2' if the presence of magnetic flux is important. This allows any non-compliance to be reported to Central. D-Scribe allows documents to have magnetism specified as a prerequisite but this on its own will not allow NDC+ to report an error.</p>	Value	Action	'0'	Do not use magnetism when deciding whether a document is acceptable to continue processing	'1'	The document must be non-magnetic to be acceptable. Report as a DPM solicited error.	'2'	The document must be magnetic to be acceptable. Report as a DPM solicited error.
Value	Action										
'0'	Do not use magnetism when deciding whether a document is acceptable to continue processing										
'1'	The document must be non-magnetic to be acceptable. Report as a DPM solicited error.										
'2'	The document must be magnetic to be acceptable. Report as a DPM solicited error.										
ae8	1	See Note 10	<p>Check Zone Verification</p> <p>If this field is not present in the message, the terminal will use the previously downloaded value. If no value has been downloaded, the terminal will use a default value of 1 - carry out zone verification (if supported) as detailed by the appropriate Verify List in the DDF, but do not use the results to decide whether a document is valid to continue processing. If zone verification is not supported, the default value will be zero - do not perform zone verification. The value is maintained through a power supply interruption by NVRAM.</p> <p>This field is mandatory if any of the subsequent fields are present.</p> <p>If the value is not in the range 0-3, the message will be rejected.</p> <p>If the Zone Verification feature is not installed, this field should be given a value of zero. Otherwise, the message will be rejected.</p> <p>The following summarises the values this field may take and the action that will follow:</p>								

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Transaction Reply Commands  
**Transaction Reply**

Field	Number of Characters	Mandatory/ Optional	Description								
		Value	Action								
		'0'	Do not perform zone verification								
		'1'	Carry out zone verification as detailed by the appropriate Verify List in the DDF, but do not use the results to decide whether a document is valid to continue processing								
		'2'	All zones in the verify list must have an endorsement for the document to be acceptable. Otherwise, issue a DPM solicited status error.								
		'3'	All zones in the verify list must have no endorsement for the document to be acceptable. Otherwise, issue a DPM solicited status error.								
ae9	1	See Note 10	<p><b>Report Candidates/Identify</b></p> <p>If this field is not present in the message, the terminal will use the previously downloaded value. If no value has been downloaded and the identification feature is supported, the terminal will use a default value of '1' - send the DPM's multiple candidates to Central as a solicited status message. If the identification feature is not supported, the default value will be zero - do not use identification. The value is maintained through a power supply interruption by NVRAM.</p> <p>This field is mandatory if any of the subsequent fields are present.</p> <p>If the value is not in the range 0-2, the message will be rejected.</p> <p>If the identification feature is not installed, this field should be given a value of zero. Otherwise, the message will be rejected.</p> <p>In certain circumstances, the DPM may be unable to identify a document uniquely. This field is used to determine how this situation is dealt with.</p> <p>The following summarises the values this field may take and the action that will follow:</p> <table> <thead> <tr> <th>Value</th><th>Action</th></tr> </thead> <tbody> <tr> <td>'0'</td><td>Do not use the identification feature.</td></tr> <tr> <td>'1'</td><td>Use the identification feature. Send the DPM's candidates to Central as a solicited error.</td></tr> <tr> <td>'2'</td><td>Use the identification feature. Set the current document definition to the DPM's preferred candidate.</td></tr> </tbody> </table>	Value	Action	'0'	Do not use the identification feature.	'1'	Use the identification feature. Send the DPM's candidates to Central as a solicited error.	'2'	Use the identification feature. Set the current document definition to the DPM's preferred candidate.
Value	Action										
'0'	Do not use the identification feature.										
'1'	Use the identification feature. Send the DPM's candidates to Central as a solicited error.										
'2'	Use the identification feature. Set the current document definition to the DPM's preferred candidate.										

Field	Number of Characters	Mandatory/ Optional	Description															
ae10	1	See Note 10	<p>Document Entry Retries</p> <p>If this field is not present in the message, the terminal will use the previously downloaded value. If no value has been downloaded, the terminal will use a default value of '3' - allow three re-insertion attempts. The value is maintained through a power supply interruption by NVRAM.</p> <p>If the value is not in the range 0-3, the message will be rejected.</p> <p>This character represents the number of retries the cardholder will be given to insert a document.</p> <table> <thead> <tr> <th>Value</th><th>Action</th></tr> </thead> <tbody> <tr> <td>'0'</td><td>Do not allow cardholder retries</td></tr> <tr> <td>'1'</td><td>Allow one attempt following the initial problem before timing out.</td></tr> <tr> <td>'2'</td><td>Allow two attempts following the initial problem before timing out.</td></tr> <tr> <td>'3'</td><td>Allow three attempts following the initial problem before timing out.</td></tr> </tbody> </table>	Value	Action	'0'	Do not allow cardholder retries	'1'	Allow one attempt following the initial problem before timing out.	'2'	Allow two attempts following the initial problem before timing out.	'3'	Allow three attempts following the initial problem before timing out.					
Value	Action																	
'0'	Do not allow cardholder retries																	
'1'	Allow one attempt following the initial problem before timing out.																	
'2'	Allow two attempts following the initial problem before timing out.																	
'3'	Allow three attempts following the initial problem before timing out.																	
FS	1	See Note 11	Field Separator															
af1	1	See Note 11	<p>Buffer Identifier 'F' . Indicates that the following fields define what principal activities are carried out by the DPM when the Function Command ID is 'S' (Process Document With Cash).</p> <p>Fields 'af*' are referred to as DPM Primary Controls</p> <p>When the Function Command ID is 'S', the message may or may not be rejected if there is no Buffer Identifier 'F' present. The decision to reject or not is determined by the presence or absence of a document waiting to be further processed inside the DPM, as summarised below:</p> <table> <thead> <tr> <th>Buffer ID 'F'</th><th>Document</th><th>Action</th></tr> </thead> <tbody> <tr> <td>Not present</td><td>Not present</td><td>Reject message</td></tr> <tr> <td>Not present</td><td>Present</td><td>Do not reject at this point</td></tr> <tr> <td>Present</td><td>Not present</td><td>Do not reject at this point</td></tr> <tr> <td>Present</td><td>Present</td><td>Do not reject at this point</td></tr> </tbody> </table> <p>When this field is present, the group separator between the Enable Code (field 'af2') and the Document Name (field 'af3') must be present. Otherwise, the message will be rejected.</p>	Buffer ID 'F'	Document	Action	Not present	Not present	Reject message	Not present	Present	Do not reject at this point	Present	Not present	Do not reject at this point	Present	Present	Do not reject at this point
Buffer ID 'F'	Document	Action																
Not present	Not present	Reject message																
Not present	Present	Do not reject at this point																
Present	Not present	Do not reject at this point																
Present	Present	Do not reject at this point																

Transaction Reply Commands  
**Transaction Reply**

Field	Number of Characters	Mandatory/ Optional	Description															
af2	0 or 5	See Note 11	<p>Document Enable Code. This five-character entry is used to enable the DPM to accept a document.</p> <p>When the Function Command ID is 'S' (Process Document With Cash), the message may or may not be rejected if there is no Enable Code present. The decision to reject or not is determined by the presence or absence of a document waiting to be further processed inside the DPM, as summarised below:</p> <table> <thead> <tr> <th>Enable Code</th> <th>Document</th> <th>Action</th> </tr> </thead> <tbody> <tr> <td>Not present</td> <td>Not present</td> <td>Reject message</td> </tr> <tr> <td>Not present</td> <td>Present</td> <td>Do not reject at this point</td> </tr> <tr> <td>Present</td> <td>Not present</td> <td>Do not reject at this point</td> </tr> <tr> <td>Present</td> <td>Present</td> <td>Do not reject at this point</td> </tr> </tbody> </table> <p>The message will also be rejected if the Enable Code is not within the range 0-65532.</p> <p>The Enable Code may be included in the message when a document is inside the DPM so that the document definition can be changed following any cardholder retries. It will not cause the current document definition to be changed unless such a retry occurs.</p>	Enable Code	Document	Action	Not present	Not present	Reject message	Not present	Present	Do not reject at this point	Present	Not present	Do not reject at this point	Present	Present	Do not reject at this point
Enable Code	Document	Action																
Not present	Not present	Reject message																
Not present	Present	Do not reject at this point																
Present	Not present	Do not reject at this point																
Present	Present	Do not reject at this point																
GS	1	See Note 11	Group Separator															
af3	Var (16)	See Note 11	<p>Document Name. When this field is included in the message, the current document definition will be changed to the Document Name given.</p> <p>In most cases, if the Document Name is explicitly given by Central, no validation will be carried out to check that the name given agrees in any way with the document present.</p> <p>The only variation on this is when the Transaction Reply is in reply to a multiple candidate DPM solicited error message. In this case, if the name returned in the Transaction Reply is recognised as being one of the previous candidates, a check on the current orientation of the Central-confirmed candidate will be made. If the orientation is incorrect, the document will be ejected for orientation correction and then re-identified. This re-identification may again yield a multiple candidate error and Central should again reply with the confirmed candidate. This process will continue until a candidate is returned which has an associated correct orientation. Alternatively, Central may elect simply to return such documents to the cardholder by issuing a suitable reply.</p>															

Field	Number of Characters	Mandatory/ Optional	Description
			<p><b>Note:</b> The document should not be further processed until its definition has been passed to Central in a Transaction Request message.</p> <p>If the name explicitly given cannot be found in the DDF, a DPM solicited error message will be returned.</p>
FS	1	See Note 2	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 Note 2	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 Note 2	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. See page 5.1-6, "Providing Security With Message Authentication."
am2	Var	O	VC data The Exit data. The data field should not contain the Group Separator character (1DH).
FS	1	See Note 2	Field Separator. Reserved for Exits
an1	1	O	VC data ID 'N'.
an2	Var	O	VC data
FS	1	See Note 2	Field Separator. Reserved for Exits
ao1	1	O	VC data ID 'O'.
ao2	Var	O	VC data
FS	1	See Note 2	Field Separator. Reserved for Exits

Transaction Reply Commands  
Transaction Reply

Field	Number of Characters	Mandatory/ Optional	Description
ap1	1	O	VC data ID 'P'.
ap2	Var	O	VC data
FS	1	See Note 2	Field Separator. Reserved for Exits
aq1	1	O	VC data ID 'Q'.
aq2	Var	O	VC data
FS	1	See Note 2	Field Separator. Reserved for Exits
ar1	1	O	VC data ID 'R'.
ar2	Var	O	VC data
FS	1	O	See Note 7
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.

## Notes

**Note:** 1. 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.

**Note:** 2. The fields 'w' and 'x', 'ae\*', 'af\*', 'ak\*' to 'ar\*' including their field separators, comprise groups. If the field is not included, its preceding field separator must be omitted.

**Note:** 3. Higher numbered types may be omitted if no dispense from these types is required. The total number of all types of note dispensed must not exceed 40. To ensure a tidy presentation we recommend that 20 is not exceeded.

**Note:** 4. This field must be included in all Transaction Reply messages except a Print Immediate.

**Note:** 5. This field must be present if field 'n' is present. Otherwise, it is optional.

**Note:** 6. The Time Variant Number, length eight bytes, is present if the Data Security feature is selected and the MAC flag settings are correct. Otherwise, the Message Sequence Number, length three

bytes, is optionally present. See *NDC+ Supervisor's Reference Manual* for details.

**Note:** 7. The field separator and MAC data field 'y' are present if the Data Security feature is selected, and the MAC flag settings are correct. See *NDC+ Supervisor's Reference Manual* for details.

**Note:** 8. This group separator should only be included if a coin dispense is required.

**Note:** 9. 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.

**Note:** 10. The field introduced by the field separator and buffer identifier 'E' is mandatory if the Function Command ID is 'S' (Process Document With Cash). However, the elements of the field beyond the Document Destination field (fields 'ae3' to 'ae10') are optional. These fields will hold the last value downloaded for them by Central. If Central has not previously assigned values to them, they assume default values.

**Note:** 11. The field introduced by the field separator and buffer identifier 'F' is only used when the Function Command ID is 'S' (Process Document With Cash). The field is only mandatory if the Function Command ID is 'S' and there is no document currently in the DPM. The group separator preceding field 'af3' is only present if field 'af3' is present.

**Note:** 12. The following summarises how printing can be achieved when performing the Function 'S' (Process Document With Cash). The term 'zone name' in this context implies that it is preceded by the zone name string length.

- a **'; followed by the delimiter** - Use the appropriate DDF Class Write List and print the pre-defined print data contained in the DDF for each zone. If the message contains ';' followed immediately by the delimiter more than once, the message will be rejected.
- b **'< followed by the delimiter** - Use the appropriate DDF Class Write And Confirm List and print the pre-defined print data contained in the DDF for each zone. When printing is complete, verify that the zone has been marked in some way. If the message contains '<' followed immediately by the delimiter more than once, the message will be rejected.

- c **'; followed by 'zone name' followed by the delimiter** - Use the pre-defined print data contained in the DDF for the specified zone.
- d **'< followed by 'zone name' followed by the delimiter** - Use the pre-defined print data contained in the DDF for the specified zone. When printing is complete, verify that the zone has been marked in some way.
- e **'; followed by 'zone name' followed by the characters 'DEFAULT' followed by the delimiter** - Use the NDC+ default data, which will contain information such as the TSN, date and time, to print on the zone specified.
- f **'< followed by 'zone name' followed by the characters 'DEFAULT' followed by the delimiter** - Use the NDC+ default data, which will contain information such as the TSN, date and time, to print on the zone specified. When printing is complete, verify that the zone has been marked in some way.
- g **'; followed by 'zone name' followed by up to 100 ASCII characters followed by the delimiter** - Print the supplied data in the specified zone. Note the use of the reserved string 'DEFAULT' in 'e' above.
- h **'< followed by 'zone name' followed by up to 100 ASCII characters followed by the delimiter** - Print the supplied data in the specified zone. When printing is complete, verify that the zone has been marked in some way. Note the use of the reserved string 'DEFAULT' in 'e' above.
- i **No flag values of ';' or '<' present** - Do not print on the document.

All of the thirteen printer fields may be used to cause data to be printed on the document. The printer fields may not specify more than one Write List or more than one Write And Confirm List or the message will be rejected.

The following combinations of printer fields are possible if Write And Confirm is supported:

- a The printer fields may request the use of up to a total of thirteen specific zones, where the print fields can be any combination of Write and/or Write And Confirm fields.
- b The printer fields may request the use of up to a total of twelve specific zones and the use of one list, where the print fields can be any combination of Write and/or Write And Confirm fields and the list can be a Write or Write And Confirm list.

- c The printer fields may request the use of up to a total of eleven specific zones and the use of two lists, where the printer fields can be any combination of Write and/or Write And Confirm fields. Of the two lists, one must be a Write list and the other a Write And Confirm list.

Each list may be defined to hold up to ten zones. If the maximum amount of printing is carried out on a document, this gives a total of 31 individual write zones, that is, two lists and eleven zones.

Writing to the document is carried out on a per field basis, such that printing will stop as soon as an error is detected. When an error is detected during the writing of a list, the DPM is unable to detect which zones in that list were printed. As a result, all data in that list is brought into question. However, specifying zones individually will avoid this if required. See Chapter 3.5, “Document Processing Module” passage, and Appendix O, “DPM Error Data”, for details of DPM printer errors.

The transaction reply will be rejected if the zone name length supplied in the field is not within the acceptable limits, a field or group separator is found within a zone name, or a Write And Confirm printer flag is found but Write And Confirm is not supported. See Chapter 3.2, Status Information” passage, for more information.

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## Functions The Terminal Can Perform To Complete A Transaction

Field ‘l’ of the Transaction Reply contains a Function Identifier. This instructs the terminal on what functions are to be performed to complete the transaction. The functions consist of:

- 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
- Process Document With Cash
- DP-ATM Deposit Envelope

Note that dispense functions may have slightly different behaviours if an Angel spray dispenser is present. This is because the Angel dispenser drives each note straight out into a receiving pocket

instead of stacking and presenting them as a standard dispenser does. The maximum dispenser is 70 notes instead of the standard 40. Also, there is no possibility of retracting notes dispensed by an Angel spray dispenser.

In the following tables we illustrate the sequence of events, and related screen displays, for each of these functions.

### Deposit and Print

State	Screen	Operation
Transaction Request	Transaction Request Screen (PLEASE WAIT)	Present envelope. See Note 3. Enable depository. Start slow beep. See Note 2. Switch on media entry indicator. Wait for cardholder to insert envelope. Stop beeping. (Enter Time-Out state if timer 04 expires. See Note 4)
		Print on envelope.  Print on receipt and journal. Annunciate voice data (printer flag is '>').  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 Note 4) See Note 5

**Note:** 1. 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.

**Note:** 2. If the beeper is not required, Message Mode option 11c (Diebold Emulation mode) or option 2c (Native mode) can be used to inhibit its operation. See *NDC+ Supervisor's Reference Manual* for details.

**Note:** 3. If an envelope has not been dispensed by an Envelope Dispenser state within the transaction, executing this function causes an envelope to be dispensed if the terminal is in Diebold

Emulation mode with option 9a set. See *NDC+ Supervisor's Reference Manual* for details.

**Note:** 4. For details of timers, see Chapter 4.2, “Configuration Parameters Load” passage.

**Note:** 5. Timer 02 is used to determine the length of time that the Close screen is displayed.

## Dispense and Print

State	Screen	Operation	
Transaction Request	Transaction Request Screen (PLEASE WAIT)	Dispense cash.	Timer (07 + 10) See Note
	Transaction Reply Screen (TAKE CASH)	Print on receipt and journal. Annunciate voice data (printer flag is ' <gt>'). See Note. Send status.</gt>	
Next State in Transaction Reply Command	Next State Screen (for example, SELECT TRANSACTION)		

**Note:** If the terminal is configured to inhibit notes retract, timer (07 + 10) is used as shown. See *NDC+ Supervisor's Reference Manual* 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 if Native mode status messages are used, an unsolicited error is reported to Central. See Chapter 3.5, “Cash Handler” passage, for details.

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. See *NDC+ Supervisor's Reference Manual* for details of configuration options.

In both cases, timer 07 is started and the next state is entered on expiry.

For details of timers, see Chapter 4.2, “Configuration Parameters Load” passage.

## Display and Print

State	Screen	Operation	
Transaction Request	Transaction Reply Screen (for example, DISPENSE ERROR)	Print on receipt and journal. Annunciate voice data (printer flag is '>'). Send status.	Timer (07 + 10) See Note
Next State in Transaction Reply Command	Next State Screen (for example, SELECT TRANSACTION)		

**Note:** This function emulates a Diebold Deliver and Print function. Its main purpose is to display an error screen following a dispense error and to ask the cardholder to collect the dispensed notes.

On a terminal configured to inhibit notes retract, timer (07 + 10) is used as shown.

On a terminal configured for notes retract, timers 05 and 07 are used in the same way as for a Dispense and Print function.

For details of configuration options, see *NDC+ Supervisor's Reference Manual*.

For details of timers, see Chapter 4.2, “Configuration Parameters Load” passage.

## Print Immediate

State	Screen	Operation
Transaction Request	Transaction Request Screen (PLEASE WAIT)	Print on Journal. Annunciate voice data (printer flag is '>'). Send status. Wait for another Transaction Reply command.

**Note:** Print Immediate may also be received at other times. See Chapter 4.6, “Messages Received In Wrong Operational Mode” passage, for details.

## Set Next State and Print

State	Screen	Operation
Transaction Request	Transaction Request Screen (PLEASE WAIT)	Print on receipt and journal. Annunciate voice data (printer flag is ' <b>&gt;</b> '). Send status.
Next State in Transaction Reply Command	Next State Screen	

## 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)	Wait for cardholder to insert bag. Stop beeping. (Enter Time-Out state if timer 08 expires. See Note 2). Print on receipt and journal. Annunciate voice data (printer flag is ' <b>&gt;</b> ). Send status.
Next state in Transaction Reply Command	Next State Screen (for example, Transaction State)	

**Note:** 1. 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.

**Note:** 2. Timer 08 is started when the night safe door is unlocked to accept a night safe deposit.

## Card Before Cash

State	Screen	Operation	
Transaction Request	Transaction Request Screen (PLEASE WAIT)	Eject card.	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 Cash. Print on receipt and journal. Annunciate voice data (printer flag is '>'). Send status. Cut and deliver receipt if necessary.	
Close	Close screen Table Entry 2 (TAKE RECEIPT AND CASH) <b>or</b> Table Entry 4 (TAKE CASH)	Timer 02 (Determines the length of time that the Close screen is displayed).	

**Note:** 1. Track 3 update can take place before card eject if new Track 3 data is contained in the transaction reply message.

**Note:** 2. In normal usage the next state is always Close.

**Note:** 3. For a terminal configured for notes retract, timer 05 is started after the cash has been dispensed. See *NDC+ Supervisor's Reference Manual* for details of configuration options.

If the notes have not been taken when this timer expires, 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 when Native mode status messages are used. See Chapter 3.5, "Cash Handler" passage, for details.

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 Chapter 4.2, "Configuration Parameters Load" passage.

If the message mode option is selected, the beeper is sounded during the time that timer 05 is operative. See *NDC+ Supervisor's Reference Manual* for details.

## Parallel Eject/Dispense and Print (Fast Cash)

State	Screen	Operation	
Transaction Request	Transaction Request Screen (PLEASE WAIT)	Parallel Eject/Dispense and Print. Annunciate voice data (printer flag is '>').	
	Transaction Screen (TAKE CARD AND CASH)	Send status. Cut and deliver receipt if necessary.	
Close	Close Screen Table Entry 2 (AND RECEIPT) <b>or</b> Table Entry 4 (NULL)	Wait for card to be taken or captured, if not already taken.	Timer 02 See Note 5

**Note:** 1. In normal usage the next state is Close.

**Note:** 2. We recommend that the close screens add text to the Transaction Reply screen rather than clear the screen.

**Note:** 3. 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.

**Note:** 4. On a terminal configured for notes retract, timer (05 + 07) is started. For details of timers, see Chapter 4.2, “Configuration Parameters Load” passage. 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 when Native mode status messages are used, an unsolicited error is reported to Central. See Chapter 3.5, “Cash Handler” passage, for details. 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 (05 + 07) is in use. See *NDC+ Supervisor’s Reference Manual* for details of configuration options.

**Note:** 5. Timer 02 is used to determine the length of time that the Close screen is displayed.

**Note:** 6. 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 Card Read - PIN Entry Initiation State. See Chapter 2.1, “State Tables”, for details.

## Card Before Parallel Dispense and Print

State	Screen	Operation
Transaction Request	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)
	Transaction Reply Screen 2 (PLEASE WAIT FOR CASH AND RECEIPT)	Send status if failure and abort. Otherwise continue.  Stack and dispense cash and print buffer 'r'. Send status if failure and abort. Otherwise wait for cash to be taken. Complete printing when cash is taken. Annunciate voice data (printer flag is '>'). Send status.
Close	Close Screen	Cut and deliver receipt if necessary.

**Note:** 1. In normal usage, the next state is a Close.

**Note:** 2. We recommend that the Close Screens do not clear the screen but simply add text to the Transaction Reply Screen.

**Note:** 3. 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.

**Note:** 4. For a terminal configured for notes retract following the card eject, dispense and print, timer (05 + 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. See *NDC+ Supervisor's Reference Manual* for details of configuration options.

If the notes are taken before the timer expires, it is cancelled and the next state entered. For details of timers, see Chapter 4.2, "Configuration Parameters Load" passage.

If the local configuration option to sound the beeper is selected and the no-retract option is not set, the beeper will be sounded during the time that timer (05 + 07) is operative.

## 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. Send status (statement printer or receipt printer if printing sideways on the receipt). Wait for another Transaction Reply command.

**Note:** A message mode option can be used to enable the Cancel key on the cardholder keyboard. See *NDC+ Supervisor's Reference Manual* for details.

**Note:** The annunciation of voice data is not supported in the Print Statement and Wait function.

## 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. Annunciate voice data (printer flag is '>'). Send status (statement printer or receipt printer if printing sideways on the receipt)
Next State in Transaction Reply Command	Next State Screen	Timer 96 See Note

**Note:** 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.

## Process Document With Cash

State	Screen	Operation	Error Position
Transaction Request	Transaction Request Screen (PLEASE WAIT)	Wait for transaction reply	
	Transaction Reply Command Table Entry 'm'	Cash presented	
	Transaction Reply Screen 2 (‘D0001’)	Enable DPM to accept document (Timer 04). Start slow beep. See Note 3. Switch on media entry indicator. Wait for cardholder to insert document. Stop beeping and switch off MEI.	E E E E
	Transaction Reply Screen 3 (‘D0002’)	Lift front/rear images.	F
	Transaction Reply Screen 4 (‘D0010’)	Identify document or set current document definition. Check orientation of document Check document for magnetic flux. Perform zone verification. Lift image list zones. Archive images, image list zones and default text message. Read and store read zone data.	I O V V L A R
	Transaction Reply Screen 5 (‘D0007’)	Write/write and confirm DPM print data.	W
	Transaction Reply Screen 6 (‘D0009’)	Return document to cardholder.	D
	Transaction Reply Screen 7 (‘D0009’)	Print receipt/journal data (Timer 94). Announce voice data (printer flag is >). Send status.	
Close	Close Screen	Cut and deliver receipt if necessary. Return or retain any document present.	

**Note:** 1. If an error occurs during this function, the error position is included in the DPM error message. This indicates at what position the error arose. See Chapter 3.5, “DPM Transaction/Device Status - Field ‘e2/g2’ ” passage, for information about the error positions.

**Note:** 2. See Chapter 2.2, “D - DPM” passage, for details of these Transaction Reply screens.

**Note:** 3. If the beeper is not required, Message Mode option 2c (Native mode) can be used to inhibit its operation. See *NDC+ Supervisor's Reference Manual* for details.

**Note:** 4. For details of timers, see Chapter 4.2, “Configuration Parameters Load” passage.

## **DP-ATM Deposit Envelope**

State	Screen	Operation	
Transaction Request	Transaction Request Screen (PLEASE WAIT)		
	Transaction Reply Command Screen (INSERT ENVELOPE)	Present envelope. Enable depository. Start slow beep. See Note 2. Switch on media entry indicator. Wait for cardholder to insert envelope. Stop beeping. (Enter Time-Out state if timer 04 expires. See Note 3)	
		Print on envelope.  Print on receipt and journal. Annunciate voice data (printer flag is '>').  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. (Capture card if timer 09 expires. See Note 3)	Timer 02 See Note 4

**Note:** 1. 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.

**Note:** 2. If the beeper is not required, Message Mode option 2c (Native mode) can be used to inhibit its operation. See *NDC+ Supervisor's Reference Manual* for details.

**Note:** 3. For details of timers, see Chapter 4.2, “Configuration Parameters Load” passage.

**Note:** 4. Timer 02 is used to determine the length of time that the Close screen is displayed.

**Note:** 5. If a fault occurs, this function will attempt to return the envelope to the cardholder and prompt him to take it.

## 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. See Chapter 3.1, “Transaction Request Messages”, for more details.

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. See Chapter 2.3, “Touch Screen FDK Emulation” passage, for details.

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. See Chapter 2.3, “Keyboard Data”, for details.

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.

Transaction Reply Commands  
**Interactive Transaction Response**

Field	Number of Characters	Mandatory/Optional	Description																								
f	1	M	<p>Message Sub-Class. The message sub-class is:</p> <p>'2' - Interactive Transaction Response</p>																								
g	1	M	<p>Display Flag. This one character field instructs the terminal display as follows:</p> <p>'0' - do not display cardholder keyboard entry</p> <p>'1' - display cardholder keyboard entry</p> <p>'2' - display '*' for cardholder keyboard entry</p> <p>The keyed response is stored in General Purpose Buffer 'B', which is the only buffer included in a Transaction Request message following the Interactive Transaction Response.</p>																								
h	Var (10)	M	<p>Active Keys/Touch Areas. This is a variable length field which activates the required keys or touch areas for cardholder responses as follows:</p> <p>'0' - de-activate keys/touch areas</p> <p>'1' - activate keys/touch areas</p> <p>The first character of this field either activates or de-activates all numeric keys.</p> <table> <thead> <tr> <th>Char</th> <th>All Numeric Keys</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Numeric keys activator (0-9)</td> </tr> </tbody> </table> <p>The next nine characters either activate or de-activate the function keys or touch areas as follows:</p> <table> <thead> <tr> <th>Char</th> <th>Function Keys or Touch Areas</th> </tr> </thead> <tbody> <tr> <td>2</td> <td>FDK A/FDK A touch area and Enter Key</td> </tr> <tr> <td>3</td> <td>FDK B/FDK B touch area</td> </tr> <tr> <td>4</td> <td>FDK C/FDK C touch area</td> </tr> <tr> <td>5</td> <td>FDK D/FDK D touch area</td> </tr> <tr> <td>6</td> <td>Cancel Key E</td> </tr> <tr> <td>7</td> <td>FDK F/FDK F touch area</td> </tr> <tr> <td>8</td> <td>FDK G/FDK G touch area</td> </tr> <tr> <td>9</td> <td>FDK H/FDK H touch area</td> </tr> <tr> <td>10</td> <td>FDK I/FDK I touch area</td> </tr> </tbody> </table>	Char	All Numeric Keys	1	Numeric keys activator (0-9)	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	8	FDK G/FDK G touch area	9	FDK H/FDK H touch area	10	FDK I/FDK I touch area
Char	All Numeric Keys																										
1	Numeric keys activator (0-9)																										
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																										
8	FDK G/FDK G touch area																										
9	FDK H/FDK H touch area																										
10	FDK I/FDK I touch area																										

Field	Number of Characters	Mandatory/Optional	Description
			<p>Trailing '0' characters may be omitted from this field.</p> <p><b>Note:</b> If numeric keys are active and FDK A (or FDK I if the option which enables the keys to the left of the CRT is set) is also active, the Enter key will be active and equivalent to FDK A or FDK I.</p>
FS	1	M	Field Separator.
i	3	M	Screen Timer Field. This three character field contains the time-out intervals from the CRT 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 CRT.
k	Var	M	Trailer. Protocol-dependent.

Transaction Reply Commands  
**Interactive Transaction Response**

## Chapter 4.5

# EJ Commands

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Introduction	4.5-1
EJ Options And Timers	4.5-2
Message Format	4.5-2
Acknowledge EJ Upload Block	4.5-3
Message Format	4.5-3
Acknowledge and Stop EJ	4.5-4
Message Format	4.5-4
Continuous and Batch Upload Methods	4.5-5

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Table of Contents  
**EJ Commands**

# Introduction

This chapter contains details of the EJ Commands:

- EJ Options and Timers
- Acknowledge EJ Upload Block
- Acknowledge and Stop EJ

We describe the format and content of each command in the following passages, along with an explanation of continuous and batch upload methods.

See Chapter 3.4, ‘Upload EJ Data Message’ for details of the SST to host upload message.

## EJ Options And Timers

This command may be sent by the host 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.

### Message Format

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
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. See Chapter 3.4, 'EJ Upload Message' for details. Option 61 - Retry Threshold. The number of attempts to successfully send an EJ Upload block before the EJ is automatically disabled. See note.
e	3	O	Option Value. For Option 60, the value range is 010-350. 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 the host before resending the block.
g	3	O	Timer Value. Range 000-255. Default is 255, 000 is infinite.

**Note :** 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 the host 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 the host, 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.

### Message Format

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 note 1. 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.

**Note 1:** 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 NVRAM is preserved.

**Note 2:** 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 the host, and in addition indicates that EJ upload is to cease. This will disable the EJ upload function until the host 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 (i.e. not in response to an upload message).

If the host disables EJ upload, EJ data will accumulate at the SST until the host 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.

### Message Format

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 note. 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.

**Note:** 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 NVRAM is preserved.

## Continuous and Batch Upload Methods

Continuous upload is the normal method of operation when the EJ upload function has been enabled. The host 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 the host 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. The host 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:

- The host 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.
- The host then enables EJ upload.
- Upload proceeds, paced by the host's acknowledgement messages, until all the EJ data has been sent to the host.
- When the last message has been received, the host 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.
- Once EJ upload is disabled, the host 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, the host should send a Print

Immediate command to the SST with a short message, such as 'END OF DAY', to be printed on the journal. The host 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.

Chapter 4.6

# Other Messages

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Message Exception Handling	4.6-1
Exits	4.6-2
Messages Received In Wrong Operational Mode	4.6-8
Customisation Data Commands	4.6-8
Transaction Reply Command	4.6-9
Terminal Commands	4.6-9
IBM 3600 Loop Messages	4.6-12
All Messages	4.6-12
All Terminal To Central Messages	4.6-12
Transaction Request Messages	4.6-12
Track 2 Data	4.6-12
Track 3 Data	4.6-12
Operation Code	4.6-12
Amount Entry	4.6-13
Pin Buffer (Buffer A)	4.6-13
Central To Terminal Messages	4.6-13
Error Logs And Tallies	4.6-13

[Table of Contents](#)  
[Other Messages](#)

## Message Exception Handling

Validation checks are performed on all messages received from Central. The situations which cause a command reject are as follows:

- Illegal message class (legal classes are 1, 2, 3, 4, 6 or 7)
- 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 request is too large (more than 40 notes or 25 coins)
- 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.

- Card before cash function ID on terminal which has been configured at installation time with Diebold message mode option
- 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. Any other illegal parameter in a received message will be accepted and the appropriate default operation will occur, but system integrity will not be lost. However, the operation is largely unpredictable, and we recommend that you ensure that Central validation occurs before a message is sent, or check the terminal operation before going live.

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 CRT.

### Exits

If a rule file specifies a DLL which cannot be loaded, or a routine which cannot be accessed, the terminal will:

- Trace the error, using trace messages T93 or T94. See page 30 of Appendix A, “Reserved Screens.”
- If the error occurs during the execution of a user defined Exit State, NDC+ will also put the terminal into a default Close state.

This will affect:

- 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.

The following are the conditions under which the Specific Command Reject value/qualifier combinations are produced.

Value	Qualifier	Description
A		Message Format Errors.
01		<p>Message Length Error. An incomplete message is found under the following conditions:</p> <p>Report Logs/Tallies missing the group number.</p> <p>Load configuration ID incomplete or missing ID field.</p> <p>Diebold PIN Mode Message - missing or incomplete data.</p> <p>Option/Timer - incomplete number/value field in configuration message.</p>

Value	Qualifier	Description
		Truncated MAC Field Selection Load, with expected MAC data missing.
		The length of the value field is too short in an Override D-Screen command.
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.  Found unexpectedly in the Override Reserved Screen command.
03		Too many print groups in the Transaction Reply message. More than 13 print groups are present in a Transaction Reply message.
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.
05		Too many DPM Write Lists or too many DPM Write And Confirm Lists in the Transaction Reply message.
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' or 'A' - 'C'.

Value	Qualifier	Description
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.  The command code is '?' but the modifier is not 0 or 1.
06		Illegal Function ID in Transaction Reply command:  Function ID outside the range '1' - '9', 'A', 'B', 'C', 'F', 'O', 'P', 'Q', 'S' or 'T'.  'A', 'F', 'S' and 'T' are not allowed in Diebold Emulation mode.
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' or 'af2' 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.  The zone name length in the printer fields of a Transaction Reply message is out of range.

Value	Qualifier	Description
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 as of Release 6.00, 000-254 prior to Release 6.00
11		Too many notes in Transaction Reply command. The total number of notes requested exceeds the limit of 40.
13		Unrecognised document destination. Returned if the document destination specified in field 'ae2' of the Transaction Reply is not one of the allowed values or if the field is null.
14		Too many coins in Transaction Reply command. The total number of coins requested exceeds the limit of 25.
15		Unrecognised buffer identifier. Returned if the Transaction Reply contains a buffer identifier not currently supported.
16		Buffer identifier 'E' missing. Returned if the Function Command ID is 'S' (Process Document With Cash) but there is no mandatory field 'ae' in the Transaction Reply message.
17		Document name error. Returned if the data present in a printer field in the Transaction Reply message is shorter than the zone name length given.
18		The screen identifier in an Override Reserved Screen Command is not in the range 'D0000' to 'D0010'.
19		Insufficient screen pool memory to store screen. Returned if the storage space in the screen pool is not big enough to contain the new screen during a screen download.
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.

Value	Qualifier	Description
02		<p>Message cannot be accepted while diagnostics and clear SOH programs for Level 2 and Level 3 are in progress. This reply is designed to draw attention to the fact that these programs are being executed. It applies to the following messages:</p> <p>Download messages for customisation.</p> <p>Transaction Replies (not Print Immediate).</p>
03		<p>Message cannot be accepted while in Out-of-Service or Supply modes. The following messages cannot be accepted in these modes:</p> <p>Transaction Replies (not Print Immediate).</p> <p>Interactive Transaction Response.</p>
04		<p>Message unacceptable in current mode.</p> <p>The following messages cannot be accepted while in In-Service mode:</p> <p>Terminal commands '4', '5', '6', '8', '9', '?' .</p> <p>Interactive Transaction Response when not in Transaction Request State.</p> <p>Also applies to terminal command '?' when attempting to enable Supervisor 'Dump Images' but terminal is performing a transaction.</p>
05		<p>Message not allowed while terminal configured for Native mode:</p> <p>Reserved.</p>
06		<p>Message not allowed while terminal configured for Diebold Emulation mode:</p> <p>Reserved for future enhancements.</p>
07		Reserved.
08		EKC initialise message rejected. The EKC is already in a legal state.
09		Reserved.
10		Message not accepted while processing a Transaction Reply.
11		Document is not present in DPM.
12		Cannot process a document while a statement print function is being carried out. Reported on 5665 only.

Value	Qualifier	Description
13		Cannot perform a statement print function while processing a document. Reported on 5665 only.
14		Cannot perform a DPM envelope deposit while processing a document.
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.
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		Reserved.
04		EKC initialisation command not accepted, due to encryption failure during initialisation.
05		Reserved.
06		Insufficient disk space.
E		Not Supported.
01		<p>Not supported by software:</p> <p>The requested function is not supported by the software version in use.</p> <p>VISA PIN verification key table load via Encryption key load message.</p> <p>The received communications Encryption Key Change message contains a invalid modifier, i.e. between '5' and '9'.</p> <p>MAC Field selection load.</p> <p>A requested DPM software feature is not present.</p>
02		<p>Not supported by hardware:</p> <p>The DPM has been requested to perform an action which depends on a DPM sub-device or pocket being present but the sub-device is not configured.</p> <p>A dispense function has been issued which requests coins but there is no Coin Dispenser present.</p> <p>Sideways printing on receipt is requested and the option is not available.</p>

## Other Messages

### Message Exception Handling

Value	Qualifier	Description
03		Reserved.
04		Reserved.
05		Journal printer backup is inactive.

# Messages Received In Wrong Operational Mode

In the following tables we define 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

See Chapter 4.2, “Customisation Data Commands”, for more details about these 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
Configuration ID Number Load	-	A	A	R
Enhanced Configuration Parameters Load	-	A	A	R

## Other Messages

### Messages Received In Wrong Operational Mode

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
Initialise EKC	-	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

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

See Chapter 4.1, "Terminal Commands", for more details about these 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
Tallies Request	-	D	P	R
Error Log Request	-	D	P	R
Date/Time Request	-	D	P	R
Vandal Guard Open	-	A	P	R
Vandal Guard Delay	-	A	P	R
EKC Retrieve Hallmark Key	-	D	P	R
Enable FREE JDATA	-	A	A	R
Enable Image Dumping	-	A	A	A

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.

Messages Received In Wrong Operational Mode

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 Configuration ID Status, if Diebold Emulation mode is selected. In Native mode, response is the terminal state message containing the Configuration ID.

**Note:** While In-Service, all terminal commands are held until the terminal is Idle and then processed. Commands are not stacked and a new request overrides the previous request to which no response is sent.

# IBM 3600 Loop Messages

When the terminal is configured to operate on an IBM 3600 loop, the structure of messages is different. We describe the ways in which these differences take effect in the following passages:

- All messages
- All terminal to Central messages
- Transaction Request messages
- Central to terminal messages
- Error logs and tallies.

## All Messages

The protocol-dependent header is a one-byte value in the range 0-255, defining the number of bytes of message text to follow.

## All Terminal To Central Messages

Field 'd' and all Field Separators between fields 'c' and 'e' (Unsolicited Status message), and fields 'c' and 'f' (Solicited Status/Transaction Request messages) are omitted. All messages are structured:

- Field B - Message Class
- Field C - Message Sub-Class
- Field E (or F) - Class/Sub-Class Dependent Data.

## Transaction Request Messages

The following differences apply to Transaction Request messages:

### Track 2 Data

Field 'h' contains Track 2 data packed as two hexadecimal digits per byte. Each digit has a value of 0-9 or D hex (D = Field Separator). Start and End sentinels are not transmitted. If the track contains an odd number of characters, the last byte is padded with a value of F hex. The maximum number of bytes of Track 2 data is 20.

### Track 3 Data

Field 'i' contains Track 3 data coded in the same way as Track 2 data. The maximum number of bytes of Track 3 data is 53.

### Operation Code

Field 'j' contains Operation Code data packed as two hexadecimal digits per byte. Each digit has a value in the range 0-9, representing the operation key codes of space, A to I, respectively. This means that the lower nibble of each byte of the operation code buffer is transmitted. The length of this field is four bytes.

### Amount Entry

Field 'k' contains the amount entry data packed as two hexadecimal digits per byte. Each digit has a value in the range 0-9, representing the keys 0-9 respectively. This means that the lower nibble of each byte of the amount buffer code is transmitted. The length of this field is four bytes.

### Pin Buffer (Buffer A)

Field 'l' contains the 16-digit PIN encrypted as specified in the FIT, for remote PIN verification packed as two hexadecimal digits per byte. If the terminal has been configured at installation time with the No-PIN message option, this field contains the keyboard data collected in general purpose buffer 'C' by an Information Entry state in ASCII characters.

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## Central To Terminal Messages

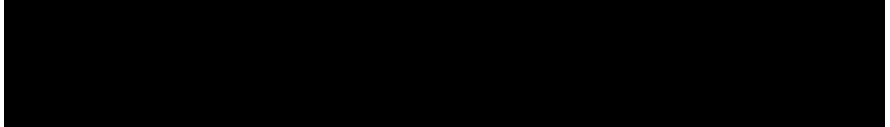
Track 3 data cannot always be transmitted in a Transaction Reply command because of the message length restriction of 256 bytes. Download messages must also be restricted in length.

---

## Error Logs And Tallies

The number of log entries reported is constrained by the message length. At least six entries are reported.

Up to 45 tallies can be reported in a tally message. High numbered tallies are not reported if the IBM loop protocol is used, due to the message limit of 256 bytes. Fewer tallies are reported if MACing is also selected, as this requires more space. Currently only the CIM86 variant of MCRW has 45 entries in its group.



Section 5

## Security Features

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Chapter 5.1

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Security Features

## Table of Contents

## Overview

# Security Features

In this section we discuss some of the security features that NDC+ software offers to safeguard against message interference and fraudulent cards. For further information on security features, see *NDC Programmer's Overview*.

In this section we discuss providing security with the following:

- PIN Block Encryption
- Encryptor Keyboard Controller (EKC)
- Message Authentication
- CIM86
- Journal Printer Backup and the checksum security feature.



Chapter 5.1

# Security Features

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Providing Security With PIN Block Encryption	5.1-1
Diebold PIN Block	5.1-1
ANSI PIN Block	5.1-3
BANKSYS PIN Block	5.1-4
PAN Block	5.1-4
Providing Security With EKC	5.1-5
EKC States	5.1-5
PIN Entry	5.1-6
EKC Communications Failure	5.1-6
Providing Security With Message Authentication	5.1-6
Message Authentication Code	5.1-7
Sending The MAC Field From The Terminal To Central	5.1-7
Sending The MAC Field From Central To The Terminal	5.1-8
Time Variant Number	5.1-8
Full Message Authentication	5.1-8
Selective Message Authentication	5.1-10
Using Selective Message Authentication	5.1-16
Providing Security With CIM86	5.1-17
Providing Security With Journal Printer Backup	5.1-18

[Table of Contents](#)

[\*\*Security Features\*\*](#)

# Providing Security With PIN Block Encryption

NDC+ software supports Diebold, ANSI and BANKSYS PIN block encryption.

## Diebold PIN Block

The Diebold PIN block is formatted and encrypted as defined by the PIN Pad (PINPD) field of the FIT table. The message co-ordination number is not included.

This field contains two digits, and the range is 00-CF hex.

The first digit specifies the method of encryption, the encryption key and if 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:

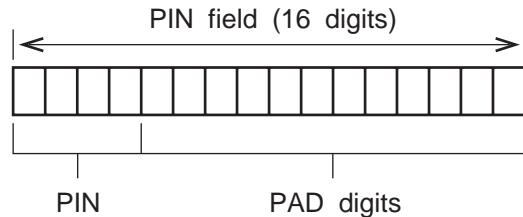
Bit 0 (1 hex)	double encryption sequence: 0 - MAST-COM 1 - PEKEY-COM
Bit 1 (2 hex)	double/single designator: 0 - single 1 - double
Bit 2 (4 hex)	encryption/no-encryption: 0 - encrypt 1 - no encrypt
Bit 3 (8 hex)	co-ordination number/no co-ordination number: 0 - no co-ordination number 1 - co-ordination number included

First Digit				
Hex Value	Type Of Encryption	Encryption Key And Sequence		Co-Ordination Number Included? See Note 1
		First	Second	
0	Single	COM	-	No
2	Double See Note 4	MASTER	COM	No
3	Double	PEKEY	COM	No
4	(none) See Note 3	-	-	No
8	Single	COM	-	Yes See Notes 2, 5
A	Double	MASTER	COM	Yes See Notes 2, 5
B	Double	PEKEY	COM	Yes See Notes 2, 5
C	(none) See Note 3	-	-	Yes See Note 5

**Note:** 1. The Co-Ordination Number is the same as the one included in the Transaction Request message. It is added to the PIN data as shown below when Diebold PIN block is selected.

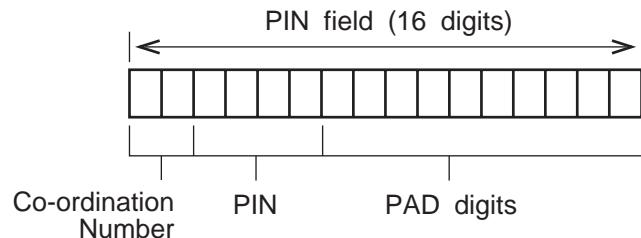
#### a PIN Data Without Co-Ordination Number

Figure 5.1-1 PIN Data Without Co-Ordination Number



#### b PIN Data With Co-Ordination Number

Figure 5.1-2 PIN Data With Co-Ordination Number



**Note:** 2. The Co-Ordination Number is also encrypted.

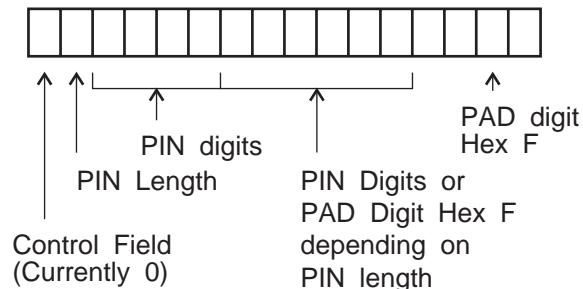
**Note:** 3. The encryption commands 4 and C hex which call for transmitting an unencrypted PIN are not secure.

**Note:** 4. Double encryption involves encrypting the PIN field using the first encryption key, then encrypting the encrypted PIN field, using the second encryption key.

**Note:** 5. The message co-ordination number is never included in this block when the data security feature is specified.

## ANSI PIN Block

Figure 5.1-3 ANSI PIN Block

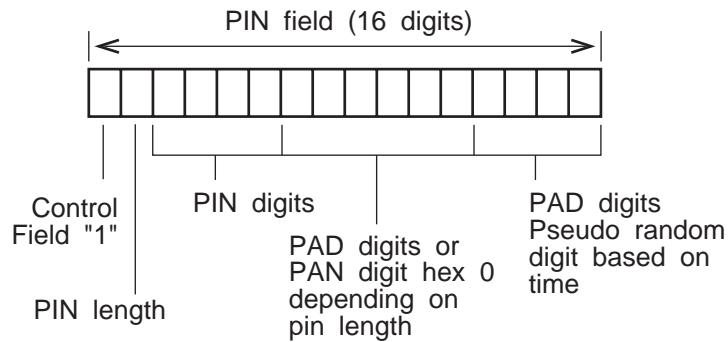


When the cardholder enters the PIN, the digits are padded to the right with F hex in order to complete the block.

## BANKSYS PIN Block

The BANKSYS PIN block is made up of 16 hex digits, as shown below.

Figure 5.1-4 BANKSYS PIN Block

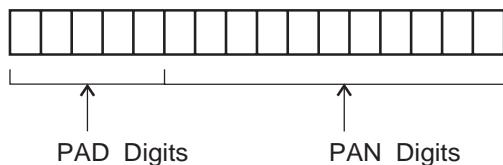


When the cardholder enters the PIN, the digits are padded to the right with 0 hex to the maximum defined by the five least significant bits of the PMXPN field. The block is completed by padding the rest of the block with a pseudo random digit based on time.

## PAN Block

A PAN block is also built. This is made up of 16 hex digits, and contains the PAN digits selected from the cardholder's card using the FIT parameters PANDX and PINDX. The next step is to scan forward to the field separator, and then count back one to allow for the check digit. The last PAN digit is dropped and the right-most digits of the remaining PAN are placed against the right hand edge of the PAN block. If there are more than 12 digits to be placed in the PAN block, only the right-most 12 are used. This block is padded to the left with 0 hex in order to create the full 16 digits.

Figure 5.1-5 PAN Block



As a maximum of 12 PAN digits are placed in the PAN block, the first four digits are always 0 hex.

The PIN and PAN blocks are then exclusively OR'ed together, to create the PIN/PAN block. This is encrypted as defined by the FIT field PINPD and placed in the Transaction Request message. For details of how the PIN/PAN block is encrypted, see the previous passage "Diebold PIN Block".

## Providing Security With EKC

This security feature is available in Native Mode only. The Encryptor Keyboard Controller (EKC) provides a high level of security for keys and PINs entered at the keyboard. It provides the following features:

- Supervisor entry of initial key values
- Supervisor authentication of the EKC
- MAC generation
- BANKSYS PIN block encryption
- Error reporting if tampering is detected by the EKC
- Error reporting of an illegal EKC
- Error reporting of an EKC communications failure
- Re-enabling PIN entry when the terminal goes in-service
- Initialisation of the EKC by Central. The EKC is initialised into the local state
- Encrypted retrieval of the hallmark key to Central.

When a terminal is fitted with an EKC, the Access menu available in Supervisor mode provides an additional option that allows the EKC to be checked for authenticity. See *NDC+ Supervisor's Reference Manual* for details.

The EKC must have a hallmark key placed in it before it can be authenticated. This can be achieved in one of two ways:

- The EKC already contains a hallmark key when it is installed in the terminal
- The EKC is initially in an illegal state. Central then sends a message to initialise it into the local state, after which it contains a hallmark key.

### EKC States

When the terminal enters power-up mode, it determines which state the EKC is in. This can be either the local state or the illegal state.

In the local state, the EKC contains the normal NDC+ keys, for example, the 'A' key, the 'B' key and the hallmark key.

In the illegal state the EKC contains an unrecognised set of keys.

If the EKC is in the illegal state at power-up, an unsolicited encryptor status message is sent to Central. See Chapter 3.5, “Device Fault Status Information - Native Mode”, for details. Central may initialise the EKC into the local state using the Initialise EKC command. See Chapter 4.2, “Customisation Data Commands”, for details. However, an illegal EKC may be a sign of unauthorised access.

For details of what happens if the EKC is in the illegal state when the hallmark function is being performed in Supervisor mode, see *NDC+ Supervisor's Reference Manual*.

### PIN Entry

If the EKC detects possible cardholder tampering, the terminal inhibits PIN entry and sends an unsolicited encryptor status message to Central. See Chapter 3.5, “Device Fault Status Information - Native Mode”, for details. On receipt of this message, Central should instruct the terminal to go out-of-service so that a local investigation can be carried out.

If cardholder tampering is detected, it will be during a PIN entry state. See Chapter 2.1, “B - PIN Entry State” and “M - Enhanced PIN Entry State” passages, for details.

Once the condition has been dealt with, Central must send a Terminal Command message to instruct the terminal to go back in-service. This allows PIN entry to be re-enabled.

### EKC Communications Failure

If a communications failure is detected between the terminal and the EKC, the terminal sends an unsolicited encryptor status message to Central. See Chapter 3.5, “Device Fault Status Information - Native Mode”, for details. If the failure is serious, a system escape occurs.

---

## Providing Security With 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 a general description of Message Authentication, see *NDC Programmer's Overview*.

## 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 and MAC Field Selection Load 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 exclusively OR'ed with the next eight bytes extracted from the data. If fewer than eight bytes remain, they are padded to the right with 0 hex.
- 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 hex digits, each of which is converted to a character in the range '0' - '9', 'A' - 'F' .

### 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. The terminal compares this TVN to the one it sent and, if it is the same the message is then MAC verified. If successful, it 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 *NDC+ Supervisor's Reference Manual* for details. This information contains flags that have the following meanings:

---

### Flag 1

- |   |  |
|---|--|
| 0 | Do not check the time variant number in Transaction Reply messages, or the MAC in Transaction Reply, State Table or FIT Load messages.                                 |
| 1 | Check the time variant number in Transaction Reply messages, and the MAC in Transaction Reply, State Table, FIT and Message Authentication field select load messages. |
- 

---

### 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.

---

**Flag 8**

---

- |   |  |
|---|--|
| 0 | Do not check the Security Terminal Number in Transaction Reply messages. |
| 1 | Check the Security Terminal Number in Transaction Reply messages.        |
- 

---

**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. |
- 

---

**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 3-7 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. For more details of Selective Message Authentication, see *NDC Programmer's Overview*.

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 Response, 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.

---

### Transaction Request Message

Offset	Meaning
0	0 - MAC complete message. Ignore the remaining digits. 1 - Selectively MAC the fields below. See Note 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
16	Fields q and r

Offset	Meaning
0	0 - MAC complete message. Ignore the remaining digits. 1 - Selectively MAC the fields below. See Note 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
16	Fields q and r

---

**Transaction Request Message**

Offset	Meaning
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' - CIM86 fields. See Note 2.
20	Field ad*, identified by Data ID 'C' - Read Zone 1
21	Field ae*, identified by Data ID 'D' - Read Zone 2
22	Field af*, identified by Data ID 'E' - Read Zone 3
23	Field ag*, identified by Data ID 'F' - Read Zone 4
24	Field ah*, identified by Data ID 'G' - Read Zone 5
25	Field ai*, identified by Data ID 'H' - Read Zone 6
26	Field aj*, identified by Data ID 'I' - Read Zone 7
27	Field ak*, identified by Data ID 'J' - Read Zone 8
28	Field al*, identified by Data ID 'K' - Read Zone 9
29	Field am*, identified by Data ID 'L' - Read Zone 10
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' - Document Data
35	Field as*, identified by Data ID 'R' - CAV Results
36	Field at*, identified by Data ID 'S' - Zone Verification Results
37	Field au*, identified by Data ID 'T' - Reserved
38	Field av*, identified by Data ID 'U' - First CSP attempt
39	Field aw*, identified by Data ID 'V' - Second CSP attempt
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

**Note:** 1. Fields are selected for inclusion in the MAC if the relevant offset byte is set to 1.

**Note:** 2. This field is a combination of the Transaction Request message fields for CIM86 verify code identifier and CIM86 verify code.

---

Transaction Reply Message

Offset	Meaning
0	0 - MAC complete message. Ignore the remaining digits. 1 - Selectively MAC the fields below. See Note 1.
1	Fields b and c
2	Field d
3	Field e
4	Field f
5	Fields g, h, i, j and j1-j4
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 Note 2.
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' - DPM
22	Field af*, identified by Data ID 'F' - DPM

---

**Transaction Reply Message**

Offset	Meaning
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
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' - Available for use by Exits
30	Field an*, identified by Data ID 'N' - Available for use by Exits
31	Field ao*, identified by Data ID 'O' - Available for use by Exits
32	Field ap*, identified by Data ID 'P' - Available for use by Exits
33	Field aq*, identified by Data ID 'Q' - Available for use by Exits
34	Field ar*, identified by Data ID 'R' - Available for use by Exits

**Note:** 1. Fields are selected for inclusion in the MAC if the relevant offset byte is set to 1.

**Note:** 2. The printer fields following 'u' and 'v' will be MACed if fields 'u' and 'v' are MACed. The group separators between the additional printer fields will not be included in the MAC.

**Solicited Status Message**

Offset	Meaning
0	0 - MAC complete message. Ignore the remaining digits. 1 - Selectively MAC the fields below. See Note 1.
1	Fields b and c
2	Field d
3	Reserved
4	Field e
5	Field f
6	Field g1
7	Field g2. See Note 2.

---

Solicited Status Message

Offset	Meaning
8	Field g3
9	Field g4
10	Field g5

---

**Note:** 1. Fields are selected for inclusion in the MAC if the relevant offset byte is set to 1.

**Note:** 2. When field 'g2' is set to be MACed selectively, any group separators within that field will not be MACed.

---

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 Command messages. 1 - MAC Terminal Command messages.

---

---

Track 1, Track 2, Track 3

Offset	Meaning
0	0 - MAC full track. Ignore bytes 1-n. 1 - Selectively MAC the fields below. See Note.
1	Sub-field 1 (including start sentinel)
2-n	Sub-fields 2-n

---

**Note:** 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 less 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.

## Using Selective Message Authentication

A set of default field values are provided. These are as follows:

Transaction Request	Selective MAC on fields e, h (sub-field l), j, k, l.
Transaction Reply	Selective MAC on fields e, g, h, i, j, j1-j4, k, l.
Solicited Status	Full MAC.
FIT/State tables	Full MAC.
Terminal Commands	No MAC.
Track 1	Full MAC.
Track 2	Selective MAC on first sub-field.
Track 3	Full MAC.

**Note:** 1. These defaults can be changed by a download configuration message.

**Note:** 2. 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.

**Note:** 3. The selective MAC is calculated in the same way as for full Message Authentication.

## Providing Security With CIM86

The MM sensor with CIM86 MCRW, if present and configured, provides an extra level of security which the system can use to decide whether a card is valid.

CIM86 reads security data from a card and validates it with other card data. This operation is referred to as a CIM86 verify, and is performed during the Card Read state, following a successful FIT match. If the card is invalid, the CIM86 feature allows for either the transaction to be cancelled at the terminal, or for Central to make the decision to cancel or proceed. If the decision is to be left with Central, a Transaction Request state must follow the Card Read state, to perform a Transaction Request/Reply. A Transaction Request state following on later in the state flow must contain parameters that indicate CIM86 data is included in a Transaction Request message.

CIM86 uses an optical sensor to read the security data from a card. If the optical sensor becomes faulty, an option in the Enhanced Configuration Parameters Load message is available that allows it to be disabled. This occurs if the CIM86 verify command reports more than two consecutive faults.

---

## Providing Security With Journal Printer Backup

There is an option available in Native mode that allows journal printer backup to be used. This means that journalling can continue even when the journal printer is fatal. To set the option, set one or both of options 16 and 17 in the Enhanced Configuration Parameters Load message.

If dual mode journal printing is active when the journal printer goes fatal, hardcopy backup will always be activated, and will not be controlled by options 16 and 17 of the Enhanced Configuration Parameters Load message. Instead, the upper limits of data stored are determined only by the length of the journal printer down-time, and the space available on the system disk.

Option 16 is the journal printer backup time option. This specifies the maximum time in hours that journal printer backup is allowed before all journalling is discontinued. Option 17 is the journal printer backup print operations option. This 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 Chapter 4.2, “Enhanced Configuration Parameters Load” passage.

If the option is set and the journal printer goes fatal, journalling continues, using the journal backup mode and the system disk resident buffer file. The journalling includes the text of the last journal printer command sent to the journal printer before it went fatal.

For details of what happens to the data when the journal printer becomes operational again, see *NDC+ Supervisor’s Reference Manual*.

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.

Another security feature provides the option of copying tampered records to disk. This is option 22 in the Enhanced Configuration Parameters Load message. An integrity check is applied to all records passing through the journal printer backup disk buffer. If a data error has occurred on a reprint record, one of the following options is taken:

- The tampered record is printed on the journal within bracketed characters

- The last printed security trace number, date, time and record offset are sent as part of the transaction data in a journal printer unsolicited status message
- The last printed security trace number, date, time and record offset are sent as part of the transaction data in a journal printer unsolicited status message and the tampered record is copied to disk.

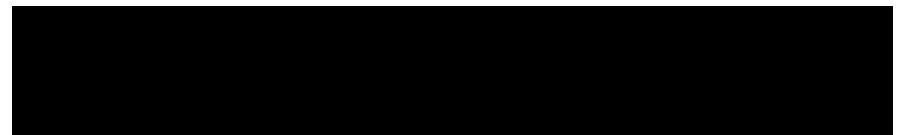
For details of how to set option 22, see Chapter 4.2, “Enhanced Configuration Parameters Load” passage.

A maximum of ten tampered records can be written to the disk as files. Each file contains the data of a tampered record. If more than ten tampered records are detected, reprint is terminated and the entire log file is saved for analysis. If there are no tampered records, no files are created.

There is an additional security check against tamper. The system will add an 8 byte ASCII numeric string to the end of the file copied to disk. This acts as a check digit string for the file. The checksum will be calculated using an algorithm based on machine number, byte offset into the file and data character values. This value is logged to the new electronic journal file on the System drive.

Security Features

## Providing Security With Journal Printer Backup



# Appendices

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**Appendix A**

Reserved Screens

---

**Appendix B**

Character Sets

---

**Appendix C**

Graphics Pictures

---

**Appendix D**

Quick Reference To Message Types

---

**Appendix E**

Screen And Keyboard Layouts

---

**Appendix F**

Code Conversion And Cross-Reference Table

---

**Appendix G**

Differences Between NDC+ And Diebold Message Formats

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**Appendix H**

Differences Between NDC+ And Diebold State Tables

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**Appendix I**

Summary Of Differences Between NCR And Diebold SSTs

---

**Appendix J**

Summary Of Diebold Emulation Features And Network Impact

---

**Appendix K**

NDC+ Diskbuild/2 Requirements

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## Table of Contents

Appendix L	Rear Supervisor/Settlement Transactions File Description
Appendix M	Screen Display Considerations
Appendix N	Device Identifiers
Appendix O	DPM Error Data
Appendix P	Document Processing
Appendix Q	Calculating Touch Screen Positions
Appendix R	Understanding the Digital Audio Service
Appendix S	Understanding the Digital Camera System
Appendix T	Understanding Monitor Burn-In

## Appendix A Reserved Screens

---

Overview	A-1
Reserved Screens	A-2
‘A’ Supervisor Reserved Screens	A-2
‘D’ DPM Reserved Screens	A-4
‘E’ Reserved Screens	A-5
‘H’ Supervisor Reserved Screens	A-7
‘T’ Supervisor Reserved Screens	A-8
‘M’ Supervisor Reserved Screens	A-14
‘P’ Supervisor Reserved Screens	A-18
‘Q’ Supervisor Reserved Screens	A-20
‘S’ Supervisor Reserved Screens	A-23
‘T’ Reserved Screens	A-26
‘X’ State Of Health And TM-Alert Reserved Screens	A-30
‘Z’ State Of Health And TM-Alert Reserved Screens	A-67

Table of Contents  
**Reserved Screens**

## Overview

The following tables show the default text for all supervisor and the remaining reserved screens which were not covered in chapter 2.2 ‘Screen Data’.

‘x’ represents those positions that are edited by the terminal before the screen is displayed or printed.

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 CRT/enhanced operator interface/basic operator interface). Text position is calculated by the row and column positions for each screen.

**Note:** Sideways printing on the receipt is not supported when printing supervisor reserved screens.

## Reserved Screens

### 'A' Supervisor Reserved Screens

'A' screens include:

- Last supervisor control key warnings
- CRT and enhanced operator interface acknowledgement lines.

See *NDC+ Supervisor's Reference Manual* for details.

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901234567890123456789012		

#### Last supervisor control key warnings - Native Mode

A00	1	SWITCH 0 SET
A01	1	SWITCH 1 SET
A02	1	SWITCH 2 SET
A03	1	SWITCH 3 SET

#### Last supervisor control key warnings - Diebold Mode

A00	1	
A01	1	SUPPLY
A02	1	SUPERV
A03	1	SUPPLY      SUPERV

#### CRT 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

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901234567890123456789012		
A11	1	KEY B ENTERED		
A12	1	KEY B STORED		
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		
A24 - A40		Reserved		
A41	1	COIN COUNTS CLEARED		
A42		Reserved		
A43	1	ENVELOPE TAKEN		
A44	1	CAMERA INITIALISED		
A45	1	DEPOSIT INITIALISED		
A46	1	FUNCTION EXITED		
A47	1	EJLOGSEC.xxx COPIED		
A48	1	LOG PRINTED OK		
A49	1	JDATA COPIED OK		
A50	1	BIN SOH OK		
A51	1	DUMP OK - PURGING		
A52	1	EJ LOG RECOPIED OK		
A53 - A57		Reserved		

## Reserved Screens

### Reserved Screens

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901234567890123456789012		
A58	1	WAIT WHILE COPYING		
A59 - A60	1	Reserved		
A61	1	EJ & JOURNAL ACTIVE		

## 'D' DPM Reserved Screens

'D' screens appear on the CRT.  
See *NDC+ Supervisor's Reference Manual* for details.

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901234567890123456789012		
D0000	1			
	2	YOUR ENVELOPE IS		
	3	UNACCEPTABLE		
	4	AT THIS TIME		
	5			
	6	PLEASE TAKE WHEN PRESENTED		
D0001	1			
	2	PLEASE INSERT		
	3	YOUR		
	4	DOCUMENT		
D0002	1			
	2	PLEASE WAIT		
	3			
	4	YOUR DOCUMENT IS		
	5	BEING PROCESSED		
D0003	1			
	2	YOUR DOCUMENT IS		
	3	UNACCEPTABLE		
	4	AT THIS TIME		
	5			
	6	PLEASE TAKE WHEN PRESENTED		
D0004	1			
	2	YOUR DOCUMENT IS		
	3	INCORRECTLY ORIENTED		
	4			
	5	PLEASE TAKE WHEN PRESENTED		

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901234567890123456789012		
D0005	1			
	2	YOUR DOCUMENT IS		
	3	INCORRECTLY ORIENTED		
	4			
	5	PLEASE TAKE WHEN PRESENTED		
D0006	1			
	2			
	3	PLEASE TAKE YOUR DOCUMENT		
D0007	1			
	2	PLEASE WAIT		
	3			
	4	YOUR DOCUMENT IS		
	5	BEING PROCESSED		
D0008	1			
	2	PLEASE TAKE YOUR STATEMENT		
D0009	1			
	2	YOUR DOCUMENT IS		
	3	BEING RETURNED		
	4			
	5	PLEASE WAIT		
D0010	1			
	2	PLEASE WAIT		
	3			
	4	YOUR DOCUMENT IS		
	5	BEING PROCESSED		

## 'E' Reserved Screens

'E' screens are error messages that appear on the CRT, enhanced operator interface and basic operator interface.

See *NDC+ Supervisor's Reference Manual* for details.

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901234567890123456789012		
E0000	1	EC00		
E0001	1	EC01		
E0002	1	EC02		
E0003	1	EC03		

Reserved Screens  
Reserved Screens

Screen Number	Row Position	Column Position		
		1 12345678901234567890123456789012	2	3
E0004	1	ILLEGAL EKC KEYSPCE		
E0005	1	NO HALLMARK KEY		
E0006	1	PAST LOG END		
E0007	1	PAST LOG BEGIN		
E0008	1	NO EARLIER ENTRIES		
E0009	1	NO LATER ENTRIES		
E0010	1	NO DISK IN DRIVE		
E0011	1	FLEX DISK PROTECTED		
E0012	1	NO SPACE FOR FILE		
E0013	1	EJ I/O ERROR		
E0014	1	PRINTER ERROR		
E0015	1	INVALID SEARCH KEY		
E0016	1	EJ NOT PRESENT		
E0017	1	NO IN SERVICE FUNCS		
E0018	1	TOO MANY DIGITS		
E0019	1	NOT ENOUGH DIGITS		
E0020	1	INVALID VALUE		
E0021	1	ERROR DURING PRINT		
E0022	1	DEVICE NOT PRESENT		
E0023	1	DISK I/O ERROR		
E0024	1	COMMAND NOT ENABLED		
E0025	1	COMMAND NOT ALLOWED		
E0026	1	COINS EXCEED LIMIT		
E0027	1	DPM BIN NOT PRESENT		
E0030	1	FAIL TO CLEAR SOH		
E0031	1	LVL1: RPLN & EXIT		
E0032	1	CAMERA FAILURE		
E0033	1	INVALID MEI OPTION		

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901234567890123456789012		
E0034	1	NO FILES FOUND		
E0035	1	EJ FILE FULL		
E0036	1	FILE ON FLOPPY		
E0037	1	NO FILE TO COPY		
E0038	1	EJ BACKUP INVALID		
E0039	1	FRONT FEATURE ONLY		
E0040	1	DCS FAILURE		
E0041	1	DAS ERROR		
E0042	1	LOAD ERROR		
E0047	1	CALL ERROR		
E0048	1	JRNL PRNTR PRESENT		
E0049	1	FAILED TO DISBL EJ		

## 'H' Supervisor Reserved Screens

'H' screens appear on the basic operator display.

See *NDC+ Supervisor's Reference Manual* for details.

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901234567890123456789012		
H00		CASS1		
H01		CASS2		
H02		CASS3		
H03		CASS4		
H04		CARDS		
H05		DEPOS		
H06		DISPF		

Reserved Screens  
Reserved Screens

## 'I' Supervisor Reserved Screens

'I' screens contain information on:

- Encryption keys
- Cash and counter displays
- Configuration data
- Multiple card image selection for rear settlement
- EJ log file inspection.

See *NDC+ Supervisor's Reference Manual* for details.

Screen Number	Row Position	Column Position				
		1	2	3	4	5
I00	1	1234567890	1234567890	1234567890	1234567890	1234567890
	2					
	3					
	4					
	5					
	6	ENCRYPTION KEY A				
	7	<<A		B>>		
	8	CURRENT DIGIT = xx				
	9					
	10	<<C		D>>		
	11					
	12					
	13	<<E		F>>		
I01	1					
	2					
	3					
	4					
	5					
	6	ENCRYPTION KEY B				
	7	<<A		B>>		
	8	CURRENT DIGIT = xx				
	9					
	10	<<C		D>>		
	11					
	12					
	13	<<E		F>>		
I02		Reserved				

		Column Position				
Screen Number	Row Position	1	2	3	4	5
		12345678901234567890123456789012345678901234567890				
I03	1		TYPE 1	TYPE 2		
	2	CASSETTE	xxxxxx	xxxxxx		
	3	+REJECTED	xxxxxx	xxxxxx		
	4	=REMAINING	xxxxxx	xxxxxx		
	5	+DISPENSED	xxxxxx	xxxxxx		
	6	=TOTAL	xxxxxx	xxxxxx		
	7					
	8		TYPE 3	TYPE 4		
	9	CASSETTE	xxxxxx	xxxxxx		
	10	+REJECTED	xxxxxx	xxxxxx		
	11	=REMAINING	xxxxxx	xxxxxx		
	12	+DISPENSED	xxxxxx	xxxxxx		
	13	=TOTAL	xxxxxx	xxxxxx		
	14	LAST CLEARED	xx/xx/xx	xx:xx		
I04	1					
	2	CARDS CAPTURED	xxxxxx			
	3	LAST CLEARED	xx/xx/xx	xx:xx		
	4					
	5	DEPOSITS MADE	xxxxxx			
	6	LAST CLEARED	xx/xx/xx	xx:xx		
	7					
	8	ACTIVITY COUNT =	xxxxxxxx			
	9	PKT A	xxxxxx	CLRD mm/dd/yy hh:mm		
	10	PKT B	xxxxxx	CLRD mm/dd/yy hh:mm		
	11	PKT C	xxxxxx	CLRD mm/dd/yy hh:mm		
	12	BIN 1	xxxxxx	CLRD mm/dd/yy hh:mm		
I05	1	*SUPPLIES STATUS*				
I06	1	*CONFIGURATION DATA*				
	2	ROLL WIDTH	= xx	JRNL=xxxxxxxx		
	3	LEFT COLUMN	= xx			
	4	TRACK 1 TYPE	= xxxxxx			
	5	MESSAGE MODE	= xxxxxxxxxxxxxxxxxxxx			
	6	MACHINE NO.	= xxxxxx			
	7	DATE	= xx/xx/xx			
	8	TIME	= xx:xx:xx			
	9	COUNT PRNTR	= xxxxxx			
	10	STANDARD NOTE COUNTS				
	11	TYPE 1	= xxxxx	TYPE 2 = xxxxx		
	12	TYPE 3	= xxxxx	TYPE 4 = xxxxx		
	13	RESTART MODE	= xxxxxx			
I07	1	*CASH TEST*				
I08	1	CURRENT SCREEN = xxx				

Reserved Screens  
Reserved Screens

Screen Number	Row Position	Column Position				
		1	2	3	4	5
		12345678901234567890123456789012345678901234567890				
I09	1					
	2					
	3					
	4					
	5					
	6		ENCRYPTION KEY V			
	7	<<A		B>>		
	8		CURRENT DIGIT = xx			
	9					
	10	<<C		D>>		
	11					
	12					
	13	<<E		F>>		
I10	1	*ACCESS DATA*				
	2	INITIAL ENT = xxxxxx				
	3	INITIAL DISP = xxxxx				
	4	EXIT MODE = xxxxxxxxxxxx				
	5	MAC NUMBER = xxxxxxxxxxxxxxxxx				
	6	SOH SUP MODE = xxxxxxxxxxxxxxx				
	7	SOH INS MODE = xxxxxxxxxxxxxxx				
<b>Note:</b> Digits in positions 16-32 of message mode are only displayed if the corresponding digits are entered. Trailing digits with default '0' values are omitted.						
I11	1	*HALLMARK VERIFICATION*				
	2					
	3					
	4	HMQ = xxxxxxxxxxxxxxxxxxxxxxx				
	5	HMA = xxxxxxxxx				
	6	FAV = xxxxxxxxx				
	7	PEC = x				
	8	IPE = x				
	9	ROM FIRMWARE = SMFxxxx				
	10	RAM FIRMWARE = EKCxxxx				
	11	SERIAL NUMBER = xxxxxxxx				
	12					
	13	PRESS <ENT> FOR MENU OR				
I15	1	PAPER				
I16	1	DISK				
I17	1	NONE				

		Column Position				
Screen Number	Row Position	1	2	3	4	5
		12345678901234567890123456789012345678901234567890				
I18	1					
	2					
	3					
	4					
	5					
	6					
	7	<<A		B>>		
	8					
	9					
	10	<<C		D>>		
	11					
	12					
	13	<<E		F>>		
I19	1	COMMANDS- A:PRINT B:UP C:NUM SEARCH				
	2	D:DOWN E:TIME SEARCH F:LEFT/RIGHT				
I20	1					
	2	* EJ LOG INSPECTION *				
	3					
	4	HELP SCREEN				
	5					
	6					
	7	<< PRINT		UP>>		
	8					
	9					
	10	<< NUM SEARCH		DOWN>>		
	11					
	12					
	13	<< TIME SEARCH		LEFT/RIGHT>>		
I21	1	* M/C xxxxxxx dd/mm/yy hh:mm:ss *				
I22	1					
	2	CLEAR DEPOSITORY COUNTERS				
	3					
	4	0: ALL POCKETS/BINS				
	5	1: BIN 1	=	xxxxxx		
	6	DEPS MADE (ENV)	=	xxxxxx		
	7	2: POCKET A	=	xxxxxx		
	8	3: POCKET B	=	xxxxxx		
	9	4: POCKET C	=	xxxxxx		
I24	1	ttt aaaaaaaaaaa mm/dd/yy hh:mm:ss mmmmmmm rrrrr				

Reserved Screens  
Reserved Screens

		Column Position				
Screen Number	Row Position	1	2	3	4	5
		12345678901234567890123456789012345678901234567890				
I25	1					
	2	* EJ LOG SEARCH MODE *				
	3					
	4	COMMAND SUMMARY				
	5					
	6					
	7	<< FILE START	SEARCH BACK>>			
	8					
	9					
	10	<< FILE END	SEARCH FRWD>>			
	11					
	12					
	13					
I28	1	*COIN HOPPER PHYSICAL POSITIONS*				
	2					
	3	HOPPER 1: CLOSEST TO THE CHUTE				
	4	HOPPER 2: SECOND CLOSEST				
	5	HOPPER 3: THIRD CLOSEST				
	6	HOPPER 4: FURTHEST FROM CHUTE				
	7					
	8	AUX: HELP ON/OFF				
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	This screen should be left blank. It is used as a base that NDC+ overlays with the currently valid rear settlement data options when the basic operator interface is in use.					
I42	1					
	2	COIN DISPENSER				
	3		HOPPER 1 HOPPER 2			
	4	REMAINING	xxxxx	xxxxx		
	5	+DISPENSED	xxxxx	xxxxx		
	6	=TOTAL COINS	xxxxx	xxxxx		
	7					
	8		HOPPER 3 HOPPER 4			
	9	REMAINING	xxxxx	xxxxx		
	10	+DISPENSED	xxxxx	xxxxx		
	11	=TOTAL COINS	xxxxx	xxxxx		
	12	LAST CLEARED	dd/mm/yy	hh:mm		

		Column Position				
Screen Number	Row Position	1	2	3	4	5
		12345678901234567890123456789012345678901234567890				
I44	1	*CONFIGURATION DATA*				
	2	STANDARD COIN COUNTS				
	3	HOPPER 1= xxxxx HOPPER 2= xxxxx				
	4	HOPPER 3= xxxxx HOPPER 4= xxxxx				
	5	VOLUME SST = X				
	6	VOLUME JACK = X				
	7	SOH PRINTER = xxxxxxxx				
I45	1	*CHECK CDM*				
I48 - I60		Reserved				
I61	4	DEFAULT VOLUME SST = X				
	5					
	6	0 = MINIMUM VOLUME				
	7	9 = MAXIMUM VOLUME				
I62	4	DEFAULT VOLUME JACK = X				
	5					
	6	0 = MINIMUM VOLUME				
	7	9 = MAXIMUM VOLUME				
I63	1	DUAL				
I64	2	EJ BACKUP FILES				
		=====				
		1: EBNNNNNN.001				
		2: EBNNNNNN.002				
		3: EBNNNNNN.003				
		4: EBNNNNNN.004				
		5: EBNNNNNN.005				
		6: EBNNNNNN.006				
		7: EBNNNNNN.007				
		8: EBNNNNNN.008				
		9: EBNNNNNN.009				
		10: EBNNNNNN.010				
		=====				
		SELECT FROM LIST ABOVE -				
		 <<CLR ENT>>				
I65	1	1: EBNNNNNN.XXX B: NEXT D: PREV				
		2: EBNNNNNN.XXX SEL-				

## 'M' Supervisor Reserved Screens

'M' screens contain information on keyboards and the following menus:

- Select
- Replenish
- Configure
- Access

See *NDC+ Supervisor's Reference Manual* for details.

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901234567890123456789012		
<b>Diebold Mode</b>				
M00	1			
	2		SELECT	
	3			
	4	0 SUPVSR ON	1 SUPVSR OFF	
	5	2 SUPPLY ON	3 SUPPLY OFF	
	6	4 REPLENISH	5 CONFIGURE	
	7	6 ACCESS	7 DIAGNOSTIC	
	8	8 TRANSFER	9 EXIT	
	9	20 CSOH 2	21 CSOH 3	
<b>Native Mode</b>				
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	34 SET SOH PRNT	
M03	1			
	2		ACCESS	
	3			
	4	0 DISP ACCESS	1 PRNT ACCESS	
	5	2 SET PASSWRD	3 INIT ENTRY	
	6	4 INIT DISPLAY	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	30 INIT SUP SOH	31 INIT INS SOH	
	12	32 FREE JDATA		
M04		Reserved		
M05	1			
	2		ACCESS	
	3			
	4	0 DISP ACCESS	1 PRNT ACCESS	
	5	2 SET PASSWRD	3 INIT ENTRY	
	6	4 INIT DISPLAY	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	30 INIT SUP SOH	
	12	31 INIT INS SOH	32 FREE JDATA	
M06		Sets the standard Transaction Processing keyboard layout. See Appendix E, "Screen And Keyboard Layouts", for details.		

## Reserved Screens

### Reserved Screens

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			
	9			
	10			
	11			
	12			
	13	99 MORE		
M09		Sets the Transaction Processing keyboard layout with the Clear and Cancel keys swapped. See Appendix E, “Screen And Keyboard Layouts”, for details.		
M10		Sets the standard Supervisor mode keyboard layout. See Appendix E, “Screen And Keyboard Layouts”, for details.		
M11		Sets the Supervisor mode keyboard layout with the Clear and Cancel keys swapped. See Appendix E, “Screen And Keyboard Layouts”, for details.		
M12	1			
	2		SELECT	
	3			
	4	0 SET SW 0	1 SET SW 1	
	5	2 SET SW 2	3 SET SW 3	
	6	4 REPLENISH	5 CONFIGURE	
	7	6 ACCESS	7 DIAGNOSTIC	
	8	8 TRANSFER	9 EXIT	
	9	20 CSOH 2	21 CSOH 3	
	10	22 TM-ALERT		
M13		Sets the Encryption Key Entry keyboard layout. See Appendix E, “Screen And Keyboard Layouts”, for details.		
M15		ESC[00p ESC(1 ESC)6 Sets the left margin and the primary and secondary character sets. See Chapter 2.2, “Special Features” passage, for details.		

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901234567890123456789012		
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. See Chapter 2.2, “Control Characters” and “Special Features” passages, for details.		

## 'P' Supervisor Reserved Screens

'P' screens are prompt lines that appear on the CRT and enhanced operator interface.

See *NDC+ Supervisor's Reference Manual* for details.

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 TRACK 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 -		
P22	1	ENTER RESTART MODE -		
P23	1	INPUT HALLMARK QUESTION -		
P24	1	PLEASE WAIT FOR HALLMARK		

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901234567890123456789012		
P27	1	ENTER SOH IN SUP MODE -		
P28	1	ENTER SOH IN SERVICE -		
P29	1	<<CLR		ENT>>
P30	1	SELECT FROM LIST ABOVE-		
P31	1	PLEASE ENTER TIME KEY		
P32	1	PLEASE ENTER NUMBER		
P33	1	WHERE?- 0:DISK 1:RCPT 2:STMT		
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	1	SELECT BIN -		
P40	1	ENTER VOL SST		
P41	1	ENTER VOL JACK		
P42	1	SET JOURNAL OPTION -		

## ‘Q’ Supervisor Reserved Screens

‘Q’ screens are prompts that appear on the basic operator interface.

See *NDC+ Supervisor’s Reference Manual* for details.

Screen Number	Row Position	Column Position			
		1	2	3	4
		1234567890	1234567890	1234567890	1234567890
Q00		SEL-			
Q01		RST-			
Q02		TYPE-			
Q03		NO.-			
Q04		TRAC-			
Q05		NO.-			
Q06		DATE-			
Q07		TIME-			
Q08		MODE-			
Q09		LEFT-			
Q10		COL-			
Q11		REP-			
Q12		CON-			
Q13		DISP-			
Q14		PRNT-			
Q15		MENU-			
Q16		EXIT-			
Q17		MAC-			
Q18		CPAS-			
Q19		NPAS-			
Q20		ACC-			
Q21		HALQ-			
Q27		SUP-			
Q28		INS-			

Screen Number	Row Position	Column Position			
		1	2	3	4
		1234567890123456789012345678901234567890			
Q29		Screen Q29 must have the text displayed at a fixed place. This is achieved by using a set cursor control sequence to start the text at line 1 column 0.			
		The text is: 1B hex 5B hex '01:00' 66 hex 'SELECT CARD IMAGE ABOVE-'			
Q30	1	SELECT OUTPUT :			
	2	0:DISK 1:RECEIPT 2:STATEMENT			
Q31	1	A:START B:SRCH BACK			
	2	C:END D:SRCH FORWARDS TIME KEY:			
Q32	1	A:START B:SRCH BACK			
	2	C:END D:SRCH FORWARDS NUM KEY:			
Q33	1	0:ALL 1:BIN + DEPS			
	2	2:PKT A 3:PKT B 4:PKT C CLR CNT-			
Q35	1	B:PG-UP ENT:PG-DOWN/EXIT CNL:EXIT			
	2	D:PG-DOWN AUX:HELP ON/OFF			
Q36	1	HOPPER 1: CLOSEST TO THE TRANSPORT CHUTE			
	2	HOPPER 2: NEXT AUX:HELP ON/OFF			
Q37	1	GOOD			
Q38	1	LOW			
Q39	1	OUT			
Q40	1	MISS			
Q41	1	JAM			
Q42	1	HOPPER1= xxxx HOPPER3= xxxx CHUTE= xxxx			
	2	HOPPER2= xxxx HOPPER4= xxxx PRESS <ENT>			
Q43	1	REMAIN+DISPD= TOTAL			
	2	xxxxx xxxx xxxxx HOPPER 1 COINS			
	3	REMAIN+DISPD= TOTAL			
	4	xxxxx xxxx xxxxx HOPPER 2 COINS			
	5	REMAIN+DISPD= TOTAL			
	6	xxxxx xxxx xxxxx HOPPER 3 COINS			
	7	REMAIN+DISPD= TOTAL			
	8	xxxxx xxxx xxxxx HOPPER 4 COINS			
	9	COIN COUNTERS			
	10	LAST CLEARED dd/mm/yy hh:mm			

Reserved Screens  
Reserved Screens

Screen Number	Row Position	Column Position			
		1	2	3	4
		1234567890123456789012345678901234567890			
Q44	1	CARDS CAPTURED	xxxxx	CLRD mm/dd/yy hh:mm	
	2	DEPOSITS MADE	xxxxx	CLRD mm/dd/yy hh:mm	
	3	DPM POCKET A	xxxxx	CLRD mm/dd/yy hh:mm	
	4	DPM POCKET B	xxxxx	CLRD mm/dd/yy hh:mm	
	5	DPM POCKET C	xxxxx	CLRD mm/dd/yy hh:mm	
	6	DPM BIN 1	xxxxx	CLRD mm/dd/yy hh:mm	
	7	ACTIVITY COUNT	xxxxxxxx	PRESS <ENT>	
Q46	1	<ENTER>:	PRINT MENU		
	2	A: ISS C: SOH		SELECT MENU -	
Q47	1	<ENTER>:	PRINT MENU		
	2	A: ISS C: SOH		REPLENISH MENU -	
Q48	1	<ENTER>:	PRINT MENU		
	2	A: ISS C: SOH		CONFIGURE MENU -	
Q49	1	<ENTER>:	PRINT MENU		
	2	A: ISS C: SOH		ACCESS MENU -	
Q52	1				
	2			ENTER COIN HOPPER	
Q53	1				
	2			ENTER NO. OF COINS	
Q54	1				
	2			SET JOURNAL OPTION -	

**'S' Supervisor Reserved Screens**

'S' screens contain the following messages:

- Media status
- Test cash
- Check CDM.

See *NDC+ Supervisor's Reference Manual* for details.

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		
S06	1	TYPE 2 CASH EMPTY		
S07	1	TYPE 3 CASH EMPTY		
S08	1	TYPE 4 CASH EMPTY		
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		
S21	1	STATEMENT PAPER EXHAUSTED		
S22	1	STATEMENT PAPER LOW		

Reserved Screens  
Reserved Screens

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901234567890123456789012		
S23	1	STATEMENT RIBBON EXHAUSTED		
S24	1	STATEMENT RIBBON LOW		
S25	1	DISPENSER FAULT		
S26	1	NIGHT DEPOSIT OVERFILL		
S27 - S30	1	Reserved		
S31	1	RECEIPT RIBBON EXHAUSTED		
S32	1	RECEIPT RIBBON LOW		
S33	1	RECEIPT HEAD EXHAUSTED		
S34	1	RECEIPT HEAD LOW		
S35		Reserved		
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		Reserved		
S44	1	STATEMENT KNIFE LOW		
S45	1	STATEMENT BIN OVERFILL		
S46	1	COIN HOPPER 1 GOOD		
S47	1	COIN HOPPER 2 GOOD		
S48	1	COIN HOPPER 3 GOOD		
S49	1	COIN HOPPER 4 GOOD		
S50	1	COIN HOPPER 1 JAM		
S51	1	COIN HOPPER 2 JAM		
S52	1	COIN HOPPER 3 JAM		
S53	1	COIN HOPPER 4 JAM		

Screen Number	Row Position	Column Position		
		1 12345678901234567890123456789012	2	3
S54	1	COIN HOPPER 1 MISSING		
S55	1	COIN HOPPER 2 MISSING		
S56	1	COIN HOPPER 3 MISSING		
S57	1	COIN HOPPER 4 MISSING		
S58	1	TRANSPORT CHUTE GOOD		
S59	1	TRANSPORT CHUTE JAMMED		
S60	1	E/JOURNAL LOG FULL		
S61	1	E/JOURNAL LOG SPACE LOW		
S62	1	CAN'T WRITE TO E/JOURNAL		
S63	1	COIN HOPPER 1 LOW		
S64	1	COIN HOPPER 2 LOW		
S65	1	COIN HOPPER 3 LOW		
S66	1	COIN HOPPER 4 LOW		
S67	1	COIN HOPPER 1 OUT		
S68	1	COIN HOPPER 2 OUT		
S69	1	COIN HOPPER 3 OUT		
S70	1	COIN HOPPER 4 OUT		
S71	1	DPM POCKET A OVERFILL		
S72	1	DPM POCKET B OVERFILL		
S73	1	DPM POCKET C OVERFILL		
S74	1	DPM REJ/ENV BIN (BIN 1) OVERFILL		
S75	1	DPM ENCODER RIBBON LOW		
S76	1	DPM ENCODER RIBBON EMPTY		
S77	1	DPM FRONT PRINTER INKWELL LOW		
S78	1	DPM FRONT PRINTER INKWELL EMPTY		
S79	1	COIN LOWS NOT SETUP		
S80	1	DPM REAR PRINTER INKWELL LOW		
S81	1	DPM REAR PRINTER INKWELL EMPTY		

## Reserved Screens

### Reserved Screens

Screen Number	Row Position	Column Position		
		1 12345678901234567890123456789012	2	3
S82	1	IMAGE ARCHIVE SPACE LOW		
S83	1	IMAGE ARCHIVE SPACE FULL		
S84	1	ENVELOPE DISPENSER LOW		
S85	1	ENVELOPE DISPENSER EXHAUSTED		
S86	1	CAMERA FILM LOW		
S87	1	CAMERA FILM EMPTY		

## ‘T’ Reserved Screens

‘T’ screens contain the following messages:

- Envelope serial number
- Security trace
- Presenter error
- Envelope length
- Journal reprint.

See *NDC+ Supervisor’s Reference Manual* for details.

Screen Number	Row Position	Column Position			
		1 1234567890123456789012345678901234567890	2	3	4
T00		Reserved			
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			

Screen Number	Row Position	Column Position			
		1	2	3	4
		1234567890123456789012345678901234567890			
T12	1	BOTTOM CASSETTE INSERTED			
T13	1	DIAGNOSTIC DISPENSE REPORT			
	2	TYPE 1 = xx	TYPE 2 = xx		
	3	TYPE 3 = xx	TYPE 4 = xx		
T14	1	POWER-UP/RESET			
T15	1	SUPERVISOR MODE ENTRY			
T16	1	SUPERVISOR MODE EXIT			
T17	1	CASH COUNTS CLEARED			
	2	CASH DISPENSED			
	3	TYPE 1 = xxxxx	TYPE 2 = xxxxx		
	4	TYPE 3 = xxxxx	TYPE 4 = xxxxx		
	5	CASH REMAINING			
	6	TYPE 1 = xxxxx	TYPE 2 = xxxxx		
	7	TYPE 3 = xxxxx	TYPE 4 = xxxxx		
T18	1	CARDS CLEARED	= xxxxx		
T19	1	DEPOSITS CLEARED	= xxxxx		
T20	1	CASH ADDED			
	2	TYPE 1 = xxxxx	TYPE 2 = xxxxx		
	3	TYPE 3 = xxxxx	TYPE 4 = xxxxx		
T21		Reserved			
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		Reserved			
T28		Reserved			
T29	1	KEY V STORED			
T30	1	PRESENTER ERROR			
T31	1	PASSWORD CHANGED			
T32	1	PASSWORD ERROR			
T33	1	ENVELOPE LENGTH ERROR			

Reserved Screens  
Reserved Screens

Screen Number	Row Position	Column Position			
		1	2	3	4
		1234567890123456789012345678901234567890			
T34		Reserved			
T35	1	CARD CAPTURED A/C NO. UNKNOWN			
T36	1	CARD CAPTURED A/C xxxxxxxxxxxxxxxx			
T37	1	SST OFF-LINE			
T38	1	SST ON-LINE			
T43	1	EJ STARTED BY OPERATOR			
T44	1	EJ LOG INITIALIZED OK			
T45	1	EJ LOG COPIED OK xxxxxxxx			
T47	1	***** COMMENCING REPRINT *****			
T48	1	***** REPRINT COMPLETED OK ***			
T49	1	DPM BIN 1 (ENV/REJ) CLRD = xxxxx			
T50	1	DPM POCKET A CLEARED = xxxxx			
T51	1	***** REPRINT HALTED *****			
T52	1	>>			
T53	1	<<			
T54	1	***** JOURNAL BACKUP STARTED *****			
T55	1	***** JOURNAL LIMIT EXCEEDED *****			
T56	1	DPM POCKET B CLEARED = xxxxx			
T57	1	DPM POCKET C CLEARED = xxxxx			
T58	1	COIN COUNTS CLEARED			
	2	COINS DISPENSED			
	3	HOPPER 1 = xxxxx HOPPER 2 = xxxxx			
	4	HOPPER 3 = xxxxx HOPPER 4 = xxxxx			
	5				
	6	COINS REMAINING			
	7	HOPPER 1 = xxxxx HOPPER 2 = xxxxx			
	8	HOPPER 3 = xxxxx HOPPER 4 = xxxxx			
T59	1	COINS ADDED			
	2	HOPPER 1 = xxxxx HOPPER 2 = xxxxx			
	3	HOPPER 3 = xxxxx HOPPER 4 = xxxxx			
T60	1	DIAGNOSTIC COIN DISPENSE REPORT			
	2	HOPPER 1 = xxxxx HOPPER 2 = xxxxx			
	3	HOPPER 3 = xxxxx HOPPER 4 = xxxxx			

Screen Number	Row Position	Column Position			
		1	2	3	4
		1234567890123456789012345678901234567890			
T61	1	COIN DISPENSER REMOVED			
T62	1	COIN DISPENSER INSERTED			
T63	1	COIN HOPPER 1 REMOVED			
T64	1	COIN HOPPER 1 INSERTED			
T65	1	COIN HOPPER 2 REMOVED			
T66	1	COIN HOPPER 2 INSERTED			
T67	1	COIN HOPPER 3 REMOVED			
T68	1	COIN HOPPER 3 INSERTED			
T69	1	COIN HOPPER 4 REMOVED			
T70	1	COIN HOPPER 4 INSERTED			
T71	1	DPM POCKETS CLOSED			
T72	1	DPM POCKETS OPEN			
T73	1	IMAGES DUMPED			
T74	1	DOCUMENT CLEARED TO BIN 1			
	2	CARD ACC. NO. = UNKNOWNxxxxxxxxxx			
	3	DOC. DATA = NONExxxxxxxxxxxxxxxx			
	4	xxxxxxxxxxxxxxxxxxxxxx			
	5	xxxxxxxxxxxxxxxxxxxxxx			
	6	xxxxxxxxxxxxxxxxxxxxxx			
	7	xxxxxxxxxxxxxxxxxxxxxx			
T75	1	DOC. CLEAR FAIL/ACCESS = NONE			
	2	CARD ACC. NO. = UNKNOWNxxxxxxxxxx			
	3	DOC. DATA = NONExxxxxxxxxxxxxxxx			
	4	xxxxxxxxxxxxxxxxxxxxxx			
	5	xxxxxxxxxxxxxxxxxxxxxx			
	6	xxxxxxxxxxxxxxxxxxxxxx			
	7	xxxxxxxxxxxxxxxxxxxxxx			

## Reserved Screens

### Reserved Screens

Screen Number	Row Position	Column Position			
		1	2	3	4
		1234567890123456789012345678901234567890			
T76	1	POWER INTERRUPTION DURING			
	2	DISPENSE			
	3	NOTES DISPENSED			
	4	TYPE 1 = xxxxx	TYPE 2 = xxxxx		
	5	TYPE 3 = xxxxx	TYPE 4 = xxxxx		
	6	NOTES REMAINING			
	7	TYPE 1 = xxxxx	TYPE 2 = xxxxx		
	8	TYPE 3 = xxxxx	TYPE 4 = xxxxx		
	9				
	10	COINS DISPENSED			
	11	HOP 1 = xxxxx	HOP 2 = xxxxx		
	12	HOP 3 = xxxxx	HOP 4 = xxxxx		
	13	COINS REMAINING			
	14	HOP 1 = xxxxx	HOP 2 = xxxxx		
	15	HOP 3 = xxxxx	HOP 4 = xxxxx		
T82	1	DOC. CLEAR FAIL/ACCESS = UNKNOWN			
	2	CARD ACC. NO. = UNKNOWNxxxxxxxxxxxx			
	3	DOC. DATA = NONExxxxxxxxxxxxxxxxxxxx			
	4	xxxxxxxxxxxxxxxxxxxxxxxxxxxx			
	5	xxxxxxxxxxxxxxxxxxxxxxxxxxxx			
	6	xxxxxxxxxxxxxxxxxxxxxxxxxxxx			
	7	xxxxxxxxxxxxxxxxxxxxxxxxxxxx			
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	1	PENDING SM INSTALLATION			
T90	1	COMPLETED SM INSTALLATION			
T91	1	CANCELLED SM INSTALLATION			
T92	1	ACCOUNT NOT KNOWN			
T93	1	DLL LOAD ERROR			
T94	1	DLL CALL ERROR			

## ‘X’ State Of Health And TM-Alert Reserved Screens

‘X’ State of Health and TM-Alert screens are displayed on the enhanced operator interface or CRT, and can be printed on the journal or receipt printers.

See *NDC+ Supervisor’s Reference Manual* for details.

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901234567890123456789012		
X0000	1	STATE OF HEALTH		
X0001	1	UNRECOGNISED STATE OF HEALTH		
	2	SOH =	MSG ID =	
X0002	1	TM-ALERT		
X0003	1			
	2	<<PRINT		NEXT>>
	3		( SELECT MENU )	
	4			
	5	<<SOH		PREV>>
	6			
	7			
	8	<<TM		
X0004	1			
	2	<<PRINT		NEXT>>
	3		( REPLENISH MENU )	
	4			
	5	<<SOH		PREV>>
	6			
	7			
	8	<<TM		
X0005	1			
	2	<<PRINT		NEXT>>
	3		( CONFIGURE MENU )	
	4			
	5	<<SOH		PREV>>
	6			
	7			
	8	<<TM		
X0006	1			
	2	<<PRINT		NEXT>>
	3		( ACCESS MENU )	
	4			
	5	<<SOH		PREV>>
	6			
	7			
	8	<<TM		
X0007	1			
	2		TERMINAL HEALTHY	
	3			
	4			

## Reserved Screens

### Reserved Screens

Screen Number	Row Position	Column Position		
		1 12345678901234567890123456789012	2	3
X0008	1			
	2	<<PRINT		NEXT>>
	3			
	4			
	5	<<SOH OFF		PREV>>
	6			
	7			
	8			
X0009		ESC[37;20m		
		Sets foreground and background colours for SOH display area. See Chapter 2.2, "Special Features" passage, for details.		
X0010		ESC[34;23m		
		Resets colours of Supervisor display. See Chapter 2.2, "Special Features" passage, for details.		
X0011	1			
	2	DISPLAY LIST CONTROLS		
	3	=====		
	4	A:PRINT	B:FORWARD SELECTION	
	5	C:SOH ON/OFF	D:REVERSE SELECTION	
	6	E:TM ON/OFF		
	7			
X0012	1	TMA TEXT LIBRARY FILE MISSING		
	2	- FILE TMATEXT .000		
X0013	1	TMA MESSAGE ( )		
	2	NOT FOUND IN TEXT LIBRARY		
X0014	1	TMA TEXT LIBRARY IS BEING		
	2	UPDATED - PLEASE WAIT		
X0015	1	NO TM-ALERT MESSAGE		
X0016	1			
	2			
	3			
	4			
	5	<<SOH ON		
	6			
	7			
	8			
X0501	1	CARDHOLDER DISPLAY		
	2	GRAPHICS		

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901234567890123456789012		
X0505	1	BASIC OPERATOR PANEL		
X0506	1	BASIC OPERATOR PANEL		
	2	OPERATOR KEYBOARD		
X0507	1	BASIC OPERATOR PANEL		
	2	SYSTEM INTERFACE		
X0510	1	ALPHA KEYBOARD		
	2	MAIN KEYBRD OVERLAY		
X0511	1	ALPHA KEYBOARD		
	2	MAIN KEYBOARD MATRIX		
X0512	1	ALPHA KEYBOARD		
	2	LEFT FDK OVERLAY		
X0513	1	ALPHA KEYBOARD		
	2	LEFT FDK MATRIX		
X0514	1	ALPHA KEYBOARD		
	2	RIGHT FDK OVERLAY		
X0515	1	ALPHA KEYBOARD		
	2	RIGHT FDK MATRIX		
X0516	1	ALPHA KEYBOARD		
	2	EKC ELECTRONICS		
X0517	1	ALPHA KEYBOARD		
	2	SYSTEM INTERFACE		
X0518	1	ALPHA KEYBOARD		
	2	BAPE ELECTRONICS		
X0520	1	IR TOUCH SCREEN		
	2	OPTO MATRIX		
X0521	1	IR TOUCH SCREEN		
	2	CONTROL ELECTRONICS		
X0522	1	IR TOUCH SCREEN		
	2	SYSTEM INTERFACE		
X0525	1	40 COLUMN PRINTER		
	2	INTERFACE		
X0526	1	40 COLUMN PRINTER		
	2	RECEIPT CONTROLLER		
X0527	1	40 COLUMN PRINTER		
	2	JOURNAL CONTROLLER		

Reserved Screens  
Reserved Screens

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901234567890123456789012		
X0528	1	40 COLUMN PRINTER		
	2	RECEIPT MECHANISM		
X0529	1	40 COLUMN PRINTER		
	2	JOURNAL MECHANISM		
X0530	1	40 COLUMN PRINTER		
	2	RECEIPT PRINthead		
X0531	1	40 COLUMN PRINTER		
	2	JOURNAL PRINthead		
X0532	1	40 COLUMN PRINTER		
	2	RECEIPT RIBBON		
X0533	1	40 COLUMN PRINTER		
	2	JOURNAL RIBBON		
X0534	1	40 COLUMN PRINTER		
	2	RECEIPT PAPER		
X0535	1	40 COLUMN PRINTER		
	2	JOURNAL PAPER		
X0536	1	40 COLUMN PRINTER		
	2	RECEIPT KNIFE		
X0537	1	40 COLUMN PRINTER		
	2	SYSTEM INTERFACE		
X0540	1	40 COLUMN PRINTER 2		
	2	INTERFACE		
X0541	1	40 COLUMN PRINTER 2		
	2	RECEIPT CONTROLLER		
X0542	1	40 COLUMN PRINTER 2		
	2	JOURNAL CONTROLLER		
X0543	1	40 COLUMN PRINTER 2		
	2	RECEIPT MECHANISM		
X0544	1	40 COLUMN PRINTER 2		
	2	JOURNAL MECHANISM		
X0545	1	40 COLUMN PRINTER 2		
	2	RECEIPT PRINthead		
X0546	1	40 COLUMN PRINTER 2		
	2	JOURNAL PRINthead		
X0547	1	40 COLUMN PRINTER 2		
	2	RECEIPT RIBBON		

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901234567890123456789012		
X0548	1	40 COLUMN PRINTER 2		
	2	JOURNAL RIBBON		
X0549	1	40 COLUMN PRINTER 2		
	2	RECEIPT PAPER		
X0550	1	40 COLUMN PRINTER 2		
	2	JOURNAL PAPER		
X0551	1	40 COLUMN PRINTER 2		
	2	RECEIPT KNIFE TYPE 1		
X0552	1	40 COLUMN PRINTER 2		
	2	SYSTEM INTERFACE		
X0555	1	80 COLUMN PRINTER		
	2	ELECTRONICS		
X0556	1	80 COLUMN PRINTER		
	2	MECHANISM		
X0557	1	80 COLUMN PRINTER		
	2	STATEMENT PRINthead		
X0558	1	80 COLUMN PRINTER		
	2	COMBINED PRINthead		
X0559	1	80 COLUMN PRINTER		
	2	STATEMENT RIBBON		
X0560	1	80 COLUMN PRINTER		
	2	COMBINED RIBBON		
X0561	1	80 COLUMN PRINTER		
	2	STATEMENT PAPER		
X0562	1	80 COLUMN PRINTER		
	2	KNIFE		
X0563	1	80 COLUMN PRINTER		
	2	CAPTURE BIN		
X0564	1	80 COLUMN PRINTER		
	2	SYSTEM INTERFACE		
X0570	1	80 COLUMN PRINTER 2		
	2	ELECTRONICS		
X0571	1	80 COLUMN PRINTER 2		
	2	MECHANISM		
X0572	1	80 COLUMN PRINTER 2		
	2	STATEMENT PRINthead		

Reserved Screens  
Reserved Screens

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901234567890123456789012		
X0573	1	80 COLUMN PRINTER 2		
	2	COMBINED PRINthead		
X0574	1	80 COLUMN PRINTER 2		
	2	STATEMENT RIBBON		
X0575	1	80 COLUMN PRINTER 2		
	2	COMBINED RIBBON		
X0576	1	80 COLUMN PRINTER 2		
	2	STATEMENT PAPER		
X0577	1	80 COLUMN PRINTER 2		
	2	KNIFE		
X0578	1	80 COLUMN PRINTER 2		
	2	CAPTURE BIN		
X0579	1	80 COLUMN PRINTER 2		
	2	SYSTEM INTERFACE		
X0585	1	DIP CARD READER		
	2			
X0586	1	DIP CARD READER		
	2	SYSTEM INTERFACE		
X0590	1	CARD READER		
	2			
X0591	1	CARD READER		
	2	TRANSPORT		
X0592	1	CARD READER		
	2	READ/WRITE HEAD		
X0593	1	CARD READER		
	2	CROPF		
X0594	1	CARD READER		
	2	LFCC BIN		
X0595	1	CARD READER		
	2	SYSTEM I/F		
X0596	1	CARD READER		
	2	CIM I/F		
X0597	1	CARD READER		
	2	CIM MODULE		
X0598	1	CARD READER		
	2	SMART CARD I/F		

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901	12345678901	23456789012
X0599	1	CARD READER		
	2	READ HEAD I/F		
X0600	1	MISC I/F		
	2	ELECTRONICS		
X0601	1	MISC I/F		
	2	SYSTEM INTERFACE		
X0605	1	VIDEO DISK		
	2	PLAYER		
X0606	1	VIDEO DISK		
	2	SYSTEM INTERFACE		
X0610	1	DIGITAL AUDIO		
	2	ELECTRONICS		
X0615	1	DOOR ACCESS		
	2	INTERFACE		
X0616	1	DOOR ACCESS		
	2	CARD READER		
X0617	1	DOOR ACCESS		
	2	SYSTEM INTERFACE		
X0620	1	SECURITY CAMERA		
	2	INTERFACE		
X0621	1	SECURITY CAMERA		
	2	FILM		
X0622	1	SECURITY CAMERA		
	2	SYSTEM INTERFACE		
X0625	1	DEPOSITORY		
	2	CONTROL ELECTRONICS		
X0626	1	DEPOSITORY		
	2	SHUTTER		
X0627	1	DEPOSITORY		
	2	MAIN TRANSPORT		
X0628	1	DEPOSITORY		
	2	AUXILIARY TRANSPORT		
X0629	1	DEPOSITORY		
	2	PRINTHEAD		
X0630	1	DEPOSITORY		
	2	BIN		

Reserved Screens  
Reserved Screens

Screen Number	Row Position	Column Position		
		1 1234567890123456789012	2	3
X0631	1	ENVELOPE DISPENSER		
	2	TRANSPORT		
X0632	1	ENVELOPE DISPENSER		
	2	HOPPER		
X0633	1	DEPOSITORY		
	2	SYSTEM INTERFACE		
X0635	1	COMMUNICATIONS		
	2	PCCM		
X0636	1	COMMUNICATIONS 2		
	2	PCCM		
X0637	1	COMMUNICATIONS 3		
	2	PCCM		
X0638	1	COMMUNICATIONS 4		
	2	PCCM		
X0645	1	COMMUNICATIONS		
	2	PCIFL		
X0646	1	COMMUNICATIONS 2		
	2	PCIFL		
X0647	1	COMMUNICATIONS 3		
	2	PCIFL		
X0648	1	COMMUNICATIONS 4		
	2	PCIFL		
X0655	1	COMMUNICATIONS		
	2	HAYES MODEM		
X0656	1	COMMUNICATIONS 2		
	2	HAYES MODEM		
X0657	1	COMMUNICATIONS 3		
	2	HAYES MODEM		
X0658	1	COMMUNICATIONS 4		
	2	HAYES MODEM		
X0665	1	COMMUNICATIONS		
	2	NETBIOS		
X0670	1	CURRENCY DISPENSER		
	2	CONTROL BOARD		
X0671	1	CURRENCY DISPENSER		
	2	PICK MODULE 1		

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901234567890123456789012		
X0672	1	CURRENCY DISPENSER		
	2	PICK MODULE 2		
X0673	1	CURRENCY DISPENSER		
	2	PICK MODULE 3		
X0674	1	CURRENCY DISPENSER		
	2	PICK MODULE 4		
X0675	1	CURRENCY DISPENSER		
	2	CASSETTE 1	TYPE :	
X0676	1	CURRENCY DISPENSER		
	2	CASSETTE 2	TYPE :	
X0677	1	CURRENCY DISPENSER		
	2	CASSETTE 3	TYPE :	
X0678	1	CURRENCY DISPENSER		
	2	CASSETTE 4	TYPE :	
X0679	1	CURRENCY DISPENSER		
	2	PURGE BIN		
X0680	1	CURRENCY DISPENSER		
	2	PRESENTER		
X0681	1	CURRENCY DISPENSER		
	2	EXIT SHUTTER		
X0682	1	CURRENCY DISPENSER		
	2	SUCTION CUPS		
X0683	1	CURRENCY DISPENSER		
	2	SYSTEM INTERFACE		
X0690	1	COMMUNICATIONS		
	2	MIRLAN		
X0691	1	COMMUNICATIONS 2		
	2	MIRLAN		
X0692	1	COMMUNICATIONS 3		
	2	MIRLAN		
X0693	1	COMMUNICATIONS 4		
	2	MIRLAN		
X0695	1	SIGNAGE		
	2	INTERFACE		
X0696	1	SIGNAGE		
	2	SYSTEM INTERFACE		

Reserved Screens  
Reserved Screens

Screen Number	Row Position	Column Position		
		1 1234567890123456789012	2	3
X0697	1	ENHANCED OPERATOR PANEL		
	2			
X0698	1	ENHANCED OPERATOR PANEL		
	2	OPERATOR KEYBOARD		
X0699	1	ENHANCED OPERATOR PANEL		
	2	SYSTEM INTERFACE		
X0700	1	COMMUNICATIONS		
	2	COAX		
X0701	1	COMMUNICATIONS 2		
	2	COAX		
X0702	1	COMMUNICATIONS 3		
	2	COAX		
X0703	1	COMMUNICATIONS 4		
	2	COAX		
X0704	1	COMMS MANAGER		
	2	CMCONF		
X0706	1	DOCUMENT PROCESSING MODULE		
	2	7731/2 UNIT		
X0707	1	DOCUMENT PROCESSING MODULE		
	2	7731/2 FRONT PRINTER		
X0708	1	DOCUMENT PROCESSING MODULE		
	2	7731/2 REAR PRINTER		
X0709	1	DOCUMENT PROCESSING MODULE		
	2	7731/2 ENCODER		
X0710	1	DOCUMENT PROCESSING MODULE		
	2	7731/2 FRONT CAMERA		
X0711	1	DOCUMENT PROCESSING MODULE		
	2	7731/2 REAR CAMERA		
X0712	1	DOCUMENT PROCESSING MODULE		
	2	TRANSPORT MECHANISM		
X0713	1	DOCUMENT PROCESSING MODULE		
	2	TRANSPORT ELECTRONICS		
X0714	1	DOCUMENT PROCESSING MODULE		
	2	SCSI ELECTRONICS		
X0715	1	DOCUMENT PROCESSING MODULE		
	2	ESCROW MECHANISM		

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901234567890123456789012		
X0716	1	DOCUMENT PROCESSING MODULE		
	2	MAGNETIC INK DETECTOR		
X0717	1	DOCUMENT PROCESSING MODULE		
	2	STACKING POCKETS		
X0718	1	DOCUMENT PROCESSING MODULE		
	2	RECOGNITION BOARD		
X0719	1	DOCUMENT PROCESSING MODULE		
	2	REJECT BIN		
X0720	1	DOCUMENT PROCESSING MODULE		
	2	7731/2 POCKET A		
X0721	1	DOCUMENT PROCESSING MODULE		
	2	7731/2 POCKET B		
X0722	1	DOCUMENT PROCESSING MODULE		
	2	7731/2 POCKET C		
X0723	1	DOCUMENT PROCESSING MODULE		
	2	80 COL CAPTURE BIN		
X0724	1	DOCUMENT PROCESSING MODULE		
	2	7731/2 FRONT PRINthead		
X0725	1	DOCUMENT PROCESSING MODULE		
	2	7731/2 REAR PRINthead		
X0726	1	DOCUMENT PROCESSING MODULE		
	2	7731/2 ENCODER RIBBON		
X0727	1	PAGE TURNING PASSBOOK		
	2	MAIN ELECTRONICS BOARD		
X0728	1	PAGE TURNING PASSBOOK		
	2	MECHANISM		
X0729	1	PAGE TURNING PASSBOOK		
	2	PRINthead		
X0737	1	PAGE TURNING PASSBOOK		
	2	RIBBON		
X0738	1	PAGE TURNING PASSBOOK		
	2	CAPTURE BIN		
X0739	1	PAGE TURNING PASSBOOK		
	2	MAGNETIC ELECTRONICS		
X0740	1	COIN DISPENSER		
	2	INTERFACE		

Reserved Screens  
Reserved Screens

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901234567890123456789012		
X0741	1	COIN DISPENSER		
	2	HOPPER UNIT 1		
X0742	1	COIN DISPENSER		
	2	HOPPER UNIT 2		
X0743	1	COIN DISPENSER		
	2	HOPPER UNIT 3		
X0744	1	COIN DISPENSER		
	2	HOPPER UNIT 4		
X0745	1	COIN DISPENSER		
	2	TRANSPORT		
X0746	1	COIN DISPENSER		
	2	SYSTEM INTERFACE		
X0747	1	DIGITAL SECURITY CAMERA		
	2	ECM ELECTRONICS		
X0748	1	DIGITAL SECURITY CAMERA		
	2	MASS STORAGE DEVICE		
X0749	1	DIGITAL SECURITY CAMERA		
	2	CAMERA 0		
X0750	1	DIGITAL SECURITY CAMERA		
	2	CAMERA 1		
X0751	1	DIGITAL SECURITY CAMERA		
	2	CAMERA 2		
X0752	1	BASIC OPERATOR PANEL		
X0753	1	BASIC OPERATOR PANEL		
	2	SYSTEM INTERFACE		
X0754	1	ENHANCED OPERATOR PANEL		
X0755	1	ENHANCED OPERATOR PANEL		
	2	SYSTEM INTERFACE		
X0756	1	ALPHA KEYBOARD		
	2	EKC ELECTRONICS		
X0757	1	ALPHA KEYBOARD		
	2	SYSTEM INTERFACE		
X0758	1	ALPHA KEYBOARD		
	2	BAPE ELECTRONICS		

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901234567890123456789012		
X0759	1	CARD READER		
	2	LFCC BIN		
X0760	1	CARD READER		
	2	SYSTEM I/F		
X0761	1	DEPOSITORY		
	2	CONTROL ELECTRONICS		
X0762	1	CURRENCY DISPENSER		
	2	SYSTEM INTERFACE		
X0763	1	DOCUMENT PROCESSING MODULE		
	2	DEPOSITORY PRINthead		
X0764	1	DOCUMENT PROCESSING MODULE		
	2	ENVELOPE DISPENSER MECHANISM		
X0765	1	DOCUMENT PROCESSING MODULE		
	2	ENVELOPE DISPENSER HOPPER		
X0766	1	40 COL THERMAL PRINTER		
	2	INTERFACE		
X0767	1	40 COL THERMAL PRINTER		
	2	JOURNAL CONTROLLER		
X0768	1	40 COL THERMAL PRINTER		
	2	RECEIPT MECHANISM		
X0769	1	40 COL THERMAL PRINTER		
	2	JOURNAL MECHANISM		
X0770	1	40 COL THERMAL PRINTER		
	2	RECEIPT PRINthead		
X0771	1	40 COL THERMAL PRINTER		
	2	JOURNAL PRINthead		
X0772	1	40 COL THERMAL PRINTER		
	2	RECEIPT PAPER		
X0773	1	40 COL THERMAL PRINTER		
	2	JOURNAL PAPER		
X0774	1	40 COL THERMAL PRINTER		
	2	RECEIPT KNIFE		
X0775	1	SWIPE READER		
	2	ELECTRONIC I/F		
X0777	1	SWIPE READER		
	2	MECHANICAL I/F		

Reserved Screens  
Reserved Screens

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901234567890123456789012		
X0901	1	SDC COMMS FAILURE		
	2	INSPECT SDC CABLE NOW		
X0902	1	VIDEO PLAYER OR PLAYER		
	2	I/F FAULT - REPLACE NOW		
X0903	1	MIXER / VIDEO INCOMPATIBLE		
	2	REPLACE MIXER NOW		
X0904	1	MIXER DATA CORRUPT		
	2	REPLACE MIXER SOON		
X0905	1	VIDEO PLAYER NOT READY		
	2	INSPECT PLAYER NOW		
X0906	1	VIDEO PLAYER NOT RESPONDING		
	2	INSPECT PLAYER NOW		
X0907	1	VIDEO RS-232 LINK FAULTY		
	2	INSPECT LINK NOW		
X0908	1	VIDEO RS-232 LINK FAULTY		
	2	INSPECT LINK NOW		
X0909	1	VIDEO DROP OUT ERRORS		
	2	INSPECT DISK NOW		
X0910	1	VIDEO RS-232 LINK FAULTY		
	2	INSPECT LINK NOW		
X0911	1	VIDEO PLAYER NOT ACTIVATED		
	2	INSPECT NOW		
X0912	1	NO VIDEO SIGNAL RECEIVED		
	2	INSPECT MIXER NOW		
X0913	1	VIDEO/GRAFICS MIX LOCK		
	2	ERROR - INSPECT NOW		
X0914	1	MIXER HARDWARE NOT PRESENT		
	2	INSPECT NOW		
X0915	1	GRAFICS BOARD NOT PRESENT		
	2	INSPECT NOW		
X0916	1	INVALID CONFIG DATA FILE		
	2	INSPECT FILE NOW		
X0917	1	VGA GRAFICS BOARD NOT PRESENT		
	2	INSPECT NOW		
X0925	1	EXCEEDED LIFE EXPECTANCY		
	2	REPLACE KEYBOARD SOON		

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901234567890123456789012		
X0926	1	CONTROLLER FAULT		
	2	INSPECT NOW		
X0927	1	CHARACTER ROM MISSING		
	2	INSPECT NOW		
X0930	1	EXCEEDED LIFE EXPECTANCY		
	2	REPLACE OVERLAY SOON		
X0931	1	EXCEEDED LIFE EXPECTANCY		
	2	REPLACE MATRIX SOON		
X0932	1	EXCEEDED LIFE EXPECTANCY		
	2	REPLACE OVERLAY SOON		
X0933	1	EXCEEDED LIFE EXPECTANCY		
	2	REPLACE MATRIX SOON		
X0934	1	EXCEEDED LIFE EXPECTANCY		
	2	REPLACE OVERLAY SOON		
X0935	1	EXCEEDED LIFE EXPECTANCY		
	2	REPLACE MATRIX SOON		
X0936	1	ENCRYPTOR FAILURE		
	2	REPLACE ENCRYPTOR NOW		
X0937	1	KEYSTORE RAM FAILURE		
	2	REPLACE ENCRYPTOR NOW		
X0938	1	KEY PARITY ERROR		
	2	REPLACE ENCRYPTOR NOW		
X0939	1	COMMUNICATIONS FAILURE		
	2	INSPECT ENCRYPTOR NOW		
X0945	1	FAILED BEAM IN X AXIS		
	2	INSPECT BEAM SOON		
X0946	1	FAILED BEAM IN Y AXIS		
	2	INSPECT BEAM SOON		
X0947	1	WEAK BEAM IN X AXIS		
	2	CLEAN BEAM SOON		
X0948	1	WEAK BEAM IN Y AXIS		
	2	CLEAN BEAM SOON		
X0949	1	TOO MANY FAILED BEAMS		
	2	INSPECT OPTO MATRIX NOW		
X0950	1	CONTROL ELECTRONICS/OPTO MATRIX		
	2	INSPECT NOW		

Reserved Screens  
Reserved Screens

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901234567890123456789012		
X0951	1	A TO D CONVERTOR FAILURE		
	2	REPLACE CONTROLLER NOW		
X0952	1	COMMS FAILURE		
	2	REPLACE I/F CABLE NOW		
X0953	1	NOT CALIBRATED		
	2	CALIBRATE NOW		
X0960	1	INTERFACE BOARD FAILURE		
	2	REPLACE NOW		
X0961	1	INTERFACE BOARD FAILURE		
	2	REPLACE NOW		
X0962	1	CONTROLLER BOARD FAILURE		
	2	REPLACE NOW		
X0963	1	SIDEWAYS BOARD FAILURE		
	2	REPLACE CONTROLLER NOW		
X0964	1	CONTROLLER BOARD FAILURE		
	2	REPLACE NOW		
X0965	1	HEAD/KNIFE JAM		
	2	CLEAR JAM NOW		
X0966	1	BLACK MARK ERROR		
	2	INSPECT PAPER NOW		
X0967	1	EJECT JAM		
	2	INSPECT TRANSPORT NOW		
X0968	1	PAPER NOT LOADED/JAM		
	2	INSPECT NOW		
X0969	1	PRINTER OPEN		
	2	CLOSE PRINTER NOW		
X0970	1	HEAD PAPER JAM		
	2	CLEAR JAM NOW		
X0971	1	PAPER NOT LOADED		
	2	INSPECT NOW		
X0972	1	PRINTER OPEN		
	2	CLOSE PRINTER NOW		
X0973	1	NEARING END OF LIFE		
	2	REPLACE PRINthead SOON		
X0974	1	END OF LIFE REACHED		
	2	REPLACE PRINthead NOW		

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901234567890123456789012		
X0975	1	NEARING END OF LIFE		
	2	REPLACE PRINthead SOON		
X0976	1	END OF LIFE REACHED		
	2	REPLACE PRINthead NOW		
X0977	1	NEARING END OF LIFE		
	2	REPLACE RIBBON SOON		
X0978	1	END OF LIFE REACHED		
	2	REPLACE RIBBON NOW		
X0979	1	NEARING END OF LIFE		
	2	REPLACE RIBBON SOON		
X0980	1	END OF LIFE REACHED		
	2	REPLACE RIBBON NOW		
X0981	1	PAPER LOW		
	2	REPLENISH SOON		
X0982	1	PAPER EMPTY		
	2	REPLENISH NOW		
X0983	1	PAPER LOW		
	2	REPLENISH SOON		
X0984	1	PAPER EMPTY		
	2	REPLENISH NOW		
X0985	1	NEARING END OF LIFE		
	2	REPLACE KNIFE SOON		
X0986	1	BLACK MARK ERROR		
	2	INSPECT PAPER NOW		
X0987	1	MAIN ELEC BOARD FAILURE		
	2	REPLACE NOW		
X0988	1	ADJUST DATA LOST		
	2	INSPECT BOARD NOW		
X0989	1	MAG ELEC BOARD FAILURE		
	2	REPLACE NOW		
X0990	1	MAG. BOARD COMMS ERROR		
	2	REPLACE NOW		
X0991	1	TOO MANY PAGETURN ERRORS		
	2	INSPECT MECHANISM NOW		
X0992	1	BOOK GUIDE JAMMED OPEN		
	2	INSPECT MECHANISM NOW		

Reserved Screens  
Reserved Screens

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901234567890123456789012		
X0993	1	BOOK GUIDE JAMMED CLOSED		
	2	INSPECT MECHANISM NOW		
X0994	1	COMMS FAILURE - REPLACE		
	2	BUNCHER/MAIN PCB NOW		
X0995	1	COMMS ERROR		
	2	REPLACE MAIN PCB NOW		
X0996	1	COMMS ERROR		
	2	INSPECT RS232 CABLE NOW		
X0997	1	COMMS ERROR		
	2	REPLACE SCANNER/MAIN PCB NOW		
X0998	1	MECHANICAL JAM		
	2	INSPECT MECHANISM NOW		
X0999	1	BLACK MARK ERROR		
	2	INSPECT PAPER NOW		
X1000	1	MEDIA JAM		
	2	INSPECT TRANSPORT NOW		
X1001	1	PRINTER OPEN		
	2	CLOSE PRINTER NOW		
X1002	1	SHUTTER JAMMED OPEN		
	2	INSPECT SHUTTER NOW		
X1003	1	SHUTTER JAMMED CLOSED		
	2	INSPECT SHUTTER NOW		
X1004	1	CAPTURE JAM		
	2	INSPECT TRANSPORT NOW		
X1005	1	THROAT TAMPERS		
	2	INSPECT TRANSPORT NOW		
X1006	1	PASSBOOK READ ERRORS		
	2	CHECK MAGNETIC HEAD NOW		
X1007	1	PASSBOOK WRITE ERRORS		
	2	CHECK MAGNETIC HEAD NOW		
X1008	1	TOO MANY JAMS		
	2	INSPECT TRANSPORT NOW		
X1009	1	THROAT JAM		
	2	INSPECT TRANSPORT NOW		
X1010	1	CAPTURE JAM		
	2	INSPECT TRANSPORT NOW		

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901234567890123456789012		
X1011	1	SHUTTER JAMMED OPEN		
	2	INSPECT SHUTTER NOW		
X1012	1	SHUTTER JAMMED CLOSED		
	2	INSPECT SHUTTER NOW		
X1013	1	MECHANICAL JAM		
	2	INSPECT MECHANISM NOW		
X1014	1	PRINTER OPEN		
	2	CLOSE PRINTER NOW		
X1015	1	NEARING END OF LIFE		
	2	REPLACE PRINthead SOON		
X1016	1	NEARING END OF LIFE		
	2	REPLACE PRINthead SOON		
X1017	1	END OF LIFE REACHED		
	2	REPLACE PRINthead NOW		
X1018	1	END OF LIFE REACHED		
	2	REPLACE PRINthead NOW		
X1019	1	NEARING END OF LIFE		
	2	REPLACE RIBBON SOON		
X1020	1	NEARING END OF LIFE		
	2	REPLACE RIBBON SOON		
X1021	1	END OF LIFE REACHED		
	2	REPLACE RIBBON NOW		
X1022	1	END OF LIFE REACHED		
	2	REPLACE RIBBON NOW		
X1023	1	PAPER LOW		
	2	REPLENISH SOON		
X1024	1	PAPER EMPTY		
	2	REPLENISH NOW		
X1025	1	NEARING END OF LIFE		
	2	REPLACE KNIFE SOON		
X1026	1	NEARLY FULL		
	2	EMPTY BIN SOON		
X1027	1	NEARLY FULL		
	2	EMPTY BIN SOON		
X1028	1	FULL		
	2	EMPTY BIN NOW		

Reserved Screens  
Reserved Screens

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901234567890123456789012		
X1029	1	FULL		
	2	EMPTY BIN NOW		
X1030	1	BUNCHER JAMMED OPEN		
	2	INSPECT BUNCHER NOW		
X1031	1	BUNCHER JAMMED CLOSED		
	2	INSPECT BUNCHER NOW		
X1032	1	PRINthead FIRE ERROR		
	2	INSPECT PRINthead NOW		
X1033	1	COIN DISPENSER REMOVED		
	2			
X1034	1	COIN DISPENSER NOT INITIALISED		
	2	SET COIN LOW THRESHOLDS		
X1035	1	HOPPER LOW		
	2	REFILL HOPPER SOON		
X1036	1	HOPPER EMPTY		
	2	REFILL HOPPER NOW		
X1037	1	HOPPER MECHANISM FAILURE		
	2	INSPECT NOW		
X1038	1	HOPPER SENSOR FAILURE		
	2	INSPECT NOW		
X1039	1	HOPPER FUSED		
	2	INSPECT NOW		
X1040	1	NEARING END OF LIFE		
	2	REPLACE DIP READER SOON		
X1041	1	READ ERRORS		
	2	CLEAN DIP READER SOON		
X1042	1	READ ERRORS		
	2	CLEAN CARD READER SOON		
X1043	1	WRITE ERRORS		
	2	CLEAN CARD READER SOON		
X1044	1	READ ERRORS		
	2	CLEAN CARD READER NOW		
X1045	1	WRITE ERRORS		
	2	CLEAN CARD READER NOW		
X1046	1	CARD JAM		
	2	INSPECT CARD READER NOW		

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901234567890123456789012		
X1047	1	SHUTTER MECHANISM FAULT		
	2	INSPECT SHUTTER NOW		
X1048	1	INVALID CARD LENGTH		
	2	INSPECT CARD READER NOW		
X1049	1	POSSIBLE TAMPERING		
	2	INSPECT CARD READER NOW		
X1050	1	CARD JAM		
	2	INSPECT CARD READER NOW		
X1051	1	NEARING END OF LIFE		
	2	REPLACE TRANSPORT SOON		
X1052	1	NEARING END OF LIFE		
	2	REPLACE HEAD & BELT SOON		
X1053	1	RELAY/BATTERY FAILURE		
	2	REPLACE CROPP NOW		
X1054	1	LFCC BIN REMOVED		
	2	INSERT BIN NOW		
X1055	1	FULL		
	2	EMPTY BIN NOW		
X1056	1	LFCC SHUTTER MECHANISM FAILED		
	2	INSPECT BIN NOW		
X1057	1	NEARLY FULL		
	2	EMPTY BIN SOON		
X1058	1	COMMS FAILURE		
	2	REPLACE NOW		
X1059	1	COMMS FAILURE		
	2	REPLACE NOW		
X1060	1	STOPPER PIN / CONTACTS		
	2	DOWN - INSPECT NOW		
X1061	1	I/F FAILURE		
	2	INSPECT NOW		
X1062	1	I/F TIMEOUT		
	2	INSPECT NOW		
X1063	1	COMMS ERROR		
	2	INSPECT NOW		
X1065	1	VIDEO PLAYER OR PLAYER		
	2	I/F FAULT - REPLACE NOW		

Reserved Screens  
Reserved Screens

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901234567890123456789012		
X1066	1	VIDEO PLAYER NOT READY		
	2	INSPECT PLAYER NOW		
X1067	1	VIDEO PLAYER NOT RESPONDING		
	2	INSPECT NOW		
X1068	1	VIDEO RS-232 LINK FAULTY		
	2	INSPECT LINK NOW		
X1069	1	VIDEO RS-232 LINK FAULTY		
	2	INSPECT LINK NOW		
X1070	1	VIDEO DROP OUT ERRORS		
	2	INSPECT DISK NOW		
X1071	1	VIDEO RS-232 LINK FAULTY		
	2	INSPECT LINK NOW		
X1072	1	VIDEO PLAYER NOT ACTIVATED		
	2	INSPECT NOW		
X1080	1	INTERRUPT FAILURE		
	2	INSPECT AUDIO BOARD NOW		
X1081	1	HARDWARE FAILURE		
	2	INSPECT AUDIO BOARD NOW		
X1082	1	INSTALLED DRIVER FAILURE		
	2	INSPECT S/W DRIVER NOW		
X1085	1	UART FAILED		
	2	REPLACE RS-232 I/F NOW		
X1086	1	COMMUNICATIONS ERROR		
	2	CHECK I/F AND CABLE NOW		
X1087	1	READ ERRORS		
	2	CLEAN CARD READER SOON		
X1088	1	SEVERE READ ERRORS		
	2	CLEAN CARD READER NOW		
X1095	1	INTERFACE FAILED		
	2	REPLACE BOARD NOW		
X1096	1	COMMUNICATIONS ERROR		
	2	CHECK I/F AND CABLE NOW		
X1097	1	RUNNING LOW		
	2	LOAD NEW FILM SOON		
X1098	1	OUT OF FILM		
	2	LOAD NEW FILM NOW		

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901234567890123456789012		
X1105	1	HOPPER REMOVED		
	2	REPLACE HOPPER		
X1106	1	TRANSPORT JAM		
	2	INSPECT NOW		
X1107	1	COMMS FAILURE		
	2	INSPECT COMMS		
X1108	1	POWER SUPPLY DISCONNECT		
	2	CHECK INTERLOCK NOW		
X1109	1	TOO MANY SHUTTER JAMS		
	2	INSPECT SOON		
X1110	1	PROTOCOL ERROR		
	2	INSPECT COMMS		
X1111	1	ECM FAULTY		
	2	INSPECT ECM		
X1112	1	SHUTTER JAMMED OPEN		
	2	INSPECT NOW		
X1113	1	SHUTTER JAMMED CLOSED		
	2	INSPECT NOW		
X1114	1	BOTH SENSORS BLOCKED		
	2	INSPECT SENSORS NOW		
X1115	1	MOTOR FAILED		
	2	INSPECT INTERLOCK/MOTOR NOW		
X1116	1	AT-PRINT SENSOR FAILED		
	2	REPLACE SENSOR NOW		
X1117	1	EXIT SENSOR FAILED		
	2	REPLACE SENSOR NOW		
X1118	1	MOTOR NEAR END OF LIFE		
	2	REPLACE MOTOR SOON		
X1119	1	ECM NOT PRESENT		
	2	CONNECT ECM		
X1120	1	TOO MANY ENVELOPE JAMS		
	2	INSPECT TRANSPORT SOON		
X1121	1	MSD MEDIA FULL		
	2	REPLACE MEDIA		
X1122	1	MSD MEDIA FULL SOON		
	2			

Reserved Screens  
Reserved Screens

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901234567890123456789012		
X1123	1	ENVELOPE JAM		
	2	INSPECT TRANSPORT NOW		
X1124	1	ENTRY SENSOR FAILED		
	2	REPLACE SENSOR NOW		
X1125	1	SECOND SENSOR FAILED		
	2	REPLACE SENSOR NOW		
X1126	1	CAMERA NOT CONFIGURED		
	2	CHECK INSTALLATION		
X1128	1	TOO MANY ENVELOPE JAMS		
	2	INSPECT TRANSPORT SOON		
X1130	1	CAMERA BLOCKED		
	2	INSPECT CAMERA		
X1131	1	TIMING DISK FAILED		
	2	INSPECT TIMING DISK NOW		
X1132	1	ENVELOPE JAMMED		
	2	INSPECT TRANSPORT NOW		
X1133	1	ENVELOPE JAMMED		
	2	INSPECT TRANSPORT NOW		
X1134	1	END OF LIFE REACHED		
	2	REPLACE PRINthead NOW		
X1135	1	INCORRECTLY/NOT FITTED		
	2	INSPECT PRINthead NOW		
X1136	1	REMOVED		
	2	INSERT BIN NOW		
X1137	1	FULL		
	2	EMPTY BIN NOW		
X1138	1	MOTOR NEAR END OF LIFE		
	2	REPLACE MOTOR SOON		
X1141	1	TIMING DISK FAILED		
	2	INSPECT TIMING DISK SOON		
X1142	1	ENVELOPE RETRACT FAILURE		
	2	INSPECT TRANSPORT SOON		
X1143	1	CAMERA FAULTY OR REMOVED		
	2	INSPECT CAMERA		
X1144	1	ENVELOPE JAMMED		
	2	INSPECT TRANSPORT NOW		

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901234567890123456789012		
X1145	1	TRANSPORT SENSOR FAILED		
	2	INSPECT SENSOR NOW		
X1146	1	ENVELOPE RETRACT FAILURE		
	2	INSPECT TRANSPORT NOW		
X1147	1	EMPTY		
	2	REFILL HOPPER NOW		
X1148	1	ALMOST EMPTY		
	2	REFILL HOPPER SOON		
X1150	1	SUSPECT TAMPERING		
	2	INSPECT NOW		
X1151	1	HOPPER SENSOR FAILED		
	2	INSPECT SENSOR NOW		
X1152	1	MSD MEDIA REMOVED		
	2	INSERT MSD MEDIA		
X1153	1	MSD REMOVED		
	2	INSERT MSD		
X1154	1	MSD FAULTY		
	2	INSPECT MSD		
X1160	1	COMMS BOARD NOT PRESENT		
	2	INSERT BOARD NOW		
X1161	1	HARDWARE FAULT		
	2	REPLACE BOARD NOW		
X1162	1	INTERRUPT FAILURE		
	2	REPLACE BOARD NOW		
X1163	1	FATAL COMMS ERROR		
	2	CHECK ERROR LOG NOW		
X1164	1	COMMS BOARD NOT PRESENT		
	2	INSERT BOARD NOW		
X1165	1	HARDWARE FAULT		
	2	REPLACE BOARD NOW		
X1166	1	INTERRUPT FAILURE		
	2	REPLACE BOARD NOW		
X1167	1	FATAL COMMS ERROR		
	2	REPLACE BOARD NOW		
X1168	1	MODEM CHECKSUM ERROR		
	2	REPLACE NOW		

Reserved Screens  
Reserved Screens

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901234567890123456789012		
X1169	1	INTERNAL MODEM FAILURE		
	2	REPLACE NOW		
X1170	1	SERIAL PORT FAILURE		
	2	INSPECT NOW		
X1171	1	RS-232 INTERFACE FAILURE		
	2	INSPECT CABLE NOW		
X1172	1	BLACKLISTED NUMBER		
	2	RESET BLACKLIST		
X1173	1	FATAL ERROR - SUSPECT		
	2	CABLE OR BOARD		
X1174	1	COMMS CONFIG REQUIRED		
	2	CONFIGURE COMMS NOW		
X1175	1	NETBIOS NOT AVAILABLE		
	2	CHECK S/W INSTALLATION		
X1176	1	COMMS BOARD NOT PRESENT		
	2	INSERT BOARD NOW		
X1177	1	HARDWARE FAULT		
	2	REPLACE BOARD NOW		
X1178	1	FATAL COMMS ERROR		
	2	REPLACE BOARD NOW		
X1180	1	COMMUNICATIONS FAILURE		
	2	REPLACE BOARD NOW		
X1181	1	NVRAM FAILURE		
	2	REPLACE BOARD NOW		
X1182	1	INCOMPATIBLE FIRMWARE		
	2	CHECK S/W REVISION LEVEL		
X1183	1	THERMISTOR SHOWS COLD		
	2	INSPECT PICK MODULE SOON		
X1184	1	BILL JAM		
	2	INSPECT TRANSPORT NOW		
X1185	1	GULP FEED		
	2	CLEAR TRANSPORT NOW		
X1186	1	SENSOR FAILURE		
	2	INSPECT SENSOR & I/F NOW		
X1187	1	INVALID SENSOR INTERRUPT		
	2	INSPECT SENSOR & I/F NOW		

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901234567890123456789012		
X1188	1	I2C FAULT		
	2	INSPECT BOARD & HARNESS NOW		
X1189	1	EMPTY		
	2	REPLENISH CASSETTE NOW		
X1190	1	CURRENCY LOW		
	2	REPLENISH CASSETTE SOON		
X1191	1	REMOVED		
X1192	1	INVALID CASSETTE TYPE		
	2	CHECK HOUSING NOW		
X1193	1	TOO MANY BAD BILLS		
	2	CHECK BILLS NOW		
X1194	1	BILL LEARNING FAILED		
	2	CHECK BILLS NOW		
X1195	1	TOO MANY PICK FAILURES		
	2	CHECK BILLS NOW		
X1196	1	FULL - EMPTY BIN NOW		
X1197	1	NEARLY FULL		
	2	EMPTY BIN SOON		
X1198	1	REMOVED		
	2	INSERT BIN NOW		
X1199	1	DE-CONFIGURED FOR		
	2	IN SERVICE REPLENISHMENT		
X1200	1	BILL JAM AT PRE-LVDT		
	2	INSPECT TRANSPORT NOW		
X1201	1	PICK/PRE-LVDT JAM		
	2	INSPECT TRANSPORT NOW		
X1202	1	PRE-LVDT SENSOR FAILED		
	2	INSPECT SENSOR NOW		
X1203	1	LVDT HAS FAILED		
	2	INSPECT LVDT NOW		
X1204	1	INVALID PRE-LVDT INT		
	2	CHECK PICK SENSOR NOW		
X1205	1	MAIN TIMING DISK FAILED		
	2	CHECK NOW		

Reserved Screens  
Reserved Screens

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901234567890123456789012		
X1206	1	BILL JAM/MOTOR FAIL		
	2	INSPECT TRANSPORT NOW		
X1207	1	MAIN TIMING DISK SLOW		
	2	CHECK MAIN MOTOR NOW		
X1208	1	POWER SUPPLY DISCONNECT		
	2	CHECK INTERLOCK NOW		
X1209	1	CLAMP NOT HOME		
	2	INSPECT HOME SENSOR NOW		
X1210	1	CLAMP JAMMED HOME		
	2	INSPECT HOME SENSOR NOW		
X1211	1	CLAMP NOT AT PRESENT		
	2	INSPECT PRESENT SENSOR		
X1212	1	CLAMP JAMMED AT PRESENT		
	2	INSPECT PRESENT SENSOR		
X1213	1	BILL JAM/SENSOR 1 FAULT		
	2	INSPECT TRANSPORT NOW		
X1214	1	BILL JAM/SENSOR 2 FAULT		
	2	INSPECT TRANSPORT NOW		
X1215	1	BILL JAM/SENSOR 3 FAULT		
	2	INSPECT TRANSPORT NOW		
X1216	1	BILL JAM/SENSOR 4 FAULT		
	2	INSPECT TRANSPORT NOW		
X1217	1	BILL JAM/SENSOR 5 FAULT		
	2	INSPECT TRANSPORT NOW		
X1218	1	BILL JAM/SENSOR 6 FAULT		
	2	INSPECT TRANSPORT NOW		
X1219	1	BILL JAM/SENSOR 7 FAULT		
	2	INSPECT TRANSPORT NOW		
X1220	1	BILL JAM/SENSOR 8 FAULT		
	2	INSPECT TRANSPORT NOW		
X1221	1	OVERFILL SENSOR FAILED		
	2	INSPECT SENSOR NOW		
X1222	1	SENSOR 1 FAILED		
	2	INSPECT SENSOR NOW		
X1223	1	SENSOR 2 FAILED		
	2	INSPECT SENSOR NOW		

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901234567890123456789012		
X1224	1	SENSOR 3 FAILED		
	2	INSPECT SENSOR NOW		
X1225	1	SENSOR 4 FAILED		
	2	INSPECT SENSOR NOW		
X1226	1	SENSOR 5 FAILED		
	2	INSPECT SENSOR NOW		
X1227	1	SENSOR 6 FAILED		
	2	INSPECT SENSOR NOW		
X1228	1	SENSOR 7 FAILED		
	2	INSPECT SENSOR NOW		
X1229	1	SENSOR 8 FAILED		
	2	INSPECT SENSOR NOW		
X1230	1	PRESENT TIMING DISK FAIL		
	2	INSPECT TIMING DISK NOW		
X1231	1	CLAMP HOME SENSOR FAILED		
	2	INSPECT SENSOR NOW		
X1232	1	CLAMP PRESENT SENSOR FAIL		
	2	INSPECT SENSOR NOW		
X1233	1	SHUTTER JAMMED OPEN		
	2	INSPECT NOW		
X1234	1	SHUTTER JAMMED CLOSED		
	2	INSPECT NOW		
X1235	1	JAM CLOSED/OPEN SENSOR FAIL		
	2	INSPECT SHUTTER NOW		
X1236	1	SHUTTER OPEN SENSOR FAIL		
	2	INSPECT SENSOR NOW		
X1237	1	JAMMED OPEN/SENSOR FAIL		
	2	INSPECT SHUTTER NOW		
X1238	1	SHUTTER CLOSED SENSOR FAIL		
	2	INSPECT SENSOR NOW		
X1239	1	NEARING END OF LIFE		
	2	REPLACE ALL CUPS SOON		
X1240	1	BILLS NOT TAKEN - INSPECT		
	2	EXIT SENSOR/CTRL BRD NOW		
X1241	1	PARAMETERS NOT CONFIG		
	2	CHECK BILLS NOW		

Reserved Screens  
Reserved Screens

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901234567890123456789012		
X1242	1	SENSOR REQUIRES CLEANING		
	2	CLEAN SOON		
X1243	1	PRE-LDVT SENSOR FAIL		
	2	CLEAN SOON		
X1244	1	LDVT CALIBRATION OUT OF		
	2	RANGE - INSPECT SOON		
X1245	1	DISPLAY UNIT NOT POWERED		
	2	INSPECT DISPLAY UNIT NOW		
X1246	1	DISPLAY UNIT COMMS FAULT		
	2	INSPECT CABLE NOW		
X1247	1	DISPLAY UNIT COMMS ERROR		
	2	INSPECT CABLE NOW		
X1248	1	NVRAM ACCESS ERROR		
	2	INSPECT RS232 BOARD NOW		
X1249	1	SENSOR 1 NEEDS CLEANING		
	2	CLEAN SOON		
X1250	1	SENSOR 2 NEEDS CLEANING		
	2	CLEAN SOON		
X1251	1	SENSOR 3 NEEDS CLEANING		
	2	CLEAN SOON		
X1252	1	SENSOR 4 NEEDS CLEANING		
	2	CLEAN SOON		
X1253	1	SENSOR 5 NEEDS CLEANING		
	2	CLEAN SOON		
X1254	1	SENSOR 6 NEEDS CLEANING		
	2	CLEAN SOON		
X1255	1	SENSOR 7 NEEDS CLEANING		
	2	CLEAN SOON		
X1256	1	SENSOR 8 NEEDS CLEANING		
	2	CLEAN SOON		
X1257	1	PURGE BIN SENSOR NEEDS		
	2	CLEANING. CLEAN SOON		
X1260	1	CURRENCY DISPENSER		
	2	CASSETTE 1		TYPE :
X1261	1	CURRENCY DISPENSER		
	2	CASSETTE 2		TYPE :

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901234567890123456789012		
X1262	1	CURRENCY DISPENSER		
	2	CASSETTE 3		TYPE :
X1263	1	CURRENCY DISPENSER		
	2	CASSETTE 4		TYPE :
X1265	1	LINK NOT ESTABLISHED		
	2	RE-CONFIGURE		
X1266	1	CONFIGURATION PROBLEM		
	2	RE-CONFIGURE		
X1267	1	CONFIGURATION MISSING		
	2	RE-CONFIGURE		
X1300	1	PERSISTENT SKEW ERRORS		
	2	INSPECT 7731/2 SOON		
X1301	1	7731/2 FAILURE		
	2	INSPECT 7731/2 NOW		
X1302	1	TOO MANY SKEW ERRORS		
	2	INSPECT 7731/2 NOW		
X1303	1	TOO MANY CODELINE ERRORS		
	2	INSPECT 7731/2 NOW		
X1304	1	7731/2 MEDIA JAM		
	2	INSPECT 7731/2 NOW		
X1305	1	7731/2 FRONT PRINT FAIL		
	2	REPLACE FRONT PRINTER		
X1306	1	7731/2 REAR PRINT FAIL		
	2	INSPECT REAR PRINTER NOW		
X1307	1	7731/2 ENCODER FAILURE		
	2	INSPECT ENCODER NOW		
X1308	1	7731/2 FRONT CAMERA FAIL		
	2	INSPECT FRONT CAMERA NOW		
X1309	1	7731/2 REAR CAMERA FAIL		
	2	INSPECT REAR CAMERA NOW		
X1310	1	DPM TRANSPORT JAM		
	2	INSPECT TRANSPORT NOW		
X1311	1	SHUTTER FAILURE		
	2	INSPECT SHUTTER NOW		
X1312	1	TRANSPORT MOTOR FAILURE		
	2	INSPECT MOTOR NOW		

Reserved Screens  
Reserved Screens

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901234567890123456789012		
X1313	1	TRANSPORT SOLENOID FAIL		
	2	INSPECT SOLENOID NOW		
X1314	1	TRANSPORT SENSOR FAILURE		
	2	INSPECT SENSOR NOW		
X1315	1	ELECTRONICS FAILURE		
	2	INSPECT ELECTRONICS NOW		
X1316	1	SCSI ELECTRONICS FAILURE		
	2	INSPECT SCSI ELECTRONICS		
X1317	1	ESCROW MOTOR FAILURE		
	2	INSPECT ESCROW MOTOR NOW		
X1318	1	ESCROW SENSOR FAILURE		
	2	INSPECT SENSOR NOW		
X1319	1	MAG INK DETECTOR FAILED		
	2	INSPECT INK DETECTOR NOW		
X1320	1	POCKET MOTOR FAILURE		
	2	INSPECT POCKET MOTOR NOW		
X1321	1	POCKET SOLENOID FAILURE		
	2	INSPECT SOLENOID NOW		
X1322	1	POCKET SENSOR FAILURE		
	2	INSPECT SENSOR NOW		
X1323	1	POCKET ELECTRONICS FAIL		
	2	INSPECT ELECTRONICS NOW		
X1324	1	RECOGNITION BOARD FAIL		
	2	INSPECT BOARD NOW		
X1325	1	REJECT BIN NEARLY FULL		
	2	EMPTY BIN SOON		
X1326	1	REJECT BIN FULL		
	2	EMPTY BIN NOW		
X1327	1	POCKET A NEARLY FULL		
	2	EMPTY POCKET A SOON		
X1328	1	POCKET A FULL		
	2	EMPTY POCKET A NOW		
X1331	1	POCKET B NEARLY FULL		
	2	EMPTY POCKET B SOON		
X1332	1	POCKET B FULL		
	2	EMPTY POCKET B NOW		

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901234567890123456789012		
X1335	1	POCKET C NEARLY FULL		
	2	EMPTY POCKET C SOON		
X1336	1	POCKET C FULL		
	2	EMPTY POCKET C NOW		
X1338	1	TRANSPORT STATEMENT JAM		
	2	INSPECT TRANSPORT NOW		
X1339	1	CAPTURE BIN NEARLY FULL		
	2	EMPTY BIN SOON		
X1340	1	CAPTURE BIN FULL		
	2	EMPTY BIN NOW		
X1341	1	NEARING END OF LIFE		
	2	REPLACE PRINthead SOON		
X1342	1	END OF LIFE REACHED		
	2	REPLACE PRINthead NOW		
X1343	1	NEARING END OF LIFE		
	2	REPLACE PRINthead SOON		
X1344	1	END OF LIFE REACHED		
	2	REPLACE PRINthead NOW		
X1345	1	NEARING END OF LIFE		
	2	REPLACE RIBBON SOON		
X1346	1	END OF LIFE REACHED		
	2	REPLACE RIBBON NOW		
X1384	1	NEARING END OF LIFE		
	2	REPLACE PRINthead SOON		
X1385	1	ENV DEPOSITORY PRINthead		
	2	REMOVED - REPLACE NOW		
X1386	1	ENVELOPE DISPENSER JAM		
	2	INSPECT TRANSPORT NOW		
X1387	1	TRANSPORT SENSOR FAILED		
	2	INSPECT SENSOR NOW		
X1388	1	TIMING DISK FAILED		
	2	INSPECT TIMING DISK NOW		
X1389	1	ENVELOPE RETRACT FAILURE		
	2	INSPECT TRANSPORT SOON		
X1390	1	ENVELOPE FAILED RETRACT		
	2	INSPECT TRANSPORT NOW		

Reserved Screens  
Reserved Screens

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901234567890123456789012		
X1391	1	ENVELOPE HOPPER LOW		
	2	REFILL HOPPER SOON		
X1392	1	ENVELOPE HOPPER EMPTY		
	2	REFILL HOPPER NOW		
X1393	1	HOPPER SENSOR FAILURE		
	2	INSPECT SENSOR SOON		
X1394	1	ENTRY TRANSPORT JAM		
	2	INSPECT TRANSPORT NOW		
X1395	1	MAIN TRANSPORT JAM		
	2	INSPECT TRANSPORT NOW		
X1396	1	ENVELOPE TRANSPORT JAM		
	2	INSPECT TRANSPORT NOW		
X1397	1	SHUTTER JAMMED OPEN		
	2	INSPECT SHUTTER NOW		
X1398	1	SHUTTER JAMMED CLOSED		
	2	INSPECT SHUTTER NOW		
X1399	1	BOTH SHUTTER SENSORS BLOCKED		
	2	INSPECT NOW		
X1400	1	ENTRY SENSOR BLOCKED		
	2	INSPECT SENSOR NOW		
X1401	1	OFFSET SENSOR BLOCKED		
	2	INSPECT SENSOR NOW		
X1402	1	ENVELOPE ENTRY SENSOR		
	2	BLOCKED - INSPECT NOW		
X1403	1	ALIGNER ENTRY SENSOR		
	2	BLOCKED - INSPECT NOW		
X1404	1	ALIGNER EXIT SENSOR		
	2	BLOCKED - INSPECT NOW		
X1405	1	START PRINT SENSOR		
	2	BLOCKED - INSPECT NOW		
X1406	1	LEADING EDGE SENSOR		
	2	BLOCKED - INSPECT NOW		
X1407	1	ENTRY SENSOR FAILED		
	2	CLEAR - INSPECT NOW		
X1408	1	OFFSET SENSOR FAILED		
	2	CLEAR - INSPECT NOW		

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901234567890123456789012		
X1409	1	ENVELOPE ENTRY SENSOR		
	2	FAILED CLEAR - INSPECT NOW		
X1410	1	ALIGNER ENTRY SENSOR		
	2	FAILED CLEAR - INSPECT NOW		
X1411	1	ALIGNER EXIT SENSOR		
	2	FAILED CLEAR - INSPECT NOW		
X1412	1	START PRINT SENSOR		
	2	FAILED CLEAR - INSPECT NOW		
X1413	1	ENVELOPE EXIT SENSOR		
	2	FAILED CLEAR - INSPECT NOW		
X1414	1	LEADING EDGE SENSOR		
	2	FAILED CLEAR - INSPECT NOW		
X1415	1	ENVELOPE GATE JAMMED		
	2	INSPECT GATE NOW		
X1416	1	CHEQUE GATE JAMMED		
	2	INSPECT CHEQUE GATE NOW		
X1417	1	CORRUGATOR SOLENOID		
	2	JAMMED - INSPECT NOW		
X1418	1	AUXILIARY MOTOR NOT		
	2	TURNING - INSPECT NOW		
X1419	1	MAIN MOTOR NOT TURNING		
	2	INSPECT MAIN MOTOR NOW		
X1420	1	TOO MANY NO DOCUMENT		
	2	PRESENT - INSPECT NOW		
X1421	1	ALIGNER MOTOR NOT		
	2	TURNING - INSPECT NOW		
X1422	1	TOO MANY SHORT DOCUMENTS		
	2	INSPECT TRANSPORT NOW		
X1423	1	TOO MANY LONG DOCUMENTS		
	2	INSPECT TRANSPORT NOW		
X1424	1	TOO MANY DOCUMENTS WITH		
	2	HOLLES - INSPECT NOW		
X1425	1	FUSE FAILED		
	2	INSPECT FUSE NOW		
X1426	1	TRANSPORT ELECTRONICS		
	2	INTERLOCK OUT - INSPECT		

Reserved Screens  
Reserved Screens

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901234567890123456789012		
X1427	1	REJECT BIN REMOVED		
	2	INSERT BIN NOW		
X1428	1	SKEWED DOCUMENTS		
	2	INSPECT TRANSPORT SOON		
X1429	1	TOO MANY SKEWED DOCS		
	2	INSPECT TRANSPORT NOW		
X1430	1	POWER POCKET DOOR OPEN		
	2	CLOSE POWER POCKET DOOR		
X1431	1	JAM IN POCKETS		
	2	INSPECT POCKETS NOW		
X1432	1	INTERLOCK OPEN		
	2	CLOSE INTERLOCK NOW		
X1433	1	ANTI-FISH SENSOR FAIL		
	2	INSPECT SENSOR NOW		
X1450	1	CARD READER NEAR END		
	2	OF LIFE - REPLACE SOON		
X1451	1	3RD PARTY COMMS CONFIG		
	2	REQD-CONFIGURE COMMS NOW		
X1452	1	3RD PARTY COMMS BOARD		
	2	FAIL - REPLACE BOARD NOW		
X1453	1	3RD PARTY COMMS CABLE		
	2	FAIL - REPLACE CABLE NOW		
X1454	1	3RD PARTY S/W FAILURE		
	2	INSPECT SOFTWARE NOW		
X1455	1	3RD PARTY S/W NETWORK		
	2	FAIL - INSPECT N/WORK NOW		
X1456	1	3RD PARTY S/W - SERVER		
	2	FAIL - INSPECT SERVER NOW		
X1457	1	3RD PARTY S/W - RESOURCE		
	2	UNAVAILABLE - INSPECT NOW		
X1458	1	3RD PARTY S/W - RESOURCE		
	2	NOT DEFINED - INSPECT NOW		
X1459	1	3RD PARTY S/W - RESOURCE		
	2	IN USE - INSPECT NOW		
X1460	1	3RD PARTY S/W - RESOURCE		
	2	ACCESS FAIL - INSPECT NOW		

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901234567890123456789012		
X1461	1	3RD PARTY S/W FAILURE #1		
	2	INSPECT SOFTWARE NOW		
X1462	1	3RD PARTY S/W FAILURE #2		
	2	INSPECT SOFTWARE NOW		
X1463	1	3RD PARTY S/W FAILURE #3		
	2	INSPECT SOFTWARE NOW		
X1464	1	3RD PARTY S/W FAILURE #4		
	2	INSPECT SOFTWARE NOW		
X1465	1	3RD PARTY S/W FAILURE #5		
	2	INSPECT SOFTWARE NOW		
X1466	1	3RD PARTY S/W FAILURE #6		
	2	INSPECT SOFTWARE NOW		
X1467	1	3RD PARTY S/W FAILURE #7		
	2	INSPECT SOFTWARE NOW		
X1468	1	3RD PARTY S/W FAILURE #8		
	2	INSPECT SOFTWARE NOW		
X1469	1	3RD PARTY S/W FAILURE #9		
	2	INSPECT SOFTWARE NOW		
X1470	1	3RD PARTY S/W FAILURE #10		
	2	INSPECT SOFTWARE NOW		

## 'Z' State Of Health And TM-Alert Reserved Screens

'Z' State of Health and TM-Alert screens are displayed on the basic operator interface.

See *NDC+ Supervisor's Reference Manual* for details.

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901234567890123456789012		
Z0000		SEL-		
Z0001		REP-		
Z0002		CON-		
Z0003		ACC-		
Z0004		C:OFF		

Reserved Screens  
Reserved Screens

Screen Number	Row Position	Column Position					
		1	2	3	4	5	6
		1	2	3	4	5	6
Z0005		UNKNOWN SOH	SOH=	H,MSG_ID=	H		
Z0006	1	TMA TEXT LIBRARY FILE MISSING					
	2	- FILE TMATEXT1.000					
Z0007	1	TMA MESSAGE ( )					
	2	NOT FOUND IN TEXT LIBRARY					
Z0008	1	TMA TEXT LIBRARY IS BEING					
	2	UPDATED - PLEASE WAIT					
Z0009	1	-- TERMINAL HEALTHY --	A:PRINT				
	2	B:NEXT C:SOH D:PREV E:TM					
Z0010	1	- NO TM-ALERT MESSAGE -	A:PRINT				
	2	B:NEXT C:SOH D:PREV E:TM					
Z0011	1	-- NO TM-ALERT MESSAGE --					
	2	C:SOH ON					
Z0012	1	-- TERMINAL HEALTHY --	A:PRINT				
	2	B:NEXT C:SOH D:PREV					
Z0014	1						
	2	UNKNOWN SOH	SOH=	H,MSG_ID=	H		
Z0501	1	C/HOLDER DISP - GRAPHICS					
Z0505	1	BASIC OPERATOR PANEL					
Z0506	1	BOP - OPERATOR KEYBOARD					
Z0507	1	BOP - SYSTEM INTERFACE					
Z0510	1	ALPHA KBD-MAIN KBD OVRLAY					
Z0511	1	ALPHA KBD-MAIN KBD MATRIX					
Z0512	1	ALPHA KBD-LEFT FDK OVRLAY					
Z0513	1	ALPHA KBD-LEFT FDK MATRIX					
Z0514	1	ALPHA KBD-RIGHT FDK OVRLAY					
Z0515	1	ALPHA KBD-RIGHT FDK MATRIX					
Z0516	1	ALPHA KBD-EKC ELECTRONICS					
Z0517	1	ALPHA KBD-SYSTEM INTERFACE					
Z0518	1	ALPHA KBD-BAPE ELECTRONICS					
Z0520	1	IR TOUCH SCRN-OPTO MATRIX					
Z0521	1	IR TOUCH SCRN - CONTROL					

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901234567890123456789012		
Z0522	1	IR TOUCH SCRN-SYSTEM I/F		
Z0525	1	40 COL-INTERFACE		
Z0526	1	40 COL-RECEIPT CONTROLLER		
Z0527	1	40 COL-JOURNAL CONTROLLER		
Z0528	1	40 COL-RECEIPT MECHANISM		
Z0529	1	40 COL-JOURNAL MECHANISM		
Z0530	1	40 COL-RCPT PRTHEAD		
Z0531	1	40 COL-JRNL PRTHEAD		
Z0532	1	40 COL-RCPT RIBBON		
Z0533	1	40 COL-JRNL RIBBON		
Z0534	1	40 COL-RECEIPT PAPER		
Z0535	1	40 COL-JOURNAL PAPER		
Z0536	1	40 COL-RECEIPT KNIFE		
Z0537	1	40 COL-SYSTEM I/F		
Z0540	1	40 COL2-INTERFACE		
Z0541	1	40 COL2-RECEIPT CONTROLLER		
Z0542	1	40 COL2-JOURNAL CONTROLLER		
Z0543	1	40 COL2-RECEIPT MECHANISM		
Z0544	1	40 COL2-JOURNAL MECHANISM		
Z0545	1	40 COL2-RCPT PRTHEAD		
Z0546	1	40 COL2-JRNL PRTHEAD		
Z0547	1	40 COL2-RCPT RIBBON		
Z0548	1	40 COL2-JRNL RIBBON		
Z0549	1	40 COL2-RECEIPT PAPER		
Z0550	1	40 COL2-JOURNAL PAPER		
Z0551	1	40 COL2-RCPT KNIFE TYPE1		
Z0552	1	40 COL2-SYSTEM I/F		
Z0555	1	80 COL-ELECTRONICS		

Reserved Screens  
Reserved Screens

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901234567890123456789012		
Z0556	1	80	COL-MECHANISM	
Z0557	1	80	COL-STATEMENT PRINthead	
Z0558	1	80	COL-COMBINED PRINthead	
Z0559	1	80	COL-STATEMENT RIBBON	
Z0560	1	80	COL-COMBINED RIBBON	
Z0561	1	80	COL-STATEMENT PAPER	
Z0562	1	80	COL-PRINTER KNIFE	
Z0563	1	80	COL-CAPTURE BIN	
Z0564	1	80	COL-SYSTEM INTERFACE	
Z0570	1	80	COL2-ELECTRONICS	
Z0571	1	80	COL2-MECHANISM	
Z0572	1	80	COL2-STATEMENT PRNthead	
Z0573	1	80	COL2-COMBINED PRINthead	
Z0574	1	80	COL2-STATEMENT RIBBON	
Z0575	1	80	COL2-COMBINED RIBBON	
Z0576	1	80	COL2-STATEMENT PAPER	
Z0577	1	80	COL2-PRINTER 2 KNIFE	
Z0578	1	80	COL2-CAPTURE BIN	
Z0579	1	80	COL2-SYSTEM INTERFACE	
Z0585	1	DIP CARD READER		
Z0586	1	DIP CARD READER SYSTEM I/F		
Z0590	1	CARD READER		
Z0591	1	CARD READER-TRANSPORT		
Z0592	1	CARD READER-RD/ WRITE HEAD		
Z0593	1	CARD READER-CROPF		
Z0594	1	CARD READER-LFCC BIN		
Z0595	1	CARD READER-SYSTEM I/F		
Z0596	1	CARD READER-CIM I/F		

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901234567890123456789012		
Z0597	1	CARD READER-CIM MODULE		
Z0598	1	CARD READER-SMART CRD I/F		
Z0599	1	CARD READER-READ HEAD I/F		
Z0600	1	MISC I/F-ELECTRONICS		
Z0601	1	MISC I/F-SYSTEM INTERFACE		
Z0605	1	VIDEO DISK-PLAYER		
Z0606	1	VIDEO DISK-SYSTEM I/F		
Z0610	1	DIGITAL AUDIO-ELECTRONICS		
Z0615	1	DOOR ACCESS-INTERFACE		
Z0616	1	DOOR ACCESS-CARD READER		
Z0617	1	DOOR ACCESS-SYSTEM I/F		
Z0620	1	SECURITY CAMERA-INTERFACE		
Z0621	1	SECURITY CAMERA - FILM		
Z0622	1	SECURITY CAMERA-SYSTEM I/F		
Z0625	1	DEPOSITORY-CONTROL ELECTS		
Z0626	1	DEPOSITORY-SHUTTER		
Z0627	1	DEPOSITORY-MAIN TRANSPORT		
Z0628	1	DEPOSITORY-AUX TRANSPORT		
Z0629	1	DEPOSITORY-PRINthead		
Z0630	1	DEPOSITORY-BIN		
Z0631	1	ENVELOPE DISP-TRANSPORT		
Z0632	1	ENVELOPE DISP-HOPPER		
Z0633	1	DEPOSITORY-SYSTEM I/F		
Z0635	1	COMMUNICATIONS-PCCM		
Z0636	1	COMMUNICATIONS2-PCCM		
Z0637	1	COMMUNICATIONS3-PCCM		
Z0638	1	COMMUNICATIONS4-PCCM		
Z0645	1	COMMUNICATIONS-PCIFL		

Reserved Screens  
Reserved Screens

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901234567890123456789012		
Z0646	1	COMMUNICATIONS2-PCIFL		
Z0647	1	COMMUNICATIONS3-PCIFL		
Z0648	1	COMMUNICATIONS4-PCIFL		
Z0655	1	COMMS-HAYES MODEM		
Z0656	1	COMMS2-HAYES MODEM		
Z0657	1	COMMS3-HAYES MODEM		
Z0658	1	COMMS4-HAYES MODEM		
Z0665	1	COMMS-NETBIOS		
Z0670	1	CURRENCY DISP-CONTROL BRD		
Z0671	1	CURRENCY DISP-PICK MODULE1		
Z0672	1	CURRENCY DISP-PICK MODULE2		
Z0673	1	CURRENCY DISP-PICK MODULE3		
Z0674	1	CURRENCY DISP-PICK MODULE4		
Z0675	1	CURRENCY DISP-CASS1 TYPE:		
Z0676	1	CURRENCY DISP-CASS2 TYPE:		
Z0677	1	CURRENCY DISP-CASS3 TYPE:		
Z0678	1	CURRENCY DISP-CASS4 TYPE:		
Z0679	1	CURRENCY DISP-PURGE BIN		
Z0680	1	CURRENCY DISP-PRESENTER		
Z0681	1	CURRENCY DISP-EXIT SHUTTER		
Z0682	1	CURRENCY DISP-SUCTION CUPS		
Z0683	1	CURRENCY DISP-SYSTEM I/F		
Z0690	1	COMMUNICATIONS - MIRLAN		
Z0691	1	COMMUNICATIONS 2 - MIRLAN		
Z0692	1	COMMUNICATIONS 3 - MIRLAN		
Z0693	1	COMMUNICATIONS 4 - MIRLAN		
Z0695	1	SIGNAGE-INTERFACE		
Z0696	1	SIGNAGE-SYSTEM INTERFACE		

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901234567890123456789012		
Z0697	1	ENHANCED OPERATOR PANEL		
Z0698	1	EOP - OPERATOR KEYBOARD		
Z0699	1	EOP - SYSTEM INTERFACE		
Z0700	1	COMMUNICATIONS - COAX		
Z0701	1	COMMUNICATIONS 2 - COAX		
Z0702	1	COMMUNICATIONS 3 - COAX		
Z0703	1	COMMUNICATIONS 4 - COAX		
Z0704	1	COMMS MANAGER - CMCONF		
Z0706	1	DPM - 7731/2 UNIT		
Z0707	1	DPM - 7731/2 FRONT PRINTER		
Z0708	1	DPM - 7731/2 REAR PRINTER		
Z0709	1	DPM - 7731/2 ENCODER		
Z0710	1	DPM - 7731/2 FRONT CAMERA		
Z0711	1	DPM - 7731/2 REAR CAMERA		
Z0712	1	DPM - TRANSPORT MECHANISM		
Z0713	1	DPM - TRANSPORT ELECTRONICS		
Z0714	1	DPM - SCSI ELECTRONICS		
Z0715	1	DPM - ESCROW MECHANISM		
Z0716	1	DPM - MAGNETIC INK DETECTOR		
Z0717	1	DPM - STACKING POCKETS		
Z0718	1	DPM - RECOGNITION BOARD		
Z0719	1	DPM - REJECT BIN		
Z0720	1	DPM - 7731/2 POCKET A		
Z0721	1	DPM - 7731/2 POCKET B		
Z0722	1	DPM - 7731/2 POCKET C		
Z0723	1	DPM - 80 COL CAPTURE BIN		
Z0724	1	DPM - 7731/2 FRONT PRINthead		
Z0725	1	DPM - 7731/2 REAR PRINthead		

Reserved Screens  
Reserved Screens

Screen Number	Row Position	Column Position		
		1 1234567890123456789012	2 1234567890123456789012	3 1234567890123456789012
Z0726	1	DPM - 7731/2 ENCODER RIBBON		
Z0727	1	PASSBOOK - ELECTRONICS BRD		
Z0728	1	PASSBOOK - MECHANISM		
Z0729	1	PASSBOOK - PRINthead		
Z0737	1	PASSBOOK - RIBBON		
Z0738	1	PASSBOOK - CAPTURE BIN		
Z0739	1	PASSBOOK - MAG ELECTRONICS		
Z0740	1	COIN DISP - INTERFACE		
Z0741	1	COIN DISP - HOPPER UNIT 1		
Z0742	1	COIN DISP - HOPPER UNIT 2		
Z0743	1	COIN DISP - HOPPER UNIT 3		
Z0744	1	COIN DISP - HOPPER UNIT 4		
Z0745	1	COIN DISP - TRANSPORT		
Z0746	1	COIN DISP - SYSTEM I/F		
Z0747	1	CAMERA - ECM ELECTRONICS		
Z0748	1	CAMERA - MASS STORAGE DEV		
Z0749	1	CAMERA 0		
Z0750	1	CAMERA 1		
Z0751	1	CAMERA 2		
Z0752	1	BOP		
Z0753	1	BOP - SYSTEM INTERFACE		
Z0754	1	EOP		
Z0755	1	EOP - SYSTEM INTERFACE		
Z0756	1	KEYBOARD - EKC ELECTRONICS		
Z0757	1	KEYBOARD - SYSTEM I/F		
Z0758	1	KEYBRD - BAPE ELECTRONICS		
Z0759	1	CARD READER - LFCC BIN		
Z0760	1	CARD READER - SYSTEM I/F		

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901234567890123456789012		
Z0761	1	DEPOSITORY		
Z0762	1	CURRENCY DISP - SYSTEM I/F		
Z0763	1	DPM - DEPOSITORY PRINthead		
Z0764	1	DPM - ENV DISP MECHANISM		
Z0765	1	DPM - ENV DISP HOPPER		
Z0766	1	40 COL THERM - I/F		
Z0767	1	40 COL THERM - JRNL CONTRL		
Z0768	1	40 COL THERM - RCPT MECH		
Z0769	1	40 COL THERM - JRNL MECH		
Z0770	1	40 COL THERM - RCPT PRTHD		
Z0771	1	40 COL THERM - JRNL PRTHD		
Z0772	1	40 COL THERM - RCPT PAPER		
Z0773	1	40 COL THERM - JRNL PAPER		
Z0774	1	40 COL THERM - RCPT KNIFE		
Z0775	1	SWIPE READR - ELECTRONIC I/F		
Z0777	1	SWIPE READR - MECHANICAL I/F		
Z0901	1	COMMS FAIL-CHECK SDC CABLE		
Z0902	1	VIDEO PLAYER OR I/F FAULT		
Z0903	1	MIX/VID ERR-REPLACE MIXER		
Z0904	1	MIX ERR-CHANGE MIXER SOON		
Z0905	1	VIDEO NOT READY-CHECK NOW		
Z0906	1	NO VIDEO RESP-CHECK NOW		
Z0907	1	VIDEO RS232 FAIL-CHECK NOW		
Z0908	1	VIDEO RS232 FAIL-CHECK NOW		
Z0909	1	VID DROPOUT-CHECK DISK NOW		
Z0910	1	VIDEO RS232 FAIL-CHECK NOW		
Z0911	1	VIDEO NOT ACTIVE-CHECK NOW		
Z0912	1	NO VIDEO SIG-CHECK MIXER		

Reserved Screens  
Reserved Screens

Screen Number	Row Position	Column Position		
		1 1234567890123456789012	2 1234567890123456789012	3 1234567890123456789012
Z0913	1	VID/GRAFICS ERR-CHECK NOW		
Z0914	1	NO MIXER PRESENT-CHECK NOW		
Z0915	1	NO GRAPHICS BRD-CHECK NOW		
Z0916	1	BAD CONFIG FILE-CHECK NOW		
Z0917	1	NO VGA BOARD-CHECK NOW		
Z0925	1	LIFE-REPLACE KEYBOARD SOON		
Z0926	1	CONTROLLER FLT-REPLACE NOW		
Z0927	1	NO CHARACTER ROM-CHECK NOW		
Z0930	1	LIFE-REPLACE OVERLAY SOON		
Z0931	1	LIFE-REPLACE MATRIX SOON		
Z0932	1	LIFE-REPLACE OVERLAY SOON		
Z0933	1	LIFE-REPLACE MATRIX SOON		
Z0934	1	LIFE-REPLACE OVERLAY SOON		
Z0935	1	LIFE-REPLACE MATRIX SOON		
Z0936	1	ENCRYPTOR FAIL-REPLACE NOW		
Z0937	1	ENCR RAM ERROR-REPLACE NOW		
Z0938	1	ENCR PARITY ER-REPLACE NOW		
Z0939	1	ENCR COMMS ERR-INSPECT NOW		
Z0945	1	X AXIS BEAM-INSPECT SOON		
Z0946	1	Y AXIS BEAM-INSPECT SOON		
Z0947	1	X AXIS WEAK-CLEAN SOON		
Z0948	1	Y AXIS WEAK-CLEAN SOON		
Z0949	1	FAILED BEAMS-INSPECT NOW		
Z0950	1	ELCTRCS/MATRIX-INSPECT NOW		
Z0951	1	A/D FAIL-REPLACE NOW		
Z0952	1	COMMS ERR-CHANGE CABLE NOW		
Z0953	1	NOT CALIBRATED-DO NOW		
Z0960	1	I/F BOARD FAIL-REPLACE NOW		

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901	12345678901	23456789012
Z0961	1	I/F BOARD FAIL-REPLACE NOW		
Z0962	1	CNTRL BRD FAIL-REPLACE NOW		
Z0963	1	S/W BOARD FAIL-REPLACE NOW		
Z0964	1	CNTRL BRD FAIL-REPLACE NOW		
Z0965	1	HEAD/KNIFE JAM-CLEAR NOW		
Z0966	1	BLACK MARK ERR-INSPECT NOW		
Z0967	1	EJECT JAM-CHECK TRANS NOW		
Z0968	1	NOT LOADED/JAM-INSPECT NOW		
Z0969	1	PRINTER OPEN-CLOSE NOW		
Z0970	1	HEAD PAPER JAM-CLEAR NOW		
Z0971	1	PAPER NOT LOADED-CHECK NOW		
Z0972	1	PRINTER OPEN-CLOSE NOW		
Z0973	1	LIFE-REPLACE PRNTHEAD SOON		
Z0974	1	LIFE-REPLACE PRINthead NOW		
Z0975	1	LIFE-REPLACE PRNTHEAD SOON		
Z0976	1	LIFE-REPLACE PRINthead NOW		
Z0977	1	LIFE-REPLACE RIBBON SOON		
Z0978	1	LIFE-REPLACE RIBBON NOW		
Z0979	1	LIFE-REPLACE RIBBON SOON		
Z0980	1	LIFE-REPLACE RIBBON NOW		
Z0981	1	PAPER LOW-REPLENISH SOON		
Z0982	1	PAPER OUT-REPLENISH NOW		
Z0983	1	PAPER LOW-REPLENISH SOON		
Z0984	1	PAPER OUT-REPLENISH NOW		
Z0985	1	LIFE-REPLACE KNIFE SOON		
Z0986	1	BLACK MARK ERR-CHECK NOW		
Z0990	1	MAG BRD COMS ERR-RPLCE NOW		
Z0994	1	NO COMS-NEW BUNCH/MAIN NOW		

Reserved Screens  
Reserved Screens

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901234567890123456789012		
Z0995	1	COMS ERR-RPLCE MN PCB NOW		
Z0996	1	COMS ERR-CHK RS232 CBL NOW		
Z0997	1	COMS ERR-RPLCE SCANNER NOW		
Z0998	1	MECHANICAL JAM-INSPECT NOW		
Z0999	1	BLK MRK ERR-CHK PAPER NOW		
Z1000	1	MEDIA JAM-CHECK TRSPRT NOW		
Z1001	1	PRINTER OPEN-CLOSE NOW		
Z1002	1	SHUTTER JAM OPEN-CHECK NOW		
Z1003	1	SHUTTER JAM CLSD-CHECK NOW		
Z1004	1	CAPTURE JAM-CHK TRSPRT NOW		
Z1005	1	THRT TMPRS-CHK TRSPRT NOW		
Z1006	1	PBOOK RD ER-CHECK HEAD NOW		
Z1007	1	PBOOK WR ER-CHECK HEAD NOW		
Z1008	1	JAM LIMIT-CHECK TRSPRT NOW		
Z1009	1	THROAT JAM-CHK TRSPRT NOW		
Z1010	1	CAPTURE JAM-CHK TRSPRT NOW		
Z1011	1	SHUTTER JAM OPEN-CHECK NOW		
Z1012	1	SHUTTER JAM CLSD-CHECK NOW		
Z1013	1	MECHANICAL JAM-INSPECT NOW		
Z1014	1	PRINTER OPEN-CLOSE NOW		
Z1015	1	LIFE-REPLACE PRNHEAD SOON		
Z1016	1	LIFE-REPLACE PRNHEAD SOON		
Z1017	1	LIFE-REPLACE PRINthead NOW		
Z1018	1	LIFE-REPLACE PRINthead NOW		
Z1019	1	LIFE-REPLACE RIBBON SOON		
Z1020	1	LIFE-REPLACE RIBBON SOON		
Z1021	1	LIFE-REPLACE RIBBON NOW		
Z1022	1	LIFE-REPLACE RIBBON NOW		

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901234567890123456789012		
Z1023	1	PAPER LOW-REPLENISH SOON		
Z1024	1	PAPER OUT-REPLENISH NOW		
Z1025	1	LIFE-REPLACE KNIFE SOON		
Z1026	1	NEARLY FULL-EMPTY BIN SOON		
Z1027	1	NEARLY FULL-EMPTY BIN SOON		
Z1028	1	FULL - EMPTY BIN NOW		
Z1029	1	FULL - EMPTY BIN NOW		
Z1030	1	BUNCHER JAM OPEN-CHECK NOW		
Z1031	1	BUNCHER JAM CLSD-CHECK NOW		
Z1033	1	COIN DISPENSER REMOVED		
Z1034	1	CN DSPNSR NOT INIT-SET LOW		
Z1035	1	HOPPER LOW REFILL SOON		
Z1036	1	HOPPER EMPTY REFILL NOW		
Z1037	1	HOP MECHANISM FAIL INSPT NOW		
Z1038	1	HOP SENS FAIL INSPECT NOW		
Z1039	1	HOP FUSED INSPECT NOW		
Z1040	1	LIFE-CHANGE DIP READR SOON		
Z1041	1	RD ER-CLEAN DIP READR SOON		
Z1042	1	RD ER-CLEAN CARD RDR SOON		
Z1043	1	WR ER-CLEAN CARD RDR SOON		
Z1044	1	RD ER-CLEAN CARD RDR NOW		
Z1045	1	WR ER-CLEAN CARD RDR NOW		
Z1046	1	CRD JAM-CHECK CARD RDR NOW		
Z1047	1	SHUTTER MECH ERR-CHECK NOW		
Z1048	1	INVALID CARD LEN-CHECK NOW		
Z1049	1	TAMPER-CHECK CARD RDR NOW		
Z1050	1	CARD JAM-CHECK READER NOW		
Z1051	1	LIFE-REPLACE TRANSPRT SOON		

Reserved Screens  
Reserved Screens

Screen Number	Row Position	Column Position		
		1 12345678901234567890123456789012	2	3
Z1052	1	LIFE-CHANGE HEAD/BELT SOON		
Z1053	1	RELAY/BAT-CHANGE CROPF NOW		
Z1054	1	LFCC BIN REMOVD-INSERT NOW		
Z1055	1	FULL - EMPTY BIN NOW		
Z1056	1	LFCC SHTR ER-CHECK BIN NOW		
Z1057	1	NEARLY FULL-EMPTY BIN SOON		
Z1058	1	COMMS FAILURE-REPLACE NOW		
Z1059	1	COMMS FAILURE-REPLACE NOW		
Z1060	1	STOPPER BIN/CONTACTS DOWN		
Z1061	1	I/F FAILURE - INSPECT NOW		
Z1062	1	I/F TIMEOUT - INSPECT NOW		
Z1063	1	COMMS ERR - INSPECT NOW		
Z1065	1	VID PLYR OR I/F-CHANGE NOW		
Z1066	1	VIDEO NOT READY-CHECK NOW		
Z1067	1	NO VIDEO RESP-CHK PLYR NOW		
Z1068	1	VID RS232 ER-CHECK LNK NOW		
Z1069	1	VID RS232 ER-CHECK LNK NOW		
Z1070	1	VID DROPOUT-CHECK DISK NOW		
Z1071	1	VID RS232 ER-CHECK LNK NOW		
Z1072	1	VID NOT ACTIVTED-CHECK NOW		
Z1080	1	INT FAIL-CHECK AUD BRD NOW		
Z1081	1	H/W FAIL-CHECK AUD BRD NOW		
Z1082	1	S/W DRVR ERR-CHECK S/W NOW		
Z1085	1	UART ERR-CHANGE RS232 I/F		
Z1086	1	COMS ER-SEE I/F &CABLE NOW		
Z1087	1	RD ER-CLEAN CRD READR SOON		
Z1088	1	RD ER-CLEAN CARD READR NOW		
Z1095	1	I/F FAILED-REPLACE BRD NOW		

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901234567890123456789012		
Z1096	1	CS ER-SEE I/F &CABLE NOW		
Z1097	1	RUNNING LOW-LOAD FILM SOON		
Z1098	1	OUT OF FILM-LOAD FILM NOW		
Z1105	1	HOP REMOVED REPLACE HOP		
Z1106	1	TRANSPORT JAM INSPECT NOW		
Z1108	1	NO POWER SPLY-INSPECT SOON		
Z1109	1	SHUTTER JAM-INSPECT SOON		
Z1112	1	SHUTTER JAM OPEN-CHECK NOW		
Z1113	1	SHUTTER JAM CLSD-CHECK NOW		
Z1114	1	BOTH SENSRS BLKD-CHECK NOW		
Z1115	1	INTRLCK/MTR FAILED-CHK NOW		
Z1116	1	AT-PRNT SNSR ER-CHANGE NOW		
Z1117	1	EXIT SENSOR ER-CHANGE NOW		
Z1118	1	LIFE-REPLACE MOTOR SOON		
Z1120	1	ENV JAM-CHECK TRNSPRT SOON		
Z1123	1	ENV JAM-CHECK TRNSPRT NOW		
Z1124	1	ENTRY SENSOR ER-CHANGE NOW		
Z1125	1	2ND SENSOR FAIL-CHANGE NOW		
Z1128	1	ENV JAM-CHECK TRNSPRT SOON		
Z1131	1	TIMING DISK ER-INSPECT NOW		
Z1132	1	ENV JAM-CHECK TRNSPRT NOW		
Z1133	1	ENV JAM-CHECK TRNSPRT NOW		
Z1134	1	LIFE-REPLACE PRINthead NOW		
Z1135	1	ERR/FIT-CHECK PRINTHD NOW		
Z1136	1	REMOVED-INSERT BIN NOW		
Z1137	1	FULL - EMPTY BIN NOW		
Z1138	1	MOTOR LIFE-REPLACE SOON		
Z1141	1	TIMING DISK ERR-CHECK SOON		

Reserved Screens  
Reserved Screens

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901234567890123456789012		
Z1142	1	ENV RETRACT	ERR-CHECK	SOON
Z1144	1	ENV JAM-CHECK	TRSPRT	NOW
Z1145	1	TRPT SENSOR	FAIL-CHECK	NOW
Z1146	1	ENV RETRACT	ERR-CHECK	NOW
Z1147	1	EMPTY-REFILL	HOPPER	NOW
Z1148	1	LOW-REFILL	HOPPER	SOON
Z1150	1	SUSPECT TAMPER-	CHECK	NOW
Z1151	1	HOPPER SENSOR	ER-CHECK	NOW
Z1160	1	NO COMMS BOARD-	INSERT	NOW
Z1161	1	H/W ERR-REPLACE	BOARD	NOW
Z1162	1	INT ERR-REPLACE	BOARD	NOW
Z1163	1	COMMS FATAL-CHECK	LOG	NOW
Z1164	1	NO COMMS BOARD-	INSERT	NOW
Z1165	1	H/W ERR-REPLACE	BOARD	NOW
Z1166	1	INT ERR-REPLACE	BOARD	NOW
Z1167	1	COMS FATAL-RPLCE	BOARD	NOW
Z1168	1	MODEM C/SUM	ERR-CHANGE	NOW
Z1169	1	INTRNL MODEM	ER-CHANGE	NOW
Z1170	1	SERIAL PORT	ERR-CHECK	NOW
Z1171	1	RS232 I/F	ER-CHECK	CABLE
Z1172	1	BLACKLISTED NUMBER-	RESET	
Z1173	1	FATAL-SUSPECT	CABLE/BOARD	
Z1174	1	COMMS CONFIG	REQUIRED	
Z1175	1	NO NETBIOS-CHECK	INSTALL	
Z1176	1	NO COMMS BRD-	INSERT	NOW
Z1177	1	H/W FAULT-REPLACE	BRD	NOW
Z1178	1	FATAL COMMS	ER-SORT	NOW
Z1180	1	COMMS ERR-CHANGE	BOARD	NOW

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901234567890123456789012		
Z1181	1	NVRAM FAIL-RPLCE BOARD NOW		
Z1182	1	INCOMPATIBLE F/W CHECK REV		
Z1183	1	COLD-CHECK PICK MOD SOON		
Z1184	1	BILL JAM-CHECK TRSPRT NOW		
Z1185	1	GULP FEED-CLR TRNSPRT NOW		
Z1186	1	ER-CHECK SENSOR & I/F NOW		
Z1187	1	BAD SENSOR INTPT-CHECK NOW		
Z1188	1	I2C FAULT-CHECK NOW		
Z1189	1	EMPTY-REPLENISH CASS NOW		
Z1190	1	LOW-REPLENISH CASS SOON		
Z1191	1	REMOVED		
Z1192	1	INVAL CASS TYPE-CHECK NOW		
Z1193	1	BAD BILLS-CHECK BILLS NOW		
Z1194	1	LEARN ERR-CHECK BILLS NOW		
Z1195	1	PICK ERRS-CHECK BILLS NOW		
Z1196	1	FULL-EMPTY BIN NOW		
Z1197	1	NEARLY FULL-EMPTY BIN SOON		
Z1198	1	REMOVED-INSERT BIN NOW		
Z1199	1	DE-CONFIGD FOR IN SER REP		
Z1200	1	JAM AT PRE-LVDT-CHECK NOW		
Z1201	1	PICK/PRELVDT JAM-CHECK NOW		
Z1202	1	PRELVDT SENS ERR-CHECK NOW		
Z1203	1	LVDT FAIL-CHECK LVDT NOW		
Z1204	1	BAD PRELVDT INT-CHECK NOW		
Z1205	1	MAIN TMG DISK ER-CHECK NOW		
Z1206	1	BIL JAM/MOT FAIL-CHECK NOW		
Z1207	1	TMG DISK SLOW-CHECK MOTOR		
Z1208	1	NO POWER-CHECK INTRLCK NOW		

Reserved Screens  
Reserved Screens

Screen Number	Row Position	Column Position		
		1 12345678901234567890123456789012	2	3
Z1209	1	CLAMP NOT HOME-CHECK NOW		
Z1210	1	CLAMP JAM HOME-CHECK NOW		
Z1211	1	CLAMP NOT AT PRESENT-CHECK		
Z1212	1	CLAMP JAM AT PRESENT-CHECK		
Z1213	1	JAM/SENS1-CHECK TRSPRT NOW		
Z1214	1	JAM/SENS2-CHECK TRSPRT NOW		
Z1215	1	JAM/SENS3-CHECK TRSPRT NOW		
Z1216	1	JAM/SENS4-CHECK TRSPRT NOW		
Z1217	1	JAM/SENS5-CHECK TRSPRT NOW		
Z1218	1	JAM/SENS6-CHECK TRSPRT NOW		
Z1219	1	JAM/SENS7-CHECK TRSPRT NOW		
Z1220	1	JAM/SENS8-CHECK TRSPRT NOW		
Z1221	1	OVRFILL SENS ERR-CHECK NOW		
Z1222	1	SENS 1 FAILED-CHECK NOW		
Z1223	1	SENS 2 FAILED-CHECK NOW		
Z1224	1	SENS 3 FAILED-CHECK NOW		
Z1225	1	SENS 4 FAILED-CHECK NOW		
Z1226	1	SENS 5 FAILED-CHECK NOW		
Z1227	1	SENS 6 FAILED-CHECK NOW		
Z1228	1	SENS 7 FAILED-CHECK NOW		
Z1229	1	SENS 8 FAILED-CHECK NOW		
Z1230	1	PRESENT TDISK ER-CHECK NOW		
Z1231	1	CLAMP HOME SENSOR ER-CHECK		
Z1232	1	CLAMP PRESENT SENS-CHECK		
Z1233	1	SHUTTER JAM OPEN-CHECK NOW		
Z1234	1	SHUTTER JAM CLSD-CHECK NOW		
Z1235	1	JAM OR SENS FAIL-CHECK NOW		
Z1236	1	SHTR OPN SENS ER-CHECK NOW		

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901234567890123456789012		
Z1237	1	JAM OR SENSOR ER-CHECK NOW		
Z1238	1	SHT CLSD SENS ER-CHECK NOW		
Z1239	1	LIFE-REPLACE ALL CUPS SOON		
Z1240	1	NO BILLS TAKEN-CHECK NOW		
Z1241	1	PRMS NOT CONF-CHECK BILLS		
Z1242	1	SENSOR NEEDS CLEANING SOON		
Z1243	1	PRE-LVDT SEN ER-CLEAN SOON		
Z1244	1	LVDT CALIB OUT-CHECK SOON		
Z1245	1	DISP UNIT POWER-CHECK NOW		
Z1246	1	DISP UNIT COMMS-CHECK NOW		
Z1247	1	DISP UNIT COMMS-CHECK NOW		
Z1248	1	NVRAM ERR-CHECK RS232 NOW		
Z1249	1	SENS 1 NEEDS CLEANING SOON		
Z1250	1	SENS 2 NEEDS CLEANING SOON		
Z1251	1	SENS 3 NEEDS CLEANING SOON		
Z1252	1	SENS 4 NEEDS CLEANING SOON		
Z1253	1	SENS 5 NEEDS CLEANING SOON		
Z1254	1	SENS 6 NEEDS CLEANING SOON		
Z1255	1	SENS 7 NEEDS CLEANING SOON		
Z1256	1	SENS 8 NEEDS CLEANING SOON		
Z1257	1	PURGE BIN SENS-CLEAN SOON		
Z1265	1	NO LINK RECONFIGURE		
Z1266	1	CONFIG PROBLEM RECONFIGURE		
Z1267	1	CONFIG MISSING RECONFIGURE		
Z1300	1	PRSTNT SKEW ERR-CHK 7731/2		
Z1301	1	7731/2 FAILURE-INSPECT NOW		
Z1302	1	SKEW ERRS LIMIT-CHK 7731/2		
Z1303	1	CODELINE ER-INSPECT 7731/2		

Reserved Screens  
Reserved Screens

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901234567890123456789012		
Z1304	1	MEDIA JAM - INSPECT	7731/2	
Z1305	1	FRONT PRINTER FAIL-INSPECT		
Z1306	1	REAR PRINTER FAIL-INSPECT		
Z1307	1	7731/2 ENCODER FAIL-INSPECT		
Z1308	1	INSPECT 7731/2 FRNT CAMERA		
Z1309	1	INSPECT 7731/2 REAR CAMERA		
Z1310	1	DPM TRANSPORT JAM-INSPECT		
Z1311	1	SHUTTER FAILURE-INSPECT		
Z1312	1	TRSPRT MOTOR FAIL-INSPECT		
Z1313	1	TRSPRT SLNOID FAIL-INSPECT		
Z1314	1	TRSPRT SENSOR FAIL-INSPECT		
Z1315	1	ELECTRONICS FAIL-INSPECT		
Z1316	1	SCSI ELCTRNCIS FAIL-INSPECT		
Z1317	1	ESCROW MOTOR FAIL-INSPECT		
Z1318	1	ESCROW SENSOR FAIL-INSPECT		
Z1319	1	MAG INK DTCTOR FAIL-INSPECT		
Z1320	1	POCKET MOTOR FAIL-INSPECT		
Z1321	1	POCKET SOLND FAIL-INSPECT		
Z1322	1	POCKET SENSR FAIL-INSPECT		
Z1323	1	POCKET ELECT FAIL-INSPECT		
Z1324	1	RECOGNITN BRD FAIL-INSPECT		
Z1325	1	REJECT BIN NRLY FULL-EMPTY		
Z1326	1	REJECT BIN FULL-EMPTY BIN		
Z1327	1	POCKET A NEARLY FULL-EMPTY		
Z1328	1	POCKET A FULL-EMPTY POCKET		
Z1331	1	POCKET B NEARLY FULL-EMPTY		
Z1332	1	POCKET B FULL-EMPTY POCKET		
Z1335	1	POCKET C NEARLY FULL-EMPTY		

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901234567890123456789012		
Z1336	1	POCKET C FULL-EMPTY POCKET		
Z1338	1	TRSPRT STMNT JAM-INSPECT		
Z1339	1	CAPTURE BIN NLY FULL-EMPTY		
Z1340	1	CAPTURE BIN FULL-EMPTY BIN		
Z1341	1	REPLACE FRONT PRNTHD SOON		
Z1342	1	REPLACE FRONT PRNTHD NOW		
Z1343	1	REPLACE REAR PRNTHD SOON		
Z1344	1	REPLACE REAR PRNTHD NOW		
Z1345	1	REPLACE RIBBON SOON		
Z1346	1	REPLACE RIBBON NOW		
Z1384	1	RPLACE ENV DEP PRNTHD SOON		
Z1385	1	ENV DEP PRNTHD REMOVED		
Z1386	1	ENV DISP JAMMED-INSPECT NOW		
Z1387	1	TRAN SNSR FAILED-INSPECT		
Z1388	1	TIMING DISK FAILURE-INSPECT		
Z1389	1	ENV RETRACT FAILURE-INSPECT		
Z1390	1	RPTD ENV RTRCT FAIL-INSPECT		
Z1391	1	ENV HOPPER LOW-REFILL SOON		
Z1392	1	ENV HOPPER EMPTY-FILL NOW		
Z1393	1	HOPPER SNSR FAIL-INSPI SOON		
Z1394	1	ENTRY TRAN JAM-INSPECT NOW		
Z1395	1	MAIN TRAN JAM-INSPECT NOW		
Z1396	1	ENV TRAN JAM-INSPECT NOW		
Z1397	1	SHUTTER JAMMED OPEN-INSPECT		
Z1398	1	SHUTTER JAMMED CLSD-INSPECT		
Z1399	1	BOTH SHUTR SNSRS BLKD-INSPI		
Z1400	1	ENTRY SNSR BLOCKED-INSPECT		
Z1401	1	OFFSET SNSR BLOCKED-INSPECT		

Reserved Screens  
Reserved Screens

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901234567890123456789012		
Z1402	1	ENV ENTRY SNSR BLKD-INSPECT		
Z1403	1	ALIGN ENTRY SNSR BLKD-INSPECT		
Z1404	1	ALIGN EXIT SNSR BLKD-INSPECT		
Z1405	1	STRT PRNT SNSR BLKD-INSPECT		
Z1406	1	LEADNG EDGE SNSR BLKD-INSPECT		
Z1407	1	ENTRY SNSR CLR FAIL-INSPECT		
Z1408	1	OFFSET SNSR CLR FAIL-INSPECT		
Z1409	1	ENV ENT SNSR CLR FAIL-INSPECT		
Z1410	1	ALN ENT SNSR CLR FAIL-INSPECT		
Z1411	1	ALN EXT SNSR CLR FAIL-INSPECT		
Z1412	1	STRT PRNT SNSR CLR FL-INSPECT		
Z1413	1	ENV EXT SNSR CLR FAIL-INSPECT		
Z1414	1	LDING EDG SNSR CLR FL-INSPECT		
Z1415	1	ENV GATE JAMMED-INSPECT NOW		
Z1416	1	CHEQUE GATE JAM-INSPECT NOW		
Z1417	1	CORRUGATOR SLND JAM-INSPECT		
Z1418	1	AUX MOTOR NOT TURNING-INSPECT		
Z1419	1	MAIN MTR NOT TURNING-INSPECT		
Z1420	1	TOO MANY NO DOC PRSENT-INSPECT		
Z1421	1	ALIGN MTR NOT TURNING-INSPECT		
Z1422	1	SHRT DOC LIMIT-INSPECT TRAN		
Z1423	1	LONG DOC LIMIT-INSPECT TRAN		
Z1424	1	HOLDS IN DOCS LIMIT-INSPECT		
Z1425	1	FUSE FAIL-REPLACE NOW		
Z1426	1	TRAN ELECT INTERLOCK OUT		
Z1427	1	REJECT BIN REMOVED-INSERT		
Z1428	1	SKEWED DOCS-CHK TRSPRT		
Z1429	1	SKEWED DOCS LIM-CHK TRSPRT		

Screen Number	Row Position	Column Position		
		1	2	3
		12345678901234567890123456789012		
Z1430	1	POWER PCKT DOOR OPEN-CLOSE		
Z1431	1	JAM IN POCKETS-INSPECT		
Z1432	1	INTERLOCK OPEN-CLOSE NOW		
Z1433	1	ANTI-FISH FAIL-INSPECT		
Z1450	1	CRD RDR LIFE-REPLACE SOON		
Z1451	1	3RD PTY COMMS CONFIG REQD		
Z1452	1	3RD PTY COMMS BRD FL-RPLACE		
Z1453	1	3RD PTY COMMS CBL FL-RPLACE		
Z1454	1	3RD PTY S/W FAIL - INSPECT		
Z1455	1	3RD PTY S/W NETWRK FL-INSP		
Z1456	1	3RD PTY S/W SERVER FL-INSP		
Z1457	1	3RDPTY S/W RSRC UNAV-INSP		
Z1458	1	3RDPTY S/W RSRC UNDEF-INSP		
Z1459	1	3RDPTY S/W RSRC IN USE-INSP		
Z1460	1	3RD PTY S/W RSRC ACC FL-INSP		
Z1461	1	3RD PTY S/W FAIL #1-INSPECT		
Z1462	1	3RD PTY S/W FAIL #2-INSPECT		
Z1463	1	3RD PTY S/W FAIL #3-INSPECT		
Z1464	1	3RD PTY S/W FAIL #4-INSPECT		
Z1465	1	3RD PTY S/W FAIL #5-INSPECT		
Z1466	1	3RD PTY S/W FAIL #6-INSPECT		
Z1467	1	3RD PTY S/W FAIL #7-INSPECT		
Z1468	1	3RD PTY S/W FAIL #8-INSPECT		
Z1469	1	3RD PTY S/W FAIL #9-INSPECT		
Z1470	1	3RD PTY S/W FAIL #10-INSP		

Reserved Screens

**Reserved Screens**

## Appendix B Character Sets

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Overview	B-1
Character Sets	B-2
Statement Code Sets	B-3
Code Pages	B-21

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Table of Contents  
**Character Sets**

## Overview

In this appendix we show the default character sets provided on CRTs and printers other than for the DPM. The character set for the DPM printer depends on what you purchase with your system. See *Document Processing Application Development Guidelines* for more information.

This appendix also describes the code page character sets for the thermal printer.

## Character Sets

**Note:** The row and column identifiers used in Figures 1-12 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.

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
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
Condensed Size Alpha 1/ Condensed Size Arabic 1	'C'	-	-	96
Condensed Size Alpha 2/ Condensed Size Arabic 2	'D'	-	-	96

Character Set	Designator	Number Of Characters Supported		
		CRT	PPD	R/J
Condensed Size Alpha 3/ Condensed Size Arabic 3	'E'	-	-	96
Condensed Size Alpha 4/ Condensed Size Arabic 4	'M'	-	-	96
Condensed Size Alpha 5/ Condensed Size Arabic 5	'N'	-	-	96
Chinese 1	'.'	64	-	-
Chinese 2	';'	64	-	-
Customer Graphics 4	'9'	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.

## Statement Code Sets

The statement printer supports either five International Alpha sets or five Arabic sets. You can select these by a hardware switch.

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	'T'	96
Single Size Alpha 5/ Single Size Arabic 5	'J'	96
Double Size Alpha 1/ Double Size Arabic 1. See Note	'>'	96

Character Sets  
Character Sets

Character Sets	Designator	Number Of Characters Supported
Double Size Alpha 2/ Double Size Arabic 2. See Note	'?'	96
Double Size Alpha 3/ Double Size Arabic 3. See Note	'B'	96
Double Size Alpha 4/ Double Size Arabic 4. See Note	'K'	96
Double Size Alpha 5/ Double Size Arabic 5. See Note	'L'	96
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
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

Figure B-1  
Alpha 1

	!	"	#	\$	%	&	,	(	)	*	+	,	-	.	/
2	0	1	2	3	4	5	6	7	8	9	:	;	<	=	> ?
3	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N O
4	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^ _
5	£	Æ	ø	Å	Ä	Δ	Ñ	Ö	Ā	Ç	Ć	Ğ	Ö	Ë	Ê É
6	Ô	Ó	Ï	Ü	ñ	Ē	Ē	Ş	ș	diamond	ş	ğ	i	cr	dr r
7	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E F

Printer	Designator
Receipt and Journal	'1' or '>'
Thermal Receipt and Journal	'1' or '>'
Thermal Receipt in Sideways mode	'1', '>' or 'C'
Statement	'1', '>', 'C' or 'F'.

Character Sets  
Character Sets

---

Figure B-2  
Alpha 2

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
5	P	Q	R	S	T	U	V	W	X	Y	Z	[	/	]	^
6	Bs	Fr	e	ç	đ	š	č	ž	đ	~	¿	i	à	>><<	Γ
7	Θ	Λ	Ξ	Π	Σ	Φ	Ψ	Ω	§	°	—		█	`	÷
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E
															F

Printer	Designator
Receipt and Journal	'2' or '?
Thermal Receipt and Journal	'2' or '?
Thermal Receipt in Sideways mode	'2', '?' or 'D'
Statement	'2', '?', 'D' or 'G'.

Figure B-3  
Alpha 3

2	£	Æ	ø	Å	Ä	Δ	Ñ	Ó	Á	Ç	Ć	€	Ö	Ë	Ê	É
3	Ô	Ó	Ï	Ü	ñ	Ē	Ē	ſ	¤	◊	Ş	Ğ	í	cr	dr	r
4	Bs	Fr	E	ç	đ	š	č	ž	đ	~	¿	i	À	>>	<<	Γ
5	Θ	Λ	Ξ	Π	Σ	Φ	Ψ	Ω	§	°	—		△	`	÷	↑
6	æ	ø	â	ä	ð	ñ	õ	ã	ö	ë	ê	é	ô	ó	ï	ü
7	đ	š	č	ž	đ	à	γ	ξ	σ	ψ	¥	Pt	f	▀		
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F

Printer	Designator
Receipt and Journal	'7' or 'B'
Thermal Receipt and Journal	'7' or 'B'
Thermal Receipt in Sideways mode	'7', 'B' or 'E'
Statement	'7', 'B', 'E' or 'H'.

Character Sets  
Character Sets

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Figure B-4  
Alpha 4

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
5	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	^	_
6	'	a	b	c	d	e	f	g	h	i	j	k	l	m	n
7	p	q	r	s	t	u	v	w	x	y	z	{	:	}	~
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E
															F

Printer	Designator
Receipt and Journal	'I' or 'K'
Thermal Receipt and Journal	'T' or 'K'
Thermal Receipt in Sideways mode	'T', 'K' or 'M'
Statement	'T', 'K', 'M' or 'O'.

Figure B-5  
Alpha 5

	!	"	#	\$	%	&	,	(	)	*	+	,	-	.	/
2	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>
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	â	ä	ð	ñ	ö	ã	ö	ë	ê	é	ô	ó	ï ü
7	đ	š	č	ž	đ	à	γ	ξ	σ	ψ	¥	Pt	f	█	
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E F

Printer	Designator
Receipt and Journal	'J' or 'L'
Thermal Receipt and Journal	'J' or 'L'
Thermal Receipt in Sideways mode	'J', 'L' or 'N'
Statement	'J', 'L', 'N' or 'P'.

Character Sets  
Character Sets

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Figure B-6  
Arabic 1

	!	"	£	\$	%	&	,	(	)	*	+	,	-	.	/
2	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>
3	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N
4	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	^	_
5	ؐ	ؑ	ؒ	ؓ	ؔ	ؕ	ؖ	ؗ	ؘ	ؙ	ؚ	؜	؝	؞	؟
6	ؠ	آ	أ	ؤ	إ	ئ	ا	ب	ة	ت	ث	ج	ح	خ	د
7	.	؋	،	؍	؎	؏	ؐ	ؑ	ؒ	ؓ	ؔ	ؕ	ؖ	ؗ	ؘ
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E
															F

Printer	Designator
Receipt and Journal,	'1' or '>'
Thermal Receipt and Journal	'1' or '>'
Thermal Receipt in Sideways mode	'1', '>' or 'C'
Statement	'1', '>' or 'C'.

Figure B-7  
Arabic 2

	!	"	#	\$	%	&	,	(	)	*	+	,	-	.	/
2	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>
3	?														
4	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N
5	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	^	_
6	ؠ	آ	ؤ	ئ	ب	ة	ت	خ	ذ	ز	ش	ص	ض	ط	ظ
7	ؚ	؛	؜	؝	؞	؟	ؠ	ء	آ	أ	ؤ	إ	ئ	ا	ب
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E
															F

Printer	Designator
Receipt and Journal	'2' or '?
Thermal Receipt and Journal	'2' or '?
Thermal Receipt in Sideways mode	'2', '?' or 'D'
Statement	'2', '?' or 'D'.

Character Sets  
Character Sets

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Figure B-8  
Arabic 3

2	ب	ا	أ	ء	ئ	ر	د	ز	ڭ	ج	ڦ	ڙ	ڻ	ڻ		
3	.	۱	۲	۳	۴	۰	۶	۷	۸	۹	ح	ڇ	ڇ	ڇ		
4	ڦ	ڻ	ڻ	ڻ	ڻ	ڻ	ڻ	ڻ	ڻ	ڻ	ڻ	ڻ	ڻ	ڻ		
5	ك	گ	ڪ	ل	ا	ن	ڦ	ڻ	ڻ	ڻ	ڻ	ڻ	ڻ	ڻ		
6	æ	ø	â	ä	ð	ñ	õ	ã	ö	ë	ê	é	ô	ó		
7	ځ	ڂ	ڃ	ڂ	ڏ	ڏ	ڏ	ڏ	ڏ	ڏ	ڏ	ڏ	ڏ	ڏ		
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F

Printer	Designator
Receipt and Journal	'7' or 'B'
Thermal Receipt and Journal	'7' or 'B'
Thermal Receipt in Sideways mode	'7', 'B' or 'E'
Statement	'7', 'B' or 'E'.

Figure B-9  
Arabic 4

	!	"	£	\$	%	&	,	(	)	*	+	,	-	.	/
2	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>
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
5	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^
6	'	a	b	c	d	e	f	g	h	i	j	k	l	m	n
7	p	q	r	s	t	u	v	w	x	y	z	{	:	}	~
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E
															F

Printer	Designator
Receipt and Journal	'T' or 'K'
Thermal Receipt and Journal	'T' or 'K'
Thermal Receipt in Sideways mode	'T', 'K' or 'M'
Statement	'T', 'K' or 'M'.

Character Sets  
Character Sets

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Figure B-10  
Arabic 5

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
5	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^
6	æ	ø	â	ä	ð	ñ	õ	ã	ö	ë	ê	é	ô	ó	ï
7	ÿ	š	č	ž	đ	à	γ	ξ	σ	ψ	¥	Pt	f	████	
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E
															F

Printer	Designator
Receipt and Journal	'J' or 'L'
Thermal Receipt and Journal	'J' or 'L'
Thermal Receipt in Sideways mode	'J', 'L' or 'N'
Statement	'J', 'L' or 'N'.

Figure B-11  
Customer Graphics 4

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

## Designator 9 - default.

**Note:** The row ‘2’ - ‘5’ and the column ‘0’ - ‘F’ form an index for the characters, from 20 to 5F in ASCII (hex). For the equivalent ASCII graphic character, see Appendix F, “Code Conversion and Cross Reference Table”.

Figure B-12  
Chinese 1

2	寄	妥	使	\$	奉	故	失	項	障	米	效	,	—	.	未
3	0	1	2	3	4	5	6	7	8	9	束	生	請	人	輸
4	需	提	按	密	鍵	選	之	款	入	碼	不	取	服	存	私
5	符	所	務	轉	賬	餘	票	現	金	對	查	戶	簿	透	額
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E
															F

Designator ':'.  
:

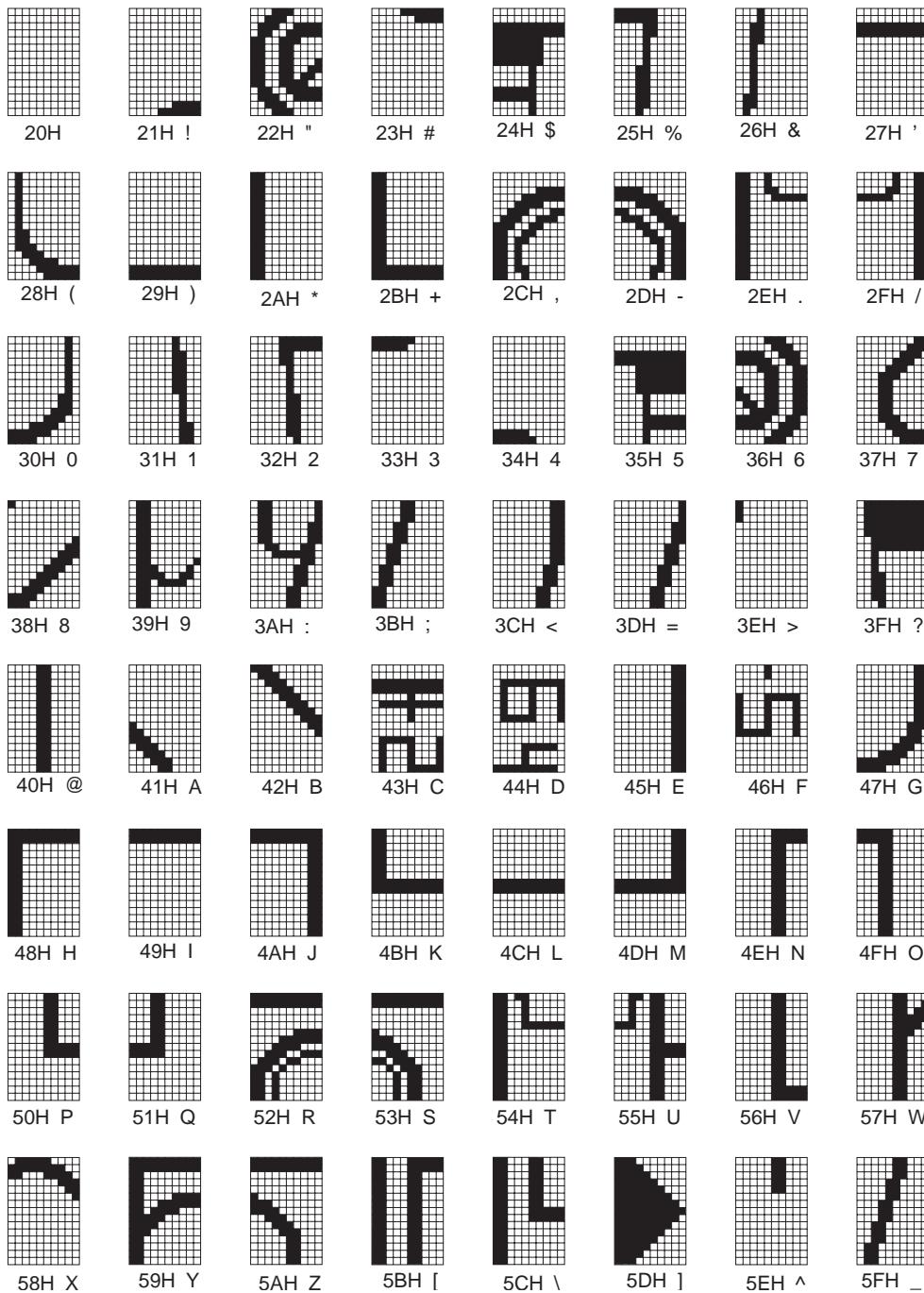
Figure B-13  
Chinese 2

2	詢	單	要	可	為	機	結	支	貴	或	核	只	能	紙	銷	誤
3	用	放	供	幣	倍	收	封	箱	應	超	數	號		套	操	及
4	限	有	錯	將	作	已	由	通	洽	接	稍	咁	本	知	換	在
5	候	過	行	書	新	中	納	期	回	與	管	進	█	另		
	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F

Designator ‘;’.

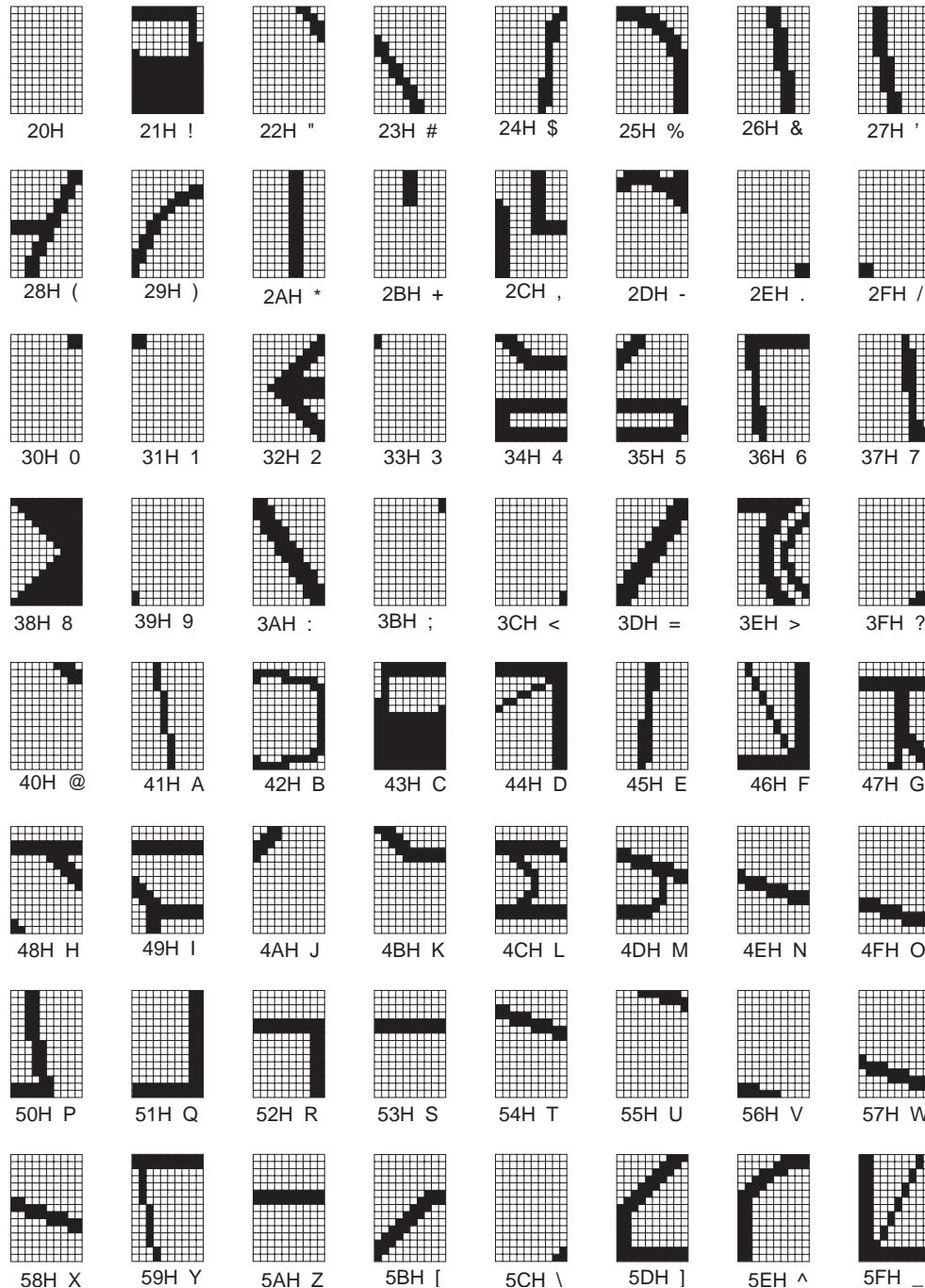
Character Sets  
Character Sets

Figure B-14  
Standard Graphics 1



Designator '3' (including Hex codes and Alpha equivalent).

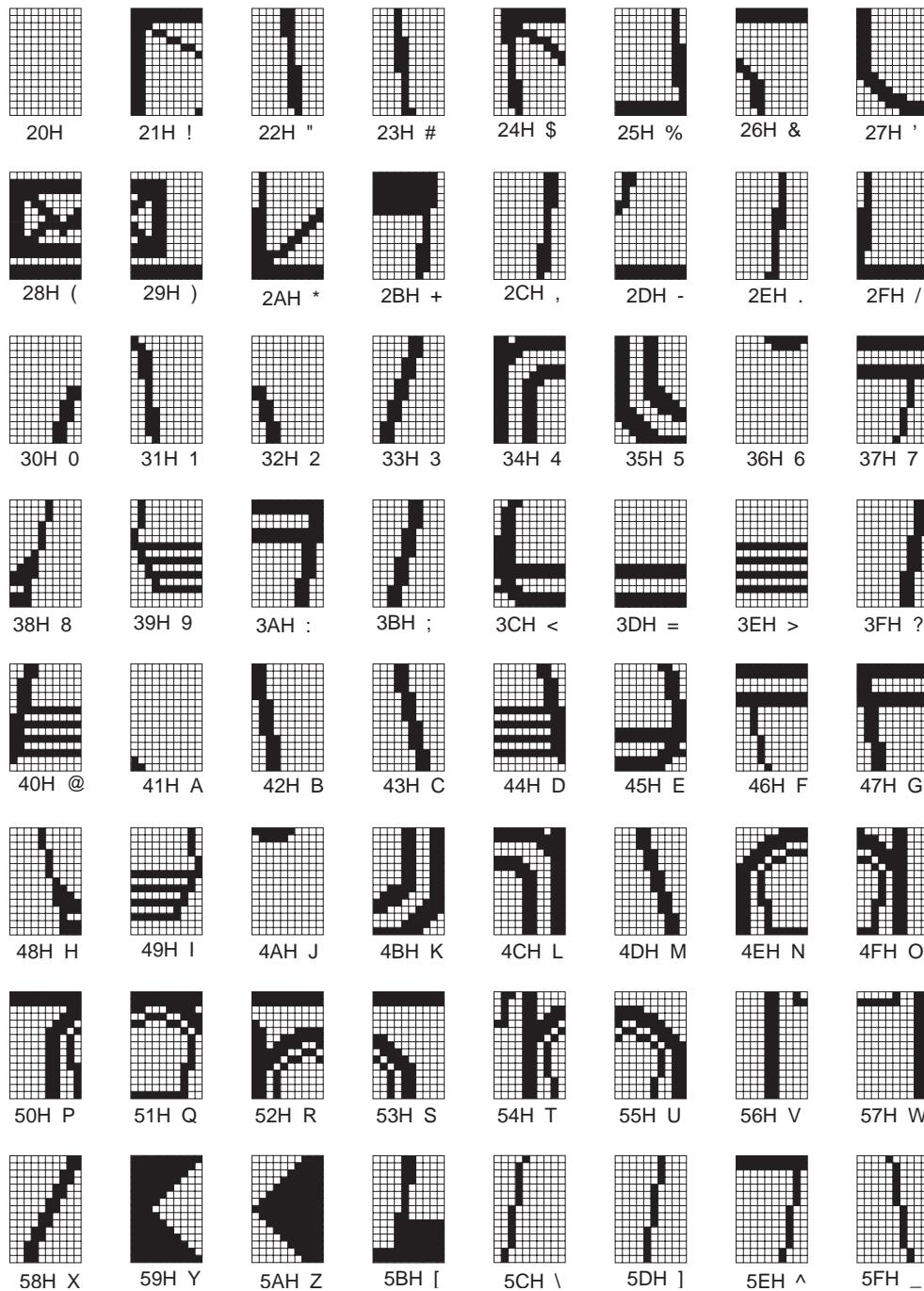
Figure B-15  
Standard Graphics 2



Designator '4' (including Hex codes and Alpha equivalent).

Character Sets  
Character Sets

Figure B-16  
Standard Graphics 3



Designator '5' (including Hex codes and Alpha equivalent).

## 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, see Chapter 2.4, must have been 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 on code pages see the “Programmer’s Manual for the 40 Column Printer”.

Figure B-17  
Code Page 437

Code Page 437

1	0	16	32	48	64	80	96	112	128	144	160	176	192	208	224	240
<b>2 A ▼ B</b>	<b>0-</b>	<b>1-</b>	<b>2-</b>	<b>3-</b>	<b>4-</b>	<b>5-</b>	<b>6-</b>	<b>7-</b>	<b>8-</b>	<b>9-</b>	<b>A-</b>	<b>B-</b>	<b>C-</b>	<b>D-</b>	<b>E-</b>	<b>F-</b>
<b>0 -0</b>			0	@	P	'	p	ç	é	á	...	„	—	—	—	α
<b>1 -1</b>			!	1	A	Q	a	q	ü	æ	í	...	—	—	—	β
<b>2 -2</b>			"	2	B	R	b	r	é	Æ	ó	...	—	—	—	≥
<b>3 -3</b>			#	3	C	S	c	s	â	ô	ú	...	—	—	—	π ≤
<b>4 -4</b>			\$	4	D	T	d	t	ä	ö	ñ	—	—	—	—	Σ ∫
<b>5 -5</b>			%	5	E	U	e	u	à	ò	ñ	—	—	—	—	σ J
<b>6 -6</b>			&	6	F	V	f	v	å	û	¤	—	—	—	—	μ ÷
<b>7 -7</b>			'	7	G	W	g	w	ç	ù	¤	—	—	—	—	τ ≈
<b>8 -8</b>			(	8	H	X	h	x	ê	ÿ	‡	—	—	—	—	Φ °
<b>9 -9</b>			)	9	I	Y	i	y	ë	Ö	—	—	—	—	—	Θ •
<b>10 -A</b>			*	:	J	Z	j	z	è	Ü	—	—	—	—	—	Ω •
<b>11 -B</b>			+	;	K	[	k	{	ï	€	½	—	—	—	—	δ ✓
<b>12 -C</b>			.	<	L	\	l	l	î	£	¼	—	—	—	—	∞ n
<b>13 -D</b>			-	=	M	]	m	}	ì	¥	·	—	—	—	—	ø 2
<b>14 -E</b>			.	>	N	^	n	~	Ä	P†	«	—	—	—	—	ε ■
<b>15 -F</b>			/	?	O	_	o	△	Å	f	»	—	—	—	—	ø ■

Figure B-18  
Code Page 850

**Code Page 850**

1	0	16	32	48	64	80	96	112	128	144	160	176	192	208	224	240
2 A vB	0-	1-	2-	3-	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
0 -0				0	@	P	`	p	Ç	É	á	í	ó	ð	Ó	-
1 -1			!	1	A	Q	a	q	ü	æ	í	é	đ	þ	±	
2 -2			"	2	B	R	b	r	é	Æ	ó	í	ê	ô	=	
3 -3			#	3	C	S	c	s	â	ô	ú	í	ë	ò	¾	
4 -4			\$	4	D	T	d	t	ä	ö	ñ	í	è	õ	¶	
5 -5			%	5	E	U	e	u	à	ò	ñ	á	í	ó	§	
6 -6			&	6	F	V	f	v	å	û	ª	â	ã	í	µ	÷
7 -7			'	7	G	W	g	w	ç	ù	º	À	Ã	Î	þ	
8 -8			(	8	H	X	h	x	ê	ÿ	¸	©	ł	ł	®	
9 -9			)	9	I	Y	i	y	ë	Ö	®	ł	ł	ú		
10 -A			*	:	J	Z	j	z	è	Ü	–	ł	ł	ł	û	•
11 -B			+	;	K	[	k	{	í	ø	½	ł	ł	ł	ù	ı
12 -C			,	<	L	\	l		î	£	¼	ł	ł	ł	ý	³
13 -D			-	=	M	]	m	}	ì	Ø	;	ç	ç	ç	ý	²
14 -E			.	>	N	^	n	~	Ä	X	«	¥	⌐	⌐	■	
15 -F			/	?	O	_	o	△	Å	f	»	⌐	⌐	⌐		

Figure B-19  
Code Page 851

**Code Page 851**

	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0		0	@	P	`	p	Ç	'I	ï	¶	Ł	T	ζ	-
1	!	1	A	Q	a	q	ü		í	¶	ł	Y	η	±
2	"	2	B	R	b	r	é	'O	ó	¶	τ	Φ	θ	υ
3	#	3	C	S	c	s	â	ô	ú	l	ł	X	ι	φ
4	\$	4	D	T	d	t	ä	ö	A	†	-	Ψ	κ	χ
5	%	5	E	U	e	u	à	'Y	B	K	†	Ω	λ	§
6	&	6	F	V	f	v	'A	û	Γ	Λ	Π	α	μ	ψ
7	'	7	G	W	g	w	ç	ù	Δ	M	P	β	v	
8	(	8	H	X	h	x	ê	'Ω	E	N	Ł	γ	ξ	º
9	)	9	I	Y	i	y	ë	Ö	Z	ł	ł	ł	o	
A	*	:	J	Z	j	z	è	Ü	H	ł	ł	ł	π	ω
B	+	;	K	[	k	{	ï	á	½	ł	ł	ł	ρ	ü
C	,	<	L	\	l		î	£	Θ	ł	ł	ł	σ	ύ
D	-	=	M	]	m	}	'E	é	I	Ξ	=	δ	ς	ώ
E	.	>	N	^	n	-	Ä	ń	«	O	ł	ε	τ	■
F	/	?	O	_	o	△	'H	í	»	ł	Σ	ł		

Figure B-20  
Code Page 852

**Code Page 852**

<b>1</b>	0	16	32	48	64	80	96	112	128	144	160	176	192	208	224	240	
	2 A ↓B	0-	1-	2-	3-	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
<b>0 -0</b>				0	@	P	`	p	Ç	É	á	„	—	d	Ó	-	
<b>1 -1</b>			!	1	A	Q	a	q	ü	Í	í	„	—	Đ	ß		
<b>2 -2</b>			~	2	B	R	b	r	é	í	ó	„	—	Đ	Ô		
<b>3 -3</b>			#	3	C	S	c	s	â	ô	ú		—	Ë	Ñ		
<b>4 -4</b>			\$	4	D	T	d	t	ä	ö	À	—	—	đ	ń		
<b>5 -5</b>			%	5	E	U	e	u	ú	Ł	a	Á	+	Ñ	ñ	§	
<b>6 -6</b>			&	6	F	V	f	v	ć	ł	Ž	Â	Ā	Í	ſ	÷	
<b>7 -7</b>			'	7	G	W	g	w	ç	Ś	ż	Ę	ā	Î	ś		
<b>8 -8</b>			(	8	H	X	h	x	ł	ś	Ę	S	—	ě	Ŕ	°	
<b>9 -9</b>			)	9	I	Y	i	y	ë	Ö	ę	—	—	—	Ú		
<b>10 -A</b>		*	:	J	Z	j	z	ő	Ü	—	—	—	—	—	ř		
<b>11 -B</b>		+	;	K	[	k	{	ő	Ł	í	—	—	—	—	—	ú	
<b>12 -C</b>		,	<	L	\	l	l	í	ł	ć	—	—	—	—	—	ŕ	
<b>13 -D</b>		-	=	M	]	m	}	í	Ł	ş	ż	—	—	—	—	ý	
<b>14 -E</b>		.	>	N	^	n	~	ä	x	«	ż	—	—	—	—	í	
<b>15 -F</b>		/	?	O	_	o	^	ć	»	—	—	—	—	—	—		

Figure B-21  
Code Page 855

**Code Page 855**

	2	3	4	5	6	7	8	9	А	В	С	Д	Е	Ф
0		0	@	P	`	р	ѣ	љ	а	҆	л	ј	-	
1	!	1	A	Q	а	q	Б	Љ	А	҆	Л	р	ы	
2	"	2	B	R	б	г	ѓ	њ	б	҆	т	м	Р	ы
3	#	3	C	S	с	с	Ѓ	Њ	Б	҆	ମ	с	з	
4	\$	4	D	T	d	t	ё	ќ	ци	҆	-	н	С	з
5	%	5	E	U	е	у	Ё	Ћ	Ц	х	ଫ	Н	т	ш
6	&	6	F	V	f	v	€	Ќ	д	Х	କ	о	Т	Ш
7	'	7	G	W	g	w	Ѐ	Ќ	д	и	କ	О	у	э
8	(	8	H	X	h	x	ѕ	ѹ	е	И	ି	ପ	у	Э
9	)	9	I	Y	i	y	Ѕ	ѹ	Е	ି	ଗ	ି	ж	щ
А	*	:	J	Z	j	z	і	и	ଫ	ି	ଗ	ଜ	ଶ	
В	+	;	K	[	k	{	І	Ц	ଫ	ି	ି	ି	в	ч
С	,	<	L	\	l		ї	ю	ଗ	ୟ	ି	ି	в	ч
Д	-	=	M	]	m	}	Ї	Ю	ଗ	ି	ି	ି	п	ь
Е	.	>	N	^	n	-	ј	ъ	«	ି	ି	ି	я	ь
Ф	/	?	O	_	o		Ј	Ђ	»	ି	ି	ି		

Figure B-22  
Code Page 857

**Code Page 857**

1		0	16	32	48	64	80	96	112	128	144	160	176	192	208	224	240
2	A ▼B	0-	1-	2-	3-	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
0	-0				0	@	P	`	p	Ç	É	á	„	—	º	Ó	—
1	-1			!	1	A	Q	a	q	ü	æ	í	„	—	ª	ß	—
2	-2			”	2	B	R	b	r	é	Æ	ó	„	—	Ê	Ô	—
3	-3			#	3	C	S	c	s	â	ô	ú	—	—	È	Ò	¼
4	-4			\$	4	D	T	d	t	ä	ö	ñ	—	—	È	ò	¶
5	-5			%	5	E	U	e	u	à	ò	Ñ	Á	—	—	Õ	§
6	-6			&	6	F	V	f	v	å	û	ă	Á	ã	Í	µ	÷
7	-7			'	7	G	W	g	w	ç	ù	ă	À	Ã	Î	—	
8	-8			(	8	H	X	h	x	ê	í	i	©	—	Í	×	°
9	-9			)	9	I	Y	i	y	ë	Ö	®	—	—	—	Ú	
10	-A			*	:	J	Z	j	z	è	Ü	—	—	—	—	—	Û
11	-B			+	;	K	[	k	{	í	ø	½	—	—	—	—	Û
12	-C			,	<	L	\	l	l	î	£	¼	—	—	—	—	ì
13	-D			-	=	M	]	m	}	ı	Ø	i	¢	=	ı	ÿ	²
14	-E			.	>	N	^	n	~	Ä	§	«	¥	—	—	—	■
15	-F			/	?	O	_	o	△	Å	ş	»	—	—	—	—	

Figure B-23  
Code Page 860

### Code Page 860

1	0	16	32	48	64	80	96	112	128	144	160	176	192	208	224	240
2	3	4	5	6	7	8	9	A	B	C	D	E	F			
0 -0			0 @	P `	p Ç	É á	„	„	„	„	„	„	„	„	„	„
1 -1		!	1 A	Q a	q ü	À í	„	„	„	„	„	„	„	„	„	„
2 -2		”	2 B	R b	r é	È ó	„	„	„	„	„	„	„	„	„	„
3 -3		#	3 C	S c	s â ô	ú	„	„	„	„	„	„	„	„	„	≤
4 -4		\$	4 D	T d	t ã õ	ñ	„	—	—	—	—	—	—	—	—	Σ ſ
5 -5		%	5 E	U e	u à ò	Ñ	„	+	+	+	+	+	+	+	+	σ J
6 -6		&	6 F	V f	v Á Ú	º	„	„	„	„	„	„	„	„	„	μ ÷
7 -7		'	7 G	W g	w ç ù	º	„	„	„	„	„	„	„	„	„	τ ≈
8 -8		(	8 H	X h	x ê ï	í	„	„	„	„	„	„	„	„	„	Φ °
9 -9		)	9 I	Y i	y È Õ	ò	„	„	„	„	„	„	„	„	„	Θ •
10 -A		*	:	J Z	j z	è Ü	„									Ω •
11 -B		+	;	K [	k {	í ¢	½	„	„	„	„	„	„	„	„	δ √
12 -C		,	<	L \	I l	Ô £	¼	„	„	„	„	„	„	„	„	∞ n
13 -D		-	=	M ]	m }	ì Ù i	„	„	„	„	„	„	„	„	„	φ ²
14 -E		.	>	N ^	n ~	Ã P†	«	„	„	„	„	„	„	„	„	ε ■
15 -F		/	?	O _	o △	Â Ó	»	„	„	„	„	„	„	„	„	□

Figure B-24  
Code Page 861

**Code Page 861**

1	0	16	32	48	64	80	96	112	128	144	160	176	192	208	224	240	
	2 A ↓B	0-	1-	2-	3-	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
0 -0				0	@	P	`	p	ç	É	á	...	—	—	α	≡	
1 -1			!	1	A	Q	a	q	ü	æ	í	...	=	=	β	≥	
2 -2			”	2	B	R	b	r	é	Æ	ó	...	—	—	Γ	≥	
3 -3			#	3	C	S	c	s	â	ô	ú	!	—	—	π	≤	
4 -4			\$	4	D	T	d	t	ä	ö	Á	—	—	=	Σ	∫	
5 -5			%	5	E	U	e	u	à	þ	í	=	+	+	=	σ	J
6 -6			&	6	F	V	f	v	å	û	Ó			-	μ	÷	
7 -7			'	7	G	W	g	w	ç	Ý	Ú			-	τ	≈	
8 -8			(	8	H	X	h	x	ê	ý	í			=	Φ	°	
9 -9			)	9	I	Y	i	y	ë	Ö	—			-	Θ	•	
10 -A			*	:	J	Z	j	z	è	Ü	—			-	Ω	•	
11 -B			+	:	K	[	k	{	Đ	ø	½			█	δ	√	
12 -C			,	<	L	\	l	l	ð	£	¼			█	∞	n	
13 -D			-	=	M	]	m	}	Þ	Ø	i			█	∅	²	
14 -E			.	>	N	^	n	~	Ä	Pts	«			█	ε	█	
15 -F			/	?	O	_	o	△	Å	f	»			█	□	□	

Figure B-25  
Code Page 862

**Code Page 862**

1	0	16	32	48	64	80	96	112	128	144	160	176	192	208	224	240	
	2 <sup>A</sup> ▼B	0-	1-	2-	3-	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
<b>0 -0</b>				0	@	P	'	p	N	J	á	...	—	—	α	≡	
<b>1 -1</b>			!	1	A	Q	a	q	ב	ס	í	...	—	—	β	±	
<b>2 -2</b>			"	2	B	R	b	r	ג	י	ó	...	—	—	Γ	≤	
<b>3 -3</b>			#	3	C	S	c	s	ד	ת	ú	...	—	—	π	≤	
<b>4 -4</b>			\$	4	D	T	d	t	ה	ט	ñ	—	—	—	Σ	/	
<b>5 -5</b>			%	5	E	U	e	u	ג	׮	ñ	=	+	—	σ	ʃ	
<b>6 -6</b>			&	6	F	V	f	v	׮	װ	ױ	—	—	—	μ	÷	
<b>7 -7</b>			'	7	G	W	g	w	ג	׮	ױ	—	—	—	τ	≈	
<b>8 -8</b>			(	8	H	X	h	x	׮	װ	ױ	=	—	—	Φ	◦	
<b>9 -9</b>			)	9	I	Y	i	y	׮	װ	ױ	—	—	—	Θ	•	
<b>10 -A</b>			*	:	J	Z	j	z	׮	װ	ױ	—	—	—	Ω	•	
<b>11 -B</b>			+	;	K	[	k	{	׮	װ	ױ	—	—	—	δ	√	
<b>12 -C</b>			,	<	L	\	l	l	׮	װ	ױ	—	—	—	∞	n	
<b>13 -D</b>			-	=	M	]	m	)	׮	װ	ױ	—	—	—	ø	²	
<b>14 -E</b>			.	>	N	^	n	~	׮	װ	ױ	«	»	—	ε	■	
<b>15 -F</b>			/	?	O	_	o	△	׮	װ	ױ	—	—	—	□	□	

Figure B-26  
Code Page 863

**Code Page 863**

1	0	16	32	48	64	80	96	112	128	144	160	176	192	208	224	240
2 A +B	0-	1-	2-	3-	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
0 -0				0	@	P	'	p	Ç	É	I	...	-	-	α	≡
1 -1			!	1	A	Q	a	q	ü	È		...	=	β	±	
2 -2			"	2	B	R	b	r	é	Ê	ó	...	-	-	Γ	≥
3 -3			#	3	C	S	c	s	â	ô	ú	...	-	-	π	≤
4 -4			\$	4	D	T	d	t	Â	Ë		+	-	=	Σ	f
5 -5			%	5	E	U	e	u	à	Í			-	=	σ	J
6 -6			&	6	F	V	f	v	¶	û			-	μ	÷	
7 -7			'	7	G	W	g	w	ç	ù				-	τ	≈
8 -8			(	8	H	X	h	x	ê	ꝝ	î		=	=	Φ	◦
9 -9			)	9	I	Y	i	y	ë	Ô	‑		=	-	Θ	•
10 -A		*	:	J	Z	j	z	è	Ü	‑		=	-	Ω	•	
11 -B		+	;	K	[	k	{	í	¢	½	¶	=	■	δ	√	
12 -C		,	<	L	\	l	l	î	£	¼	¶	=	■	∞	n	
13 -D		-	=	M	]	m	}	=	Ù	¾	¶	=	■	ø	²	
14 -E		.	>	N	^	n	~	À	Û	«	¶	=	■	ε	■	
15 -F		/	?	O	_	o	△	§	f	»	‑	=	■	□		

Figure B-27  
Code Page 864

**Code Page 864**

1	0	16	32	48	64	80	96	112	128	144	160	176	192	208	224	240	
	2 A ↓ B	0-	1-	2-	3-	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
<b>0 -0</b>			0	@	P	'	p	°	ß		•	¢	ذ	-			
<b>1 -1</b>			!	1	A	Q	a	q	•	∞	-	۱	ؑ	ؑ	ؑ	ؑ	
<b>2 -2</b>			"	2	B	R	b	r	•	ø		۲	ؒ	ؒ	ؒ	ؒ	
<b>3 -3</b>			#	3	C	S	c	s	√	±	£	۳	ؔ	ؔ	ؔ	ؔ	
<b>4 -4</b>			\$	4	D	T	d	t	⋮	½	؜	؜	؜	؜	؜	؜	
<b>5 -5</b>			%	5	E	U	e	u	—	¼	۰	ؐ	ؐ	ؐ	ؐ	ؐ	
<b>6 -6</b>			&	6	F	V	f	v	+	≈	؇	؇	؇	؇	؇	؇	
<b>7 -7</b>			'	7	G	W	g	w	+	«	؇	؇	؇	؇	؇	؇	
<b>8 -8</b>			(	8	H	X	h	x	-	»	؇	؇	؇	؇	؇	؇	
<b>9 -9</b>			)	9	I	Y	i	y	-		؇	؇	؇	؇	؇	؇	
<b>10 -A</b>	*	:	J	Z	j	z	-	-	-	؇	؇	؇	؇	؇	؇	؇	
<b>11 -B</b>	+	;	K	[	k	{	-	-	-	؇	؇	؇	؇	؇	؇	؇	
<b>12 -C</b>	.	<	L	\	l	l	-	-	-	,	؇	؇	؇	؇	؇	؇	
<b>13 -D</b>	-	=	M	]	m	}	-	-	-	؇	؇	؇	؇	؇	؇	؇	
<b>14 -E</b>	.	>	N	^	n	~	-	-	-	؇	؇	؇	؇	؇	؇	؇	
<b>15 -F</b>	/	?	O	_	o	□	-	-	-	؇	؇	؇	؇	؇	؇	؇	

Figure B-28  
Code Page 866

**Code Page 866**

	2	3	4	5	6	7	8	9	А	В	С	Д	Е	Ф
0	0	@	Р	`	р	А	Р	а	҃	҄	҅	҆	҈	҉
1	!	1	А	Q	а	q	Б	С	б	҃	҄	҅	с	ё
2	"	2	В	R	в	г	В	Т	в	҃	҄	҅	т	Ҽ
3	#	3	C	S	с	s	Г	У	г	҄	҅	҆	у	҈
4	\$	4	D	T	d	t	Д	Ф	д	҄	҆	҈	ф	Ӣ
5	%	5	E	U	е	и	Е	Х	е	҄	҆	҈	х	Ӯ
6	&	6	F	V	f	v	Ж	Ц	ж	҄	҆	҈	ц	Ӵ
7	'	7	G	W	g	w	З	Ч	з	҄	҆	҈	ч	ӵ
8	(	8	H	X	h	x	И	Ш	и	҄	҆	҈	ш	◦
9	)	9	I	Y	i	y	Й	Щ	й	҄	҆	҈	щ	•
A	*	:	J	Z	j	z	К	ъ	к	҄	҆	҈	ъ	.
B	+	;	K	[	k	{	Л	ы	л	҄	҆	҈	ы	√
C	,	<	L	\	l		М	ь	м	҄	҆	҈	ь	№
D	-	=	M	]	m	}	Н	Э	н	҄	҆	҈	э	¤
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F	/	?	O	_	o		П	Я	п	҄	҆	҈	я	



Appendix C  
**Graphics Pictures**

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Overview

C-1

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Graphics Pictures

C-2

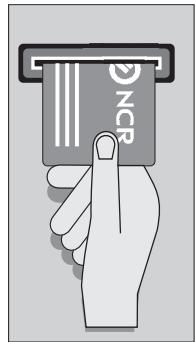
[Table of Contents](#)  
[Graphics Pictures](#)

## Overview

In this appendix we show the pre-defined graphics pictures provided with NDC+.

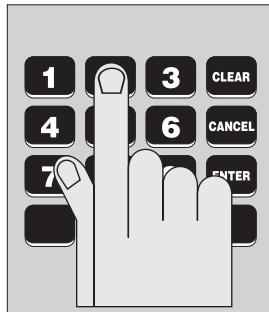
# Graphics Pictures

Figure C-1 Graphics Pictures



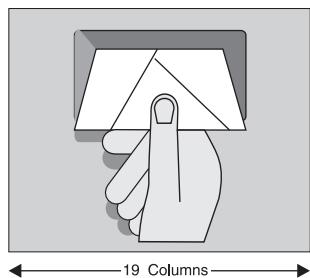
Screen 'G00' Insert Card (CARDENT.PCC)

12 Rows



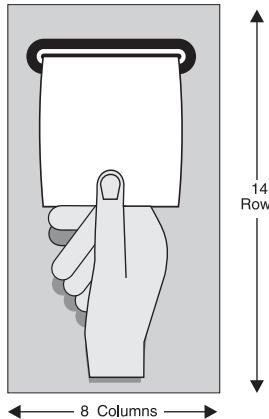
Screen 'G01' Press Key (KEYBOARD.PCC)

14 Rows



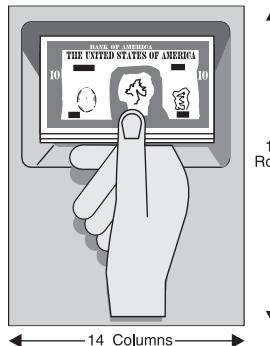
Screen 'G03' Make a Deposit (DEP85.PCC)

12 Rows



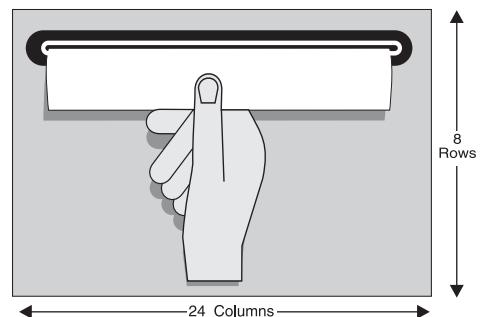
Screen 'G04' Take Receipt (RECEIPT.PCC)

14 Rows



Screen 'G05' Take Cash (MONEY.PCC)

11 Rows



Screen 'G06' Take Statement (ST85.PCC)

8 Rows

## Appendix D

# Quick Reference To Message Types

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Overview	D-1
Quick Reference To Message Types	D-2
Transaction Request	D-2
Unsolicited Status Messages	D-7
Solicited Status Messages	D-9
TM-Alert Messages	D-10
Software Management Installation Status Messages	D-11
Exit To Host Message	D-11
Upload EJ Data Message	D-11
Terminal Commands	D-11
Customisation Data Commands	D-13
Transaction Reply	D-15
Host To Exit Message	D-19
Acknowledge EJ Upload Block Command	D-19
Acknowledge and Stop Command	D-19
EJ Options and Timers Command	D-20

Table of Contents

**Quick Reference To Message Types**

## Overview

This appendix is for you, if you are a programmer designing the Central control application. We provide 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 to identify quickly the messages that pass to and from Central.

We do not include information on the protocol-dependent headers and trailers in this appendix.

## 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
3	-	~ -	~~	...	TM-Alert	Central
4	1	~ 000	~	...	SM Installation Status	Central
5	1	~ 000	~	...	Exit To Host	Central
6	1	~ ~	~~	...	Upload EJ Data	Central
1	-	~ -	~~	...	Terminal Commands	Terminal
3	-	~ -	~~	...	Customisation Data Commands	Terminal
4	-	~ 000	~	...	Transaction Reply	Terminal
5	-	~ -	~~	...	TM-Alert	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

Transaction Request		11-000~~~...	
Field	Description	Length	Page
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	3.1-1
g	Message co-ordination number	1	3.1-2

---

**Transaction Request**                                   **11-000~~~...**

<b>Field</b>	<b>Description</b>	<b>Length</b>	<b>Page</b>
FS	Field separator	1	3.1-2
h	Track 2 data	Var (39)	3.1-2
FS	Field separator	1	3.1-2
i	Track 3 data	Var (106)	3.1-2
FS	Field separator	1	3.1-2
j	Operation code data	8	3.1-2
FS	Field separator	1	3.1-2
k	Amount entered	8 or 12	3.1-2
FS	Field separator	1	3.1-2
l	PIN buffer A	Var (32)	3.1-3
FS	Field separator	1	3.1-3
m	General purpose buffer B	Var (32)	3.1-3
FS	Field separator	1	3.1-3
n	General purpose buffer C	Var (32)	3.1-3
FS	Field separator	1	3.1-3
o	Track 1 identifier	1	3.1-3
p	Track 1 data	Var (78)	3.1-3
FS	Field separator	1	3.1-3
q	Transaction status data identifier	1	3.1-3
r	Last transaction status data	Var (50)	3.1-3
FS	Field separator	1	3.1-4
aa1	Primary code line data ID 'A'	1	3.1-4
aa2	Primary code line data	Null	3.1-4
FS	Field separator	1	3.1-4
ab1	Secondary code line data ID 'B'	1	3.1-4
ab2	Secondary code line data	Null	3.1-4
FS	Field separator	1	3.1-4
ac1	CIM86 data identifier	1	3.1-5
ac2	CIM86 code and data	1 or 17	3.1-5

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Quick Reference To Message Types

Quick Reference To Message Types

Transaction Request		11-000~~~...	
Field	Description	Length	Page
FS	Field separator	1	3.1-5
ad1	Read zone 1 data identifier	1	3.1-5
ad2	Read zone 1 status	1	3.1-5
ad3	Read zone 1 data	Var (100)	3.1-6
FS	Field separator	1	3.1-6
ae1	Read zone 2 data identifier	1	3.1-6
ae2	Read zone 2 status	1	3.1-6
ae3	Read zone 2 data	Var (100)	3.1-6
FS	Field separator	1	3.1-6
af1	Read zone 3 data identifier	1	3.1-6
af2	Read zone 3 status	1	3.1-6
af3	Read zone 3 data	Var (100)	3.1-6
FS	Field separator	1	3.1-6
ag1	Read zone 4 data identifier	1	3.1-6
ag2	Read zone 4 status	1	3.1-6
ag3	Read zone 4 data	Var (100)	3.1-6
FS	Field separator	1	3.1-6
ah1	Read zone 5 data identifier	1	3.1-7
ah2	Read zone 5 status	1	3.1-7
ah3	Read zone 5 data	Var (100)	3.1-7
FS	Field separator	1	3.1-7
ai1	Read zone 6 data identifier	1	3.1-7
ai2	Read zone 6 status	1	3.1-7
ai3	Read zone 6 data	Var (100)	3.1-7
FS	Field separator	1	3.1-7
aj1	Read zone 7 data identifier	1	3.1-7
aj2	Read zone 7 status	1	3.1-7
aj3	Read zone 7 data	Var (100)	3.1-7
FS	Field separator	1	3.1-7

Transaction Request		11~000~~~...	
Field	Description	Length	Page
ak1	Read zone 8 data identifier	1	3.1-7
ak2	Read zone 8 status	1	3.1-7
ak3	Read zone 8 data	Var (100)	3.1-7
FS	Field separator	1	3.1-7
al1	Read zone 9 data identifier	1	3.1-7
al2	Read zone 9 status	1	3.1-7
al3	Read zone 9 data	Var (100)	3.1-7
FS	Field separator	1	3.1-8
am1	Read zone 10 data identifier	1	3.1-8
am2	Read zone 10 status	1	3.1-8
am3	Read zone 10 data	Var (100)	3.1-8
FS	Field separator	1	3.1-8
ar1	Document data identifier	1	3.1-8
ar2	Magnetic flux detected	1	3.1-8
ar3	Document class name	Var (16)	3.1-9
GS	Group separator	1	3.1-9
ar4	Document name	Var (16)	3.1-9
FS	Field separator	1	3.1-9
as1	Courtesy amount data identifier	1	3.1-10
as2	CAV result	1	3.1-10
as3	CAV auxiliary status	4	3.1-10
as4	Amount read	Var (13)	3.1-11
as5	Difference sign	1	3.1-11
as6	Difference magnitude	Var (13)	3.1-11
FS	Field separator	1	3.1-11
at1	Zone verification data identifier	1	3.1-11
at2	Zone verification results	Var (10)	3.1-11
FS	Field separator	1	3.1-13
av1	CSP Data ID 'U'	1	3.1-12

Transaction Request		11-000~~~...	
Field	Description	Length	Page
av2	CSP Data	Var (16)	3.1-12
FS	Field Separator	1	3.1-12
aw1	Confirmation CSP Data ID 'V'	1	3.1-12
aw2	Confirmation CSP Data	Var (16)	3.1-12
FS	Field Separator	1	3.1-12
ax1	VC data ID 'W'	1	3.1-12
ax2	VC data	1	3.1-12
FS	Field Separator	1	3.1-12
ay1	VC data ID 'X'	1	3.1-12
ay2	VC data	1	3.1-12
FS	Field Separator	1	3.1-12
az1	VC data ID 'Y'	1	3.1-12
az2	VC data	1	3.1-12
FS	Field Separator	1	3.1-12
ba1	VC data ID 'Z'	1	3.1-12
ba2	VC data	1	3.1-12
FS	Field Separator	1	3.1-12
bb1	VC data ID '['	1	3.1-12
bb2	VC data ID '	1	3.1-12
FS	Field Separator	1	3.1-12
bc1	VC data ID '\\'	1	3.1-13
bc2	VC data	1	3.1-13
w	Optional data fields (for future expansion)	1	3.1-13
	Data	Var	3.1-13
FS	Field separator	1	3.1-13
x	Message Authentication Code	8	3.1-13

## Unsolicited Status Messages

Unsolicited Status Messages		12~000~~(e1)...	
Field	Description	Length	Page
e1	Status identifier		1
<b>Native Mode</b>			
	A - Time-of-day clock		3.5-2
	B - Power failure		3.5-2
	D - Card reader/writer		3.5-3
	E - Cash handler		3.5-4
	F - Depository		3.5-8
	F - DP-ATM envelope depository		3.5-9
	G - Receipt printer		3.5-10
	H - Journal printer		3.5-11
	H - Electronic journal printer		3.5-13
	K - Night safe depository		3.5-14
	L - Encryptor		3.5-15
	M - Camera		3.5-16
	N - Door access		3.5-16
	P - Sensors		3.5-17
	Q - Touch screen keyboard		3.5-19
	R - Supervisor keys		3.5-20
	V - Statement printer		3.5-21
	Y - Coin dispenser		3.5-23
	\ - Envelope dispenser		3.5-26
	] - Document processing module		3.5-27
	a - Digital audio service		3.5-35
<b>Diebold Mode</b>			
	1 - Power failure		3.6-1
	2 - Alarm		3.6-16
	3 - Supervisor/supply switch		3.6-17

Quick Reference To Message Types

Quick Reference To Message Types

Unsolicited Status Messages		12-000~~(e1)...
Field	Description	Length
4	- Journal or acknowledgment printer	3.6-2
5	- Card reader	3.6-14
6	- Time-of-day clock/encryptor/camera	3.6-21
7	- Card writer	3.6-15
C	- Tamper indication	3.6-19
D	- Door access	3.6-20
J	- Vandal guard	3.6-25
P	- Statement printer	3.6-22

## Solicited Status Messages

Solicited Status Messages		22-000~~f~(g1)...	
Field	Description	Length	Page
f	Status descriptor	1	3.2-2
g	Status information	1	3.2-3
<hr/>			
f	g1	Description	Page
8	Device fault		3.2-2
	Native Mode		3.5-1
	D Card reader/writer		3.5-3
	E Cash handler		3.5-5
	F Depository		3.5-8
	F DP-ATM envelope depository		3.5-9
	K Night safe depository		3.5-14
	V Statement printer		3.5-21
	Y Coin dispenser		3.5-23
	] Document processing module		3.5-27
 <b>Diebold Mode</b>			
2	Journal or acknowledgment printer		3.6-2
3	Night safe depository		3.6-19
4	Cash handler (910/920)		3.6-4
6	Depository (910/920)		3.6-11
8	Cash handler (911/921)		3.6-8
B	911 hardware configuration		3.6-25
O	Reserved		
P	Statement printer		3.6-22
:	Depository (911/921)		3.6-13
<	Configuration ID		3.6-18
9	Ready		3.2-2
A	Command reject		3.2-2

Quick Reference To Message Types  
**Quick Reference To Message Types**

f	g1	Description	Page
B		Ready (transaction reply)	3.2-2
C		Specific command reject	3.2-3
	1	MAC failure	3.2-4
	2	Time variant number failure	3.2-4
	3	Security terminal number mismatch	3.2-4
	A	Message format error	3.2-4
	B	Field value error	3.2-4
	C	Illegal message type	3.2-5
	D	Hardware failure	3.2-6
	E	Not supported	3.2-6
F		Terminal state	3.2-6
	1	Send configuration information	3.2-7
	2	Send supply counters	3.2-16
	3	Send tally information	3.2-20
	4	Send error log information	3.2-21
	5	Send date/time information	3.2-23
	6	Send configuration ID	3.2-24
	F	EKC retrieve hallmark key	3.2-24
	H	Hardware configuration data	3.2-25
	I	Supplies data	3.2-27
	J	Fitness data	3.2-28
	K	Tamper and sensor status data	3.2-30
	L	Software ID and release number data	3.2-31
	M	Local configuration option digits	3.2-32

## TM-Alert Messages

TM-Alert Messages			5...
Field	Description	Length	Page
c	TM-Alert Message	Var. See Note.	-

**Note:** This length is variable and is further described in the *TM-Alert Reference Manual*.

## Software Management Installation Status Messages

Software Management Installation Status Messages		41~...~e
Field	Description	Length
e	SM Installation Activity	1

## Exit To Host Message

Exit To Host Messages		51~000~...
Field	Description	Length
f	Exit Supplied Data	Var

## 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

## Terminal Commands

Terminal Commands		1~~~fg
Field	Description	Length
f	Command code	1
g	Command modifier	1

Quick Reference To Message Types  
**Quick Reference To Message Types**

f	g	Description	Page
1		Go in-service	4.1-2
2		Go out-of-service	4.1-2
	0	Standard out-of-service screen displayed	4.1-5
	1	'Temporary' out-of-service screen displayed	4.1-5
3		Send configuration ID	4.1-1
4		Send supply counters	4.1-1
5		Send tally information	4.1-4
	A	Processor and system	4.1-3
	B	High order communications	4.1-3
	C	System disk	4.1-3
	D	Card reader/writer	4.1-3
	E	Cash handler	4.1-3
	F	Depository	4.1-3
	G	Receipt printer	4.1-3
	H	Journal printer	4.1-3
	I	Reserved	4.1-3
	J	Reserved	4.1-3
	K	Night safe	4.1-4
	L	Encryptor	4.1-4
	M	Camera	4.1-4
	N	Door access	4.1-4
	O	Off-line disk	4.1-4
	V	Statement printer	4.1-4
	Y	CDM	4.1-4
	\	Envelope dispenser	4.1-4
	J	DPM	4.1-4
6		Send error log information	4.1-1
	A	Processor and system	4.1-4
	B	High order communications	4.1-4

f	g	Description	Page
C		SST devices	4.1-4
7		Send configuration information	4.1-1
0		Send configuration information	4.1-4
1		Send hardware information only	4.1-4
2		Send supplies data only	4.1-4
3		Send fitness data only	4.1-4
4		Send tamper and sensor status data only	4.1-4
5		Send software ID and release number data only	4.1-4
6		Send enhanced configuration data	4.1-4
7		Send local configuration option digits	4.1-4
8		Send date and time information	4.1-3
9		Reserved	4.1-3
:		Reserved	4.1-3
:		Reserved	4.1-3
=		EKC retrieve hallmark key	4.1-3
<		Reserved	4.1-3
>		Enable FREE JDATA	4.1-3
?		Enable image dumping	4.1-3
0		Do not allow access to 'Dump Images'	4.1-5
1		Allow access to 'Dump Images'	4.1-5

## Customisation Data Commands

Customisation Data Commands		3---fg	
Field	Description	Length	Page
f	Message sub-class	1	4.2-1
g	Message identifier	1	4.2-1

<b>f</b>	<b>g</b>	<b>Description</b>	<b>Page</b>
1		Customisation data	4.2-1
	1	Screen and/or keyboard data load	4.2-4
	2	State tables load	4.2-2
	3	Configuration parameters load	4.2-8
	4	Diebold PIN information load	4.2-30
	5	FIT data load	4.2-26
	6	Configuration ID number load	4.2-29
	A	Enhanced configuration parameters load	4.2-16
	B	MAC field selection load	4.2-31
	C	Date and time load	4.2-37
	F	Initialise EKC	4.2-41
	G	Override reserved screens command	4.2-43
2		Interactive transaction response	4.4-33
	0	Do not display cardholder keyboard entry	4.4-34
	1	Display cardholder keyboard entry	4.4-34
	2	Display '*' for cardholder keyboard entry	4.4-34
3		Encryption key load	4.2-38
	1	Decipher new master key with current master key	4.2-39
	2	Decipher new communications key with current master key	4.2-39
	3	Decipher new communications key with current communications key	4.2-39
	4	Use locally-entered communications key ('B' key) as current MAC key	4.2-39
	5	Decipher new MAC key with current master key	4.2-39
	6	Decipher new MAC key with current communications key	4.2-39
	7	Use locally-entered communications key ('B' key) as current MAC key	4.2-39
	8	Decipher new VISA master key with current VISA master key	4.2-39
	9	Key data is new VISA key table	4.2-39

## Transaction Reply

Transaction Reply		4~000~...	
Field	Description	Length	Page
e	Message sequence number	3 or 8	4.4-2
FS	Field separator	1	4.4-2
f	Next state identifier	3	4.4-3
FS	Field separator	1	4.4-3
g	Number of type 1 notes to dispense	2	4.4-3
h	Number of type 2 notes to dispense	2	4.4-3
i	Number of type 3 notes to dispense	2	4.4-3
j	Number of type 4 notes to dispense	2	4.4-3
GS	Group separator	1	4.4-3
j1	Number of hopper 1 coins to dispense	2	4.4-3
j2	Number of hopper 2 coins to dispense	2	4.4-3
j3	Number of hopper 3 coins to dispense	2	4.4-3
j4	Number of hopper 4 coins to dispense	2	4.4-3
FS	Field separator	1	4.4-3
k	Transaction serial number	4	4.4-3
l	Function identifier:	1	4.4-4
	1 - Deposit and print		4.4-4
	2 - Dispense and print		4.4-4
	3 - Display and print		4.4-4
	4 - Print immediate		4.4-4
	5 - Set next state and print		4.4-4
	6 - Night safe deposit and print		4.4-4
	7 - Deposit and print		4.4-4
	8 - Dispense and print		4.4-4
	9 - Display and print		4.4-4
	A - Eject card, dispense and print		4.4-4
	B - Parallel dispense, print and card eject		4.4-4
	C - Parallel dispense, print and card eject		4.4-4

Transaction Reply		4-000~...	
Field	Description	Length	Page
	E - Reserved for NDC RMX		4.4-4
	F - Card before parallel dispense and print		4.4-4
	O - Reserved		4.4-4
	P - Print statement and wait		4.4-4
	Q - Print statement and set next state		4.4-4
	R - Reserved		4.4-4
	S - Process document with cash		4.4-4
	T - DPM deposit envelope		4.4-4
m	Screen number	3	4.4-5
n	Screen display update	Var	4.4-5
FS	Field Separator	1	4.4-5
o	Message co-ordination number	1	4.4-5
p	Card return/retain flag:	1	4.4-5
	0 - Return card		4.4-5
	1 - Retain card		4.4-5
q	Printer flag:	1	4.4-6
	0 - Do not print		4.4-6
	1 - Print on journal only		4.4-6
	2 - Print on receipt only		4.4-6
	3 - Print on receipt and journal		4.4-6
	4 - Print on PPD if Function ID is '1' or '7' Print on DP-ATM envelope depository if Function ID is 'T'		4.4-6
	5 - Print on PPD and journal if Function ID is '1' or '7' Print on DP-ATM envelope depository and journal if Function ID is 'T'		4.4-6
	8 - Print on statement only		4.4-6
	9 - Reserved		4.4-6

---

Transaction Reply		4-000~...	
Field	Description	Length	Page
:	- Reserved		4.4-6
;	- Print on DPM deposited document if Function ID is 'S'		4.4-6
<	- Print on DPM deposited document if Function ID is 'S' and confirm		4.4-6
=	- Sideways printing on receipt if Function ID is 'P' or 'Q'		4.4-6
>	- Announce using Digital Audio Service		4.4-6
r	Printer data field	Var (500)	4.4-7
GS	Group separator	1	4.4-8
s	Printer flag	1	4.4-8
t	Printer data	Var (500)	4.4-8
GS	Group separator	1	4.4-8
u	Printer flag	1	4.4-8
v	Printer data	Var (500)	4.4-8
GS	Group separator	1	4.4-8
v1	Printer flag	1	4.4-8
v2	Printer data	Var (500)	4.4-8
:			
GS, v1 and v2	may be repeated up to nine further times		4.4-8
:			
FS	Field separator	1	4.4-8
w	Buffer identifier	1	4.4-8
x	Track 3 data	Var (106)	4.4-8
FS	Field separator	1	4.4-8
ae1	Buffer identifier E	1	4.4-9
ae2	Document destination	1	4.4-9
ae3	Lift front/rear image(s)	2	4.4-10
ae4	Archive lifted front/rear image(s)	2	4.4-11
ae5	Lift zones in image list	1	4.4-12

---

Transaction Reply		4-000~...	
Field	Description	Length	Page
ae6	Archive lifted image list zones	1	4.4-12
ae7	Check magnetism	1	4.4-13
ae8	Check zone verification	1	4.4-13
ae9	Report candidates/identify	1	4.4-14
ae10	Document entry retries	1	4.4-15
FS	Field separator	1	4.4-15
af1	Buffer identifier F	1	4.4-15
af2	Document enable code	0 or 5	4.4-16
GS	Group separator	1	4.4-16
af3	Document name	Var (16)	4.4-16
FS	Field separator	1	4.4-17
ak1	Buffer identifier K	1	4.4-17
ak2	Track 1 Data	Var (78)	4.4-17
FS	Field Separator	1	4.4-17
al1	Buffer identifier L	1	4.4-17
al2	Track 2 Data	Var (39)	4.4-17
FS	Field Separator	1	4.4-17
am1	VC data ID 'M'.	1	4.4-17
am2	VC data	Var	4.4-17
FS	Field Separator	1	4.4-17
an1	VC data ID 'N'.	1	4.4-17
an2	VC data	Var	4.4-17
FS	Field Separator	1	4.4-17
ao1	VC data ID 'O'.	Var	4.4-17
ao2	VC data	Var	4.4-17
FS	Field Separator	1	4.4-17
ap1	VC data ID 'P'.	1	4.4-17
ap2	VC data	Var	4.4-17
FS	Field Separator	1	4.4-17

---

Transaction Reply		4-000~...	
Field	Description	Length	Page
aq1	VC data ID 'Q'.	1	4.4-17
aq2	VC data	Var	4.4-17
FS	Field Separator	1	4.4-17
ar1	VC data ID 'R'.	1	4.4-17
ar2	VC data	Var	4.4-17
FS	Field Separator	1	4.4-17
y	MAC data	8	4.4-18

---

## Host To Exit Message

---

Host to Exit Messages		7-000~1~...	
Field	Description	Length	Page
g	Data sent to Exit	Var	4.3-2

---

## Acknowledge EJ Upload Block Command

---

Acknowledge EJ Upload Block command		6~~~1d.	
Field	Description	Length	Page
d	Last Character Received	6	4.5-1

---

## Acknowledge and Stop Command

---

Acknowledge and Stop EJ command		6~~~2d.	
Field	Description	Length	Page
d	Last Character Received	6	4.5-1

---

## EJ Options and Timers Command

EJ Options and Timers command		6~~~3d.	
Field	Description	Length	Page
d	Option Number	2	4.5-1
e	Option Value	3	4.5-1
f	Timer Number	2	4.5-1
g	Timer Value	3	4.5-1

Appendix E

# Screen And Keyboard Layouts

---

Overview	E-1
CRT Screen Layout	E-2
Standard Keyboard Layouts	E-3
Position Codes	E-3
Transaction Processing Standard Keyboard Layout	E-4
Transaction Processing Alternative Keyboard Layout	E-4
Supervisor Mode Standard Keyboard	
Layout	E-5
Supervisor Mode Alternative Keyboard Layout	E-5
Encryption Key Entry Keyboard Layout	E-5

Table of Contents

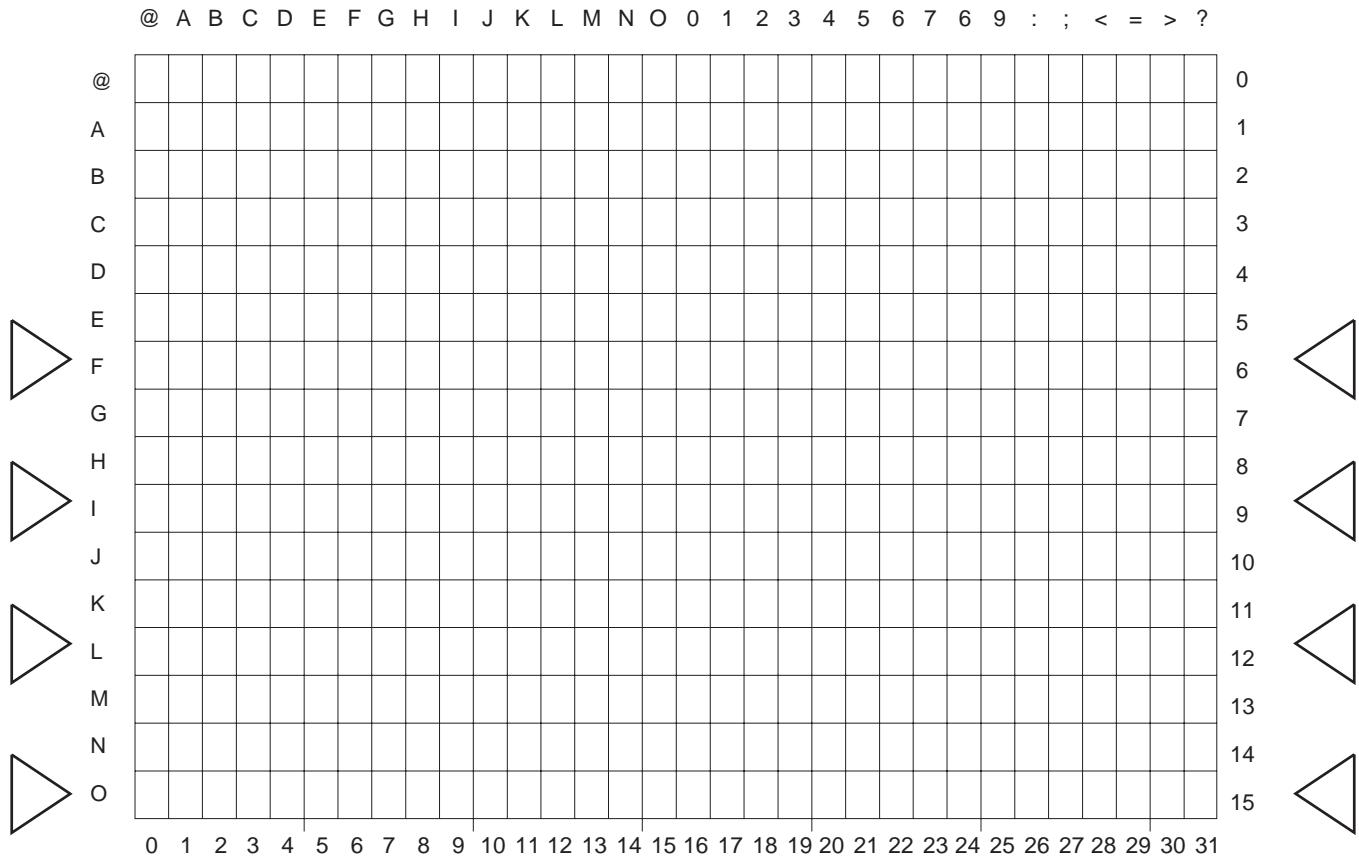
**Screen And Keyboard Layouts**

## Overview

In this appendix we show the CRT screen layout and the standard keyboard layouts.

## CRT Screen Layout

Figure E-1 CRT Screen Layout



## Standard Keyboard Layouts

Refer to Chapter 2.3, “Keyboard Data”, for more information about keyboards.

### Position Codes

The following position codes are used for all keyboard layouts:

Figure E-2 Position Codes

17	1	2	3	4	18
19	5	6	7	8	20
21	9	10	11	12	22
23	13	14	15	16	24

## Transaction Processing Standard Keyboard Layout

This is defined by screen 'M06' which has the following default setting:

```
<gs>00001310232033304FF05340635073608F209371038113912F1  
130014301500160017FA18F619F920F521F822F423F724F3
```

Figure E-3  
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'

## Transaction Processing Alternative Keyboard Layout

This is defined by screen 'M09' which has the following default setting:

```
<gs>00001310232033304F205340635073608FF09371038113912F1  
130014301500160017FA18F619F920F521F822F423F724F3
```

Figure E-4  
Alternative Transaction Processing  
Keyboard Layout

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

## Supervisor Mode Standard Keyboard Layout

This is defined by screen ‘M10’ which has the following default setting:

```
<gs>00201310232033304F205340635073608F309371038113912F1
13001430150016F417FA18F619F920F521F822F723F224F1
```

Figure E-5  
Standard Supervisor Mode 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’
CLR		0		AUX	ENT

## Supervisor Mode Alternative Keyboard Layout

This is defined by screen ‘M11’ which has the following default setting:

```
<gs>00301310232033304F305340635073608F209371038113912F1
13001430150016F417FA18F619F920F521F822F723F224F1
```

Figure E-6  
Alternative Supervisor Mode Keyboard Layout

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

## Encryption Key Entry Keyboard Layout

This is defined by screen ‘M13’ which has the following default setting:

```
<gs>00401310232033305340635073609371038113912F113001430
17411842194320442145224623F224F112F116F4
```

Screen And Keyboard Layouts  
Standard Keyboard Layouts

---

Figure E-7  
Encryption Key Entry Keyboard Layout

A	1	2	3	
C	4	5	6	
E	7	8	9	ENT
CLR		0		AUX

B
D
F
ENT

Appendix F

# Code Conversion And Cross-Reference Table

---

Overview

F-1

---

Code Conversion And Cross-Reference Table

F-2

Table of Contents

**Code Conversion And Cross-Reference Table**

## Overview

In this appendix we define the code conversion between ASCII, EBCDIC and graphic characters.

---

## Code Conversion And Cross-Reference Table

In the following table we define the code conversion between ASCII, EBCDIC and graphic characters:

Graphic	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

Code Conversion And Cross-Reference Table  
Code Conversion And Cross-Reference Table

<b>Graphic</b>	<b>EBCDIC (Hex)</b>	<b>ASCII (Hex)</b>
ETB	26	17
CAN	18	18
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
'	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

Code Conversion And Cross-Reference Table  
Code Conversion And Cross-Reference Table

Graphic	EBCDIC (Hex)	ASCII (Hex)
5	F5	35
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

Code Conversion And Cross-Reference Table  
Code Conversion And Cross-Reference Table

Graphic	EBCDIC (Hex)	ASCII (Hex)
S	E2	53
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
circumflex	5F	5E
-	6D	5F
single quote (right hand)	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

Code Conversion And Cross-Reference Table  
Code Conversion And Cross-Reference Table

Graphic	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 line	6A	7C
}	D0	7D
tilde	A1	7E
DEL	07	7F

**Appendix G****Differences Between NDC+ And Diebold Message Formats**

---

Overview

G-1

---

Differences Between NDC+ And Diebold Message Formats	G-2
Function Command Message	G-3
Operational Command Message	G-3
Write Command II Message	G-4
Write Command III Message	G-4
Write Command IV Message	G-5
Write Command V Message	G-5
Date And Time Load Message	G-5
Tamper Indication Unsolicited Status Message	G-5
Transaction Request Message	G-5
Solicited Status Message (Device Faults)	G-5
Unsolicited Status Message (Device Faults)	G-6

Table of Contents

Differences Between NDC+ And Diebold Message Formats

## Overview

In this appendix we describe the differences between NDC+ and Diebold message formats.

---

## Differences Between NDC+ And Diebold Message Formats

The following NDC SST messages equate to the Diebold TABS 900 series messages:

NDC+	Diebold
Transaction Request	Customer Request
Unsolicited Status	Unsolicited Status
Solicited Status	Solicited Status
Transaction Reply Command	Function Command
Terminal Command	Operational Command
State Table Load	Write Command I
Screen/Keyboard Data Load	Write Command II
Configuration Parameters Load	Write Command III
PIN Data Load	Write Command IV
Interactive Transaction Response	Write Command V
FIT Data Load	Write Command VI
Encryption Key Change	Write Command VII
Configuration ID Number Load	Write Command VIII
Enhanced Configuration Parameters Load	Not supported
Date and Time Load	Not supported
MAC Field Selection Load	Not supported
Override Reserved Screen Configuration Command	Not supported
Upload EJ Data	Not supported
Acknowledge EJ Upload Block	Not supported
Acknowledge and Stop EJ	Not supported
EJ Options and Timers	Not supported

---

## Function Command Message

The Function Command message format has been extended in the Transaction Reply command to include the following functions:

- Additional optional fields and additions to the Printer flag field. These allow up to 13 messages to be sent to print on a combination of printers including the PPD, DPM and Statement printers. Messages sent to print on the PPD must be 80 characters or fewer
- Additional optional fields to allow four different denominations of currency and four different denominations of coins to be dispensed
- Parallel Dispense, Print and Eject Card function added. This supports the Fast Cash transaction sequence where dispensing, printing and card ejection are performed in parallel
- Eject Card, Dispense and Print function added. This supports the Card Before Cash transaction sequence where money is not dispensed until the card has been taken
- Card Before Parallel Dispense and Print function added. This supports the transaction sequence where the card is taken and then dispensing and printing are performed in parallel
- Print Statement and Wait, Print Statement and Set Next State functions added. These support a Print Statement Transaction
- Extension of screen update field to allow multiple screen updates in one message
- Process Document With Cash and DP-ATM Deposit Envelope functions added. These support DPM document and envelope deposit transactions
- Images of documents handled by the Document Processing Module can be printed on the Receipt and Journal Printers
- Messages can be sent to the Digital Audio Service for annunciation.

There is no equivalent to the delivery door mechanism. The Deliver and Print Function command only initiates printing on the specified printer, and displays the Transaction Reply command screen for timer 07.

---

## Operational Command Message

The Operational Command message format has been extended in the Terminal Command message to include the following Command Codes:

- ‘4’ - Send supply counters
- ‘5’ - Send tally information
- ‘6’ - Send error log information
- ‘7’ - Send configuration information

## Differences Between NDC+ And Diebold Message Formats

### Differences Between NDC+ And Diebold Message Formats

'8' - Send date and time information  
'9' - Reserved  
:: - Reserved  
';' - Reserved  
'=' - EKC retrieve hallmark key  
'<' - Reserved  
'>' - Enable FREE JDATA  
'?' - Enable image dumping

### Write Command II Message

The Write Command II message format has been extended to support configurable keyboards.

### Write Command III Message

The Write Command III message format has been extended in the Configuration Parameters Load message to include additional timers.

The Write Command III message can be replaced by an Enhanced Configuration Parameters Load message when configuration data is needed to specify the following options:

- Camera control option
- Ready/Supply/Amount buffer option
- Auto voice
- Date format for supervisor/journal messages and camera
- Roll width
- Left print column
- Track 1 format
- Diebold status reporting for vandal guard
- TI control option
- Extended status control option
- Specific command reject option
- Card reader error threshold
- Track 3 write error threshold
- Transaction status information option
- Journal printer backup time option
- Journal printer backup print operations option
- Optical sensor option
- Journal printer backup log tamper option
- Envelope dispenser status option
- Enhanced TI/sensor status option

- Media entry indicators flash rate option
- Touch screen error reporting
- Timer number.

## Write Command IV Message

The FIT data tables have been expanded for GBP PIN verification and CIM86 card reader support.

## Write Command V Message

The Write Command V message has been extended in the Interactive Transaction Response message to include the use of up to eight FDKs.

## Date And Time Load Message

This message is not supported by Diebold. It allows Central to set the terminal date and time to be used by journal/error logging and the security camera.

## Upload EJ Data Message and EJ Commands

The EJ Upload message and EJ Commands are not supported by Diebold. They allow electronic journal data to be uploaded to the host.

## Tamper Indication Unsolicited Status Message

If an Enhanced Configuration Parameters Load Message has been sent to request the terminal to relay tamper indicating messages to Central, these are returned in an Unsolicited Status message. This message contains a Device Identifier field with a value of 'C', which identifies that this is a TI report for a Diebold machine. The Device Status field will contain the tamper indicating status code.

## Transaction Request Message

The Message Mode option allows the terminal to be configured for PIN or No-PIN, to emulate Diebold with or without FITs respectively. See *NDC+ Supervisor's Reference Manual* for details.

The following Diebold features apply when operating with No-PIN:

- FITs will be accepted and stored, and can be used for local PIN verification
- Optional fields 'O' and 'P' can be included in the Transaction Request message.

## Solicited Status Message (Device Faults)

If Diebold Status message mode is used, Diebold devices equate to NDC+ devices as follows:

## Differences Between NDC+ And Diebold Message Formats

### Differences Between NDC+ And Diebold Message Formats

Diebold	NDC+
Acknowledgement Printer	Receipt Printer
Auxiliary Printer	Journal Printer
Securomatic Depository	Night Safe Depository
Dispenser	Cash Handler
Delivery Door	Not supported
Linear Depository	Depository (PPD)
Trap	Not supported
Not supported	Statement Printer
Configuration ID	Configuration ID
Not supported	Document Processing Module
Not supported	Coin Dispensing Module

Status descriptor field 'F' and additional optional fields are used to send logs, supply counters and terminal configuration information to Central.

## Unsolicited Status Message (Device Faults)

If Diebold Status message mode is used, Diebold devices equate to NDC+ devices as follows:

Diebold	NDC+
Alarm	Alarm
Supervisor Switch	Supervisor Switch and keys
Supply Switch	Supervisor Switch and keys
Acknowledgement Printer	Receipt Printer
Auxiliary Printer	Journal Printer
Card Reader/Writer	Card Reader/Writer
Control Panel (RAM Data Loss) See Note 1	
Not supported. See Note 2	Tamper Indication
Power Failure	Power Failure

Diebold	NDC+
Not supported. See Note 1	Time-of-Day Clock
Not supported	Supervisor Keys
Not supported	Sensors
Not supported. See Note 1	Encryptor
Not supported. See Note 1	Camera
Not supported. See Note 2	Door Access
Not supported	Statement Printer
Not supported	Document Processing Module
Not supported	Coin Dispensing Module
Not supported	Envelope Dispenser
Not supported	Touch Screen Keyboard
Not supported	Digital Audio Service

**Note:** 1. This status is not required because the counters RAM is supported by mains power as well as battery. Therefore if battery failure occurs, the terminal will not go in-service after the next power interruption. The terminal will not respond to polls until it has been reconfigured and put in-service locally. At this point, counters can be re-synchronised. See *NDC+ Supervisor's Reference Manual* for details.

This status is extended to provide camera, time-of-day and encryptor statuses by a download configuration option. See Chapter 4.2, “Configuration Parameters Load” passage, for details.

**Note:** 2. Diebold Mode statuses can be provided for these devices by a download configuration option. See Chapter 4.2, “Enhanced Configuration Parameters Load” passage, for details.

Differences Between NDC+ And Diebold Message Formats  
**Differences Between NDC+ And Diebold Message Formats**

Appendix H

# Differences Between NDC+ And Diebold State Tables

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## Overview

H-1

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Differences Between NDC+ And Diebold State Tables	H-2
New State Tables	H-2
Exit States	H-3
Changes To Existing Diebold State Tables	H-3

Table of Contents

**Differences Between NDC+ And Diebold State Tables**

## Overview

In this appendix we describe the differences between NDC+ and Diebold state tables.

---

## Differences Between NDC+ And Diebold State Tables

---

### New State Tables

The following State types have been introduced to support some unique features of NDC+:

State Type	Description
-	Expanded FIT Switch
P	Courtesy Amount Verification
Q	DPM Document Accept
R	Enhanced Amount Entry
S	Language Switch
T	Card Read - PIN Entry Initiation
V	Language Select From Card
W	Function Display Key Switch
X	FDK Information Entry
Y	Eight FDK Selection Function
Z	Extension
b	Customer Selectable PIN
i	Audio Control
k	Smart FIT Check

These new states are required if the following NDC+ features are implemented:

- Fast Cash (PIN entry in parallel with card read)
- Process Document With Cash
- DP-ATM Deposit Envelope
- Eight Function Display Keys
- Information entry by menu selection
- Multi-language screen selection
- Pre-set the operation code buffer with one of eight graphic characters
- Document Processing Module
- Coin Dispensing Module

- Customer Selectable PIN
- Digital Audio Service
- FIT checks on smart card data.

## Differences Between NDC+ And Diebold State Tables

### Differences Between NDC+ And Diebold State Tables

The following changes have been made which affect other states:

- The Transaction Request state has been expanded to allow improved information retrieval from the SST
- The Amount Check state has been changed to allow you to choose which buffer you send information to.

---

### Exit States

State letters **d** to **g** inclusive are available for use as Exit state types. Users may also write Exits which replace any other standard NDC+ state type. For more information on Exit States, see NCR publication *Using NDC+ Exits*.

---

### Changes To Existing Diebold State Tables

An extension state is added to the state tables for the Pre-Set Operation Code Buffer State D allowing graphic characters F, G, H and I to be stored in the Operation Code Buffer. A statement screen and a DPM screen are added to the Close State J and an extension state reference. In addition, the following differences affect those functions specified by certain state table entries:

- Screens available for display from state tables have been increased from numbers 10-255 to 0-999
- The Amount Display overlay screen referenced from the Amount Entry state can contain an International Currency Display Format for initial display on entry into the state.

Appendix I

# Summary Of Differences Between NCR And Diebold SSTs

---

Overview

I-1

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Summary Of Differences Between NCR And Diebold SSTs

I-2

Table of Contents

**Summary Of Differences Between NCR And Diebold SSTs**

## Overview

In this appendix we provide a summary of the main differences between NCR and Diebold TABS terminals (910, 911, 920 and 921).

---

## Summary Of Differences Between NCR And Diebold SSTs

NCR terminals support the following unique features:

- Additional reserved screens
- International currency display format
- International character sets and graphics
- Select character set for printer
- Encrypted keyboard controller (EKC)
- MM sensor with CIM86 MCRW
- Electronic journal
- Journal printer backup
- State of health
- Document processing module (DPM)
- Coin dispensing module (CDM)
- Automatic envelope dispenser
- Terminal Management
- Software Management
- Touch screen (full touch or FDK emulation)
- Sideways printing on receipt printer
- Digital echo of cardholder keyboard
- Digital camera system
- Audio messages in transaction reply
- Audio jack
- Audio volume adjustment
- Document image printing
- Exits
- Non-magnetic smart card support

They also support the following additional screen control functions:

- Digital audio voice
- Select character set
- Screen blinking
- Changing display in idle
- Left margin control
- Colour control
- Set display mode control
- Picture control
- Logo control

- Display image files control
- Animation.

They also support the following additional printer control characters:

- Select character sets
- Print predefined images, graphics and barcode
- Left and right margin control in sideways receipt printing

Because of operational and positional differences between some of the mechanisms, we recommend that you check any screen that references the following mechanisms:

- Card reader
- Cash handler
- Receipt printer
- Depository
- Envelope dispenser.

Summary Of Differences Between NCR And Diebold SSTs

**Summary Of Differences Between NCR And Diebold SSTs**

Appendix J

# Summary Of Diebold Emulation Features And Network Impact

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## Overview

J-1

Summary Of Diebold Emulation Features And Network Impact	J-2
Features Requiring No Central Software Change	J-2
Features Requiring Minimal Central Software Change	J-2
Features Requiring Other Central Software Change	J-2

Table of Contents

**Summary Of Diebold Emulation Features And Network Impact**

## Overview

In this appendix we provide a summary of Diebold Emulation features and their network impact.

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## Summary Of Diebold Emulation Features And Network Impact

---

### Features Requiring No Central Software Change

The following Diebold Emulation features require no central software change:

- Cash retract inhibit
- Early notes low reporting
- Out on low printer status reporting
- Beeper suppression on deposit and card eject
- Enable beeper while notes are presented
- Track 1 name display
- Optional saving of downloaded data to disk
- Encryption feature
- Reading of all three tracks on a card.

---

### Features Requiring Minimal Central Software Change

The following Diebold Emulation features require minimal central software change:

- Statement printing - status action also required
- Central control of vandal guard
- Display pound sign for dollar
- Paper low reporting on receipt and journal printers.

---

### Features Requiring Other Central Software Change

The following Diebold Emulation features require other central software change:

- Vandal guard unique status - option on download to enable vandal guard, and status processing
- FIT changes for language code from card
- State changes for language code from card
- Cancel key enable during 'print statement and wait' functions
- Cancel key enable during 'print statement and wait' functions for sideways receipt printing.

Appendix K

# NDC+ Diskbuild/2 Requirements

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Overview	K-1
NDC+ Diskbuild/2 Requirements	
Logo, Graphics and Code Page Definitions For The Thermal Printer	K-2
The Files You Need For Diskbuild/2	K-3
APPDEFS.FCS	K-5
NDC.FCS	K-5
NN060200.EXE	K-5
ND060200.EXE	K-5
NDCIA.EXE	K-6
Data Files	K-6
S4NDCADI.DLL	K-6
NDCUTILS.DLL	K-6
EXUTIL.DLL	K-6
NDCDATA.DLL	K-6
Audio Files	K-7
Other Files You Need For Diskbuild/2	K-7
S4_START.RUN	K-7
Running Electronic Journal Automatically	K-7
Running NDC+ Without 'Fast-Clearing SOH'	K-8
Software Management (SM) Application	K-8
SM File Types	K-9

Table of Contents  
**NDC+ Diskbuild/2 Requirements**

## Overview

In this appendix we tell you what files you need for Diskbuild/2, the tool you use to create builds and disk suites.

## NDC+ Diskbuild/2 Requirements

Diskbuild/2 should already be installed on your development PC. You will have to enter a master user-ID and password, or a user-ID and password for yourself. If you are running a DPM and using supporting utilities, these must also be installed on your PC. See *D-Scribe User Guide* for details.

See *S4 Building A Load Disk* for information on the general use of Diskbuild/2 and on how to create or update builds and make disk suites. If you are using Software Management, refer to the appropriate Software Management User Guide for information relating to disk suites. When defining a hardware set for NDC+ you must select the Migrated ADI option. If you wish to use a DPM or Animation Files you must select 'Translator' for the display configuration.

**Note:** Selection of Digital Audio or Document Processing means that PC interrupts will be allocated for these services. Therefore, take care when combining hardware selections containing Digital Audio or Document Processing together with other features that will utilise PC resources. *E.g.* Selection of 5670, *personaS40* or swipe reader will all utilise additional PC interrupts.

### Logo, Graphics and Code Page Definitions For The Thermal Printer

The thermal printer prints logos and graphics files and uses code pages. These features are selected by defining the printer data with control characters. To enable the control sequences to be actioned you must install the files on the SST using Diskbuild and the associated FM utility. For example, to install the logo file NCR.LGO onto your SST:

- 1 Place the files on your Diskbuild PC in a suitable directory, for example, \MYBANK
- 2 In the NDCADI directory invoke FM by typing FM.
- 3 A menu will be displayed and you should select 'Select Object' followed by 'Add Object' on the next menu. You then enter an object name. The name you enter is the one you must select in Diskbuild to include the files in a build. For this example use the object name 'THERMAL'.

- 4 You will be returned to the main menu. You should now select 'Files definition menu' followed by 'Other files'. From the list of directories now shown select the directory \MYBANK. When you move to \MYBANK you will see your logo, graphic and code page files.
- 5 Select NCR.LGO. You will be given a target directory and file name where this file will be installed. This must be the same directory that is in the NDC+ reserved screen K07. The default value with NDC is \NDRCRPT. For this example you should say that this is incorrect and enter \NDRCRPT\NCR.LGO.
- 6 Select the target drive that all your software will be on and select 'APPEND' to add the file. Repeat this for each for thermal printer file you require.
- 7 You should then leave FM. This will generate a file FM\_USER.FCS. By invoking Diskbuild you must now modify the application set you are using such that
  - the 'Select User Object' menu option is selected
  - and the 'THERMAL' object is defined for your build suite.

---

## The Files You Need For Diskbuild/2

You must invoke Diskbuild/2 and the files menu utility from the directory *C:\NDCADI*; otherwise the application files are not picked up. You must also generate the Comms Template files in the directory *C:\NDCADI*; otherwise the Comms files are not picked up.

If you have defined Virtual Controllers, you will need to create the file \SYSTEM\VCCONT. If you have defined exit states and exit supervisors, you will need to modify the files \SYSTEM\STCONT and \SYSTEM\SUPCTR and you may also need to create \SYSTEM\MISCONT. These files supply the following information:

- \SYSTEM\STCONT specifies which state types are NDC+ standard states and which are user written Exits
- \SYSTEM\SUPCTR specifies which supervisor functions are NDC+ standard functions and which are user written Exits
- \SYSTEM\VCCONT specifies Virtual Controllers
- \SYSTEM\MISCONT specifies certain miscellaneous Exits
- User written DLL files containing the code for Exits.

For information about all these files, refer to the manual *Using NDC+ Exits*.

When using Diskbuild/2, you must specify the drivers and files needed to build the disk suite for your NDC+ application. However, the file NDC.FCS supplied by NCR means that Diskbuild/2 will automatically select the following files:

File Type	File Name	SM File Type
System Executable Files:	NN060200.EXE (for Native mode)	3
	ND060200.EXE (for Diebold mode)	3
	NDCIA.EXE	3
Data Files:	SCREN0. See Note 2.	8195. See Note 3.
	SCREN1. See Note 2.	8195. See Note 3.
	SCREN2. See Note 2.	8195. See Note 3.
	RESRVD. See Note 2.	3
	KEYTAB. See Note 2.	8195. See Note 3.
	STATES. See Note 2.	8195. See Note 3.
	ACCESS. See Note 2.	8195. See Note 3.
	STDATA. See Note 2.	2
	FITABL. See Note 2.	8195. See Note 3.
	SCRPTR. See Note 2.	8195. See Note 3.
	PARAMS. See Note 2.	8195. See Note 3.
	DEFALT. See Note 2.	8195. See Note 3.
	DIEBLD. See Note 2.	8195. See Note 3.
	COLDSTRT.	8195. See Note 3.
	STCONT	3
	SUPCTR	3
DLL:	S4NDCADI.DLL	3
	NDCUTILS.DLL	3
	EXUTIL.DLL	3
	NDCDATA.DLL	3

**Note 1:** The NN060000.EXE and ND060000.EXE file names are only applicable for this release, and will change with every subsequent release. The names we have used here are for example only.

**Note 2:** Must also include Coldstart file in build so that SST will perform a complete Coldstart.

**Note 3:** File Type 8195 includes an offset of 8192 so that File Type 8195 is File Type 3. The 8192 offset directs Software Management (SM) to leave a copy of the file in the build directory during the installation.

---

## APPDEFS.FCS

This is the description file which tells Diskbuild/2 to include the State of Health processing modules.

As of Release 6.00 of NDC+, the following line has been included in this file:

```
URID={QN="MCP_CLEAR_FITNESS" URID="1"}
```

This line corrects a difficulty which arose in previous releases when the operator mistakenly exited Supervisor Mode before closing the safe door. That action introduced a mismatch between the State of Health (SOH) and the Fitness of the Cash Dispenser. The SOH display would show 'Terminal Healthy' but the Cash Dispenser did not operate.

If you include the above line in *APPDEFS.FCS* before performing a Diskbuild, and you also set the SOH/Fitness Enhanced Configuration Option (33), then when the safe door is finally closed in the situation described above, the terminal will simulate an entry into Supervisor Mode, test the Cash Dispenser, clear its fitness and simulate an exit from Supervisor Mode. This brings the SOH and the Fitness into agreement.

The presence of this line allows NDC+ to detect that the Safe Door has been closed outwith Supervisor Mode.

For further details of this option, see "SOH/Fitness Option" in Enhanced Configuration Parameters Load in Chapter 2.6.

---

## NDC.FCS

This is the description file which tells Diskbuild/2 to include mandatory application files in the build definition. This file is contained in the development directory C:\NDCADI, but is not copied to the SST.

---

## NN060200.EXE

This is the executable NDC+ application file for Native mode. It is copied from the development directory C:\NDCADI to the SST directory \NDCADI.

---

## ND060200.EXE

This is the executable NDC+ application file for Diebold mode. It is copied from the development directory C:\NDCADI to the SST directory \NDCADI.

## NDCIA.EXE

This is an executable file which is transferred automatically onto the SST during the Diskbuild. It provides communication between Exits and the NDC+ core.

## Data Files

SCREN0, SCREN1, SCREN2, RESRVD, KEYTAB, STATES, ACCESS, STDATA, FITABL, SCRPTR, PARAMS, DEFALT, DIEBLD, STCONT and SUPCTR are data files used by NDC+. They are copied from the development directory C:\SYSTEM to the SST directory \SYSTEM.

The data file RESRVD replaces the data files INIPTR, RESVD0 and RESVD1. It is an ASCII text file, which you can easily edit locally. For instance, you can edit the data file RESRVD so that it contains a dummy definition of a user screen. This dummy definition can contain an association to a keyboard layout and optionally the layout data itself. This allows Central subsequently to download the real screen data and inherit the layout automatically, thereby allowing full touch screen support with no impact on Central. See Chapter 2.3, “Keyboard Data”, for more information.

RESRVD may be used as a source for data file user screens and keyboard layouts. It may also be used to edit screens and keyboards.

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

## S4NDCADI.DLL

This is a library file used by NDC+. It is copied from the development directory C:\NDCADI to the SST directory \S4DLL.

## NDCUTILS.DLL

This is a library file used by NDC+. It is copied from the development directory C:\NDCADI to the SST directory \S4DLL.

## EXUTIL.DLL

This contains a set of routines which give Exits access to NDC+. It is a library file, and it is required whether or not you are using Exits.

## NDCDATA.DLL

This contains routines which give Exits access to NDC+ shared data. It is a library file, and it is required whether or not you are using Exits.

## Audio Files

A number of speech files are provided. These are sufficient to provide a set of spoken messages in the English language. It is possible to record your own messages and to provide messages in various languages.

Speech files in different languages must reside in different directories: this means that files containing equivalent messages in different languages may have identical names for ease of reference. Files in the default language are held in directory AUDIO0; files in language 1 are held in AUDIO1 and so forth.

For further information, read the Appendix R ‘Understanding the Digital Audio Service’ in this manual.

## Other Files You Need For Diskbuild/2

The EGA/VGA configuration file associates the file names of the pictures, logos and fonts used by NDC+ to the names or numbers they are known by in the NDC+ application. Up to three graphics resolutions can be supported. It also specifies the default foreground and background screen colours used by the terminal.

For details of how to modify your configuration file using NCRCNF, see *EGA/VGA Configuration Toolset Guide*. For details of how to create or modify fonts using NCRFONT, see *Color System User Guide*.

Audio Message Files: DAUDIO00.MSG to DAUDIO09.MSG,  
DAUDIO12.MSG

For details of Speech files see NCR publication, *Programmer’s Manual for the Digital Audio*.

## S4\_START.RUN

If you are defining a development build, Diskbuild/2 creates S4\_START.RUN to define which S4 and application programs are executed (.EXE files). The command file is copied into the terminal’s root directory. This file name is selectable when defining an application set in Diskbuild/2. The default name is S4\_START. When this file is invoked, it sets the NVRAM base address and calls S4\_START.RUN to start the terminal software running.

If you are defining a secure build, all the appropriate terminal software is run automatically.

## Running Electronic Journal Automatically

You can use Diskbuild/2 to create a load disk suite that ensures that the Electronic Journal is always running when no journal printer is configured. You do this by resetting the development SST immediately after selecting the ‘SET JRNL’ and ‘SET DEFAULT’ supervisor commands. You must then copy the ‘DEFALT’ file from the SST directory \SYSTEM directory for inclusion via Diskbuild/2.

## Running NDC+ Without ‘Fast-Clearing SOH’

For details of the Single-Key Clear State of Health enhancement and device exception recovery, see the *NDC+ Supervisor’s Reference Manual*.

You have the option of running NDC+ without Fast-Clearing SOH. This means that you clear all Level 2 and Level 3 State of Health conditions through the Supervisor Select Menu CSOH options. To do this, you must open the APPDEFS.FCS file located in the \NDCADI directory after NDC+ is installed on the Diskbuild/2 PC. Use a text editor to change the text from `NDC_CLEAR_SOH` to `MIG_SOH`

## Software Management (SM) Application

Software Management (SM) is a suite of tools which allow remote control over the software running in an SST network. SM allows new versions of software to be distributed to SSTs and installed online without manual intervention. It also allows varying levels of configuration detail to be obtained from the terminal.

A component of the toolset resides on the SST to communicate with the Transaction Processing Application (TPA) before performing the installation of the SM build or update build.

The SM installation activity consists of:

- request for installation to proceed
- terminal reset at the end of an installation depending upon the SM installation type.

From NDC+ 5.01, SM performs a reset only when the updated installation type requires a reset before a build can take effect. Files are given an SM file type value during diskbuild to determine whether SM resets the terminal on a subsequent installation. The values are given in the table at the start of this Appendix.

For further information on SM, see “*Software Management/Services User Guide*”.

## SM File Types

SM makes use of the following file types:

File Type	Description
1	Picture Files and Data Tables which can be installed without resetting the SST. The files are stored closed. When the files are required by the application they are opened, read and closed.
2	Data files that are stored opened.
3	Executable files (including DLLs) which are usually running.
4	Drivers. Only read at power-up.
5	Core Files.
8195	See Note 3 for "The Files You Need For Diskbuild/2" in this Appendix.

File types 1 and 2 do not require a terminal reset for their installation. File types 3 and above require one terminal reset for their correct installation.

An SM installation number is used to ensure that a terminal reset is performed by SM when required. This number is derived from the largest file type number in a build or update build, for example, in an update build with a data file of type 1 and DLL file of type 3 the installation build has an SM installation number of 3.

NDC+ Diskbuild/2 Requirements  
**NDC+ Diskbuild/2 Requirements**

Appendix L

# Supervisor/Settlement Transactions File Description

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## Overview

L-1

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Supervisor/Settlement Transactions File Description	L-2
Supervisor Transactions Parameter Screen ('C09' - 'C19')	L-2
Data File Format (STDATA, STDAT0 - STDAT9)	L-4

Table of Contents

**Supervisor/Settlement Transactions File Description**

## Overview

In this appendix we provide details of the Supervisor/ Settlement Transactions File.

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## Supervisor/Settlement Transactions File Description

Supervisor/Settlement transactions can only be carried out if the information relating to the transactions has been downloaded in one or more of the reserved screens 'C09' - 'C19', or is present in one or more of the files STDATA, STDAT0 - STDAT9 on the NDC system disk.

When you select this function, either a screen or a file is checked for valid supervisor/settlement transaction data. The following order of preference is used for checking:

- One or more of the screens 'C10' - 'C19'
- One or more of the files STDAT0 - STDAT9
- 'C09'
- STDATA.

The data files containing the transaction description data are located on the NDC system disk directory /SYSTEM. One of these files is STDATA, which has a fixed length of 530 bytes. We provide a blank dummy file of this name on the system disk. When you use this function with STDATA, you must first overwrite the dummy file with the file containing the operational data. You can do this using a PC. The file can be copied to the /SYSTEM directory using Diskbuild/2. See *S4 Building A Load Disk* for details. Since some of this data is stored in Intel word format - Low byte/High byte - you may find it easier to write and run a small program that 'builds' the file in the proper format.

**Note:** Audio keyboard echo and sideways printing are not available in Supervisor/Settlement Transactions.

---

### Supervisor Transactions Parameter Screen ('C09' - 'C19')

The following fields are defined for this screen:

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.

Supervisor/Settlement Transactions File Description  
Supervisor/Settlement Transactions File Description

Field	Length (Bytes)	Content/Meaning
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.
g	30	Next state number table. 10 entries. Not used entries = 255.
h	10	Next state action table. 10 entries. Values 0-3.
i	8	Op-code buffer, trans n, values 'A' - 'I' or space.
j	1	Length buffer B, trans n, values 0-8, or '?'. '?' - Buffer entry required.
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, trans n values 08, or '?'. '?' - Buffer entry required.
m	Var (0-8)	Data for buffer C, length as specified by field 'l' (0-8). Not present if field 'l' = '?'. Values 0-9.
:	:	Fields 'i' - 'm' are repeated for the number of transactions specified by field 'g' .
n	Var (0-10) (optional)	Amount Buffer Flags length is that of the number of transactions specified by field 'a' :  0 - Amount entry not required 1 - Amount entry required.

**Data File Format  
 (STDATA, STDAT0 -  
 STDAT9)**

Field	Offset	Length	Type	Content
a	0	1	byte/ binary	Number of supervisor functions. Range 0-10. 0 - no functions.
b	1	1	byte/ binary	Length of card Track 1 data including start and end sentinels.
c	2	78	byte/ ASCII/ binary	Card Track 1 data, including start and end sentinels. Padded to the right with binary zero.
d	80	1	byte/ binary	Length of card Track 2 data including start and end sentinels.
e	81	39	byte/ ASCII/ binary	Card Track 2 data including start and end sentinels. Padded to the right with binary zero.
f	120	1	byte/ binary	Length of card Track 3 data including start and end sentinels.
g	121	106	byte/ ASCII/ binary	Card Track 3 data including start and end sentinels. Padded to the right with binary zero.
h	227	1	byte/ binary	PIN required flag: 0 - do not collect PIN from operator 0FF hex - search FITs for card FIID and request PIN from operator for remote verification
i	228	2	word/ binary	Transaction request state number used for supervisor transactions. See Note 2.
j	230	20	word/ binary	Table of next state numbers to be received on transaction responses. Ten entries. Entries not used contain 255. See Note 2.
k	250	10	byte/ binary	Table of next state actions. Ten entries corresponding to the ten next states above.

Field	Offset	Length	Type	Content
				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.
l	260	8	byte/ ASCII	Op-code buffer for function 0. ASCII range 'A' - 'I'.
m	268	1	byte/ binary	Length of buffer B, function 0. Range 0-8, or F if buffer entry is required. See Note 3.
n	269	8	byte/ ASCII/ binary	Buffer B for function 0 ASCII '0' - '9'. Padded to the right with binary zero.
o	277	1	byte/ binary	Length of buffer C, function 0. Range 0-8, or F if buffer entry is required. See Note 3.
p	278	8	byte/ ASCII/ binary	Buffer C for function 0 ASCII '0' - '9'. Padded to the right with binary zero.
:				
q	520	10 (optional)	byte/ binary	Amount buffer flags. Ten entries, one for each transaction value.
				0 - Amount entry not required.
				1 - Amount entry required.

**Note:** 1. Repeat fields 'l' - 'p' for functions 1-9. Transactions that are not used should contain binary zeros. Gaps in the file are not permitted.

**Note:** 2. All fields defined as words are stored in Intel word format - Low byte/High byte.

**Supervisor/Settlement Transactions File Description**

**Note:** 3. These buffers can have a maximum length of eight characters if buffer entry is not specified.

**Note:** 4. We recommend that you ensure that the length byte fields are correct and within the maximum permitted values.

Appendix M

# Screen Display Considerations

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Overview

M-1

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Screen Display Considerations

M-2

Palette And Resolution Information

M-2

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Touch Screen Reset Considerations

M-4

Table of Contents

## Screen Display Considerations

## Overview

In this appendix we provide some points to consider when you are preparing screens for display on the terminal.

## Screen Display Considerations

### Palette And Resolution Information

When defining a full screen picture (.pcc/.pcx file format) 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. The following table shows the default values for the standard 16 colour palette:

Index	Red	Green	Blue
0	0	0	0
1	0	0	42
2	0	42	0
3	0	42	42
4	42	0	0
5	42	0	42
6	42	42	0
7	42	42	42
8	21	21	21
9	21	21	63
10	21	63	21
11	21	63	63
12	63	21	21
13	63	21	63
14	63	63	21
15	63	63	63

The following points should be considered when you are preparing pictures for display on the terminal:

- If a sub-picture is of a different resolution from the main picture, it is displayed in the resolution of the main picture
- If a sub-picture has a different palette from the main picture, it is displayed in the palette of the main picture
- If a sub-picture is too large to be displayed, it is truncated

- The resolution set up by the last picture displayed remains until another full screen picture is displayed, even after a clear screen command
- At start-of-day, the VGA/CDT system is set to the standard graphics resolution (640 x 350 x 16)
- 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 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
- A foreground and background display page is available in 640 x 350 x 16 resolution mode only
- The supply mode screen, ‘C03’, **must** be of the same mode and palette as those used during the rest of supervisor mode
- Screens used during an idle sequence should be constructed using the same mode and palette values.

See the *Programmer’s Manual For The VGA Service* and *Programmer’s Manual For The Cardholder Display Translator* for further details on graphics resolutions.

---

## Touch Screen Reset Considerations

A screen reset sequence is included as a reserved screen, ‘M15’, in RESRVD. This screen sets the left margin and the primary and secondary character sets. It is sent when 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 RESRVD. 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 NDC+ default.

The default data for these two screens is given below:

‘M15’ ESC[00p ESC(1 ESC)6

‘M16’ DC2 ESC[00m ESCPi0 ESC\ FF

See Chapter 2.2, “Special Features” and “Control Characters” passages, for more information.

**Appendix N**  
**Device Identifiers**

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<b>Overview</b>	<b>N-1</b>
<b>Device Identifiers</b>	<b>N-2</b>
<b>Hardware Configuration Data</b>	<b>N-2</b>
<b>Supplies Data</b>	<b>N-7</b>
<b>Fitness Data</b>	<b>N-10</b>

Table of Contents

**Device Identifiers**

## Overview

The Device Identifiers present in the configuration messages detailed in Chapter 3.2, “Status Information” passage, indicate what device the following data in the message applies to. The following tables show which terminal device these Device Identifiers relate to, the values they may take and the data which may accompany them.

# Device Identifiers

## Hardware Configuration Data

The following table summarises the hardware configuration data associated with each device.

Device Identifier	ASCII Value (Hex)	Device Name and Associated Configuration Data	Data Length	Tally Group	Log Group
A	41	<b>Time-of-Day Clock *</b>  This Device Identifier is never returned in the configuration field		A	A
B	42	<b>High Order Communications</b>  This Device Identifier is never returned in the configuration field		B	B
C	43	<b>System Disk</b>  00 Hard disk drive present 01 Reserved 02 Reserved	var (2)	C	C
D	44	<b>Magnetic Card Reader/Writer *</b>  01 Track 2 (read only) 03 Track 1/2/3 MCRW (write on track 3 only) 05 Low Cost 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 2/3 Dip MSR 0C Track 1/2/3 CIM86 MCRW 10 Track 1/2 Dip MSR 11 Track 1/2 Swipe Reader 1D MIMIC Smart Card Dip Reader  Note that all intervening values are reserved.	var (2)	D	C
E	45	<b>Cash Handler *</b>  01 Standard cash handler present 02 Angel spray dispenser present	var (2)	E	C
F	46	<b>Envelope Depository *</b>  01 Reserved 02 Programmable printing depository 03 Reserved 04 DP-ATM envelope depository	var (2)	F	C

Device Identifier	ASCII Value (Hex)	Device Name and Associated Configuration Data	Data Length	Tally Group	Log Group
G	47	<b>Receipt Printer *</b>  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	var (2)	G	C
H	48	<b>Journal Printer *</b>  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	var (2)	H	C
I	49	Reserved  This Device Identifier is never returned in the configuration field		I	C
J	4A	Reserved  This Device Identifier is never returned in the configuration field		J	C
K	4B	<b>Night Safe Depository *</b>  01 Configured 02 Reserved	var (2)	K	C
L	4C	<b>Encryptor *</b>  01 NBS encryptor 02 Reserved 03 Reserved 04 Reserved 05 EKC encryptor 06 Reserved	var (2)	L	C
M	4D	<b>Security Camera *</b>  01 Fixed format (for example, 3M) 02 Variable format ( for example D/A) 03 Reserved 04 Digital	var (2)	M	C
N	4E	<b>Door Access System *</b>  01 Configured	var (2)	N	C

## Device Identifiers

## Device Identifiers

Device Identifier	ASCII Value (Hex)	Device Name and Associated Configuration Data	Data Length	Tally Group	Log Group
O	4F	<b>Off-Line Disk</b>	var (2)	O	C
		01      1.44 MB flex disk drive 02      2.88 MB flex disk drive			
P	50	<b>TI Bins (Alarms) *</b>	var (2)	-	-
		01      Secure cash, insecure cards, insecure deposits or no envelope depository 02      Secure cash, secure deposits 03      Secure cash, cards and envelope depository or no envelope depository			
Q	51	<b>Cardholder Keyboard</b>	var (2)	-	-
		01      Standard (BAPE) keyboard 02      EKC keyboard			
R	52	<b>Operator Keyboard</b>	var (2)	-	-
		01      Standard keyboard (basic) 02      Keyboard plus FDKs (enhanced)			
S	53	<b>Cardholder Display</b>	var (2)	-	-
		BIT 0    Always zero BIT 1    Always zero BIT 2    0 - no voice BIT 2    1 - voice supported BIT 3    0 - standard FDKs BIT 3    1 - touch screen BIT 4    0 - VGA BIT 4    1 - VGM translator BITS 5-7 are reserved - always zero			
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	<b>Statement Printer *</b>	var (2)	V	C
		01      Standard statement printer 02      Reserved 03      Reserved 04      Reserved 05      5665 DPM statement printer 09      Enhanced thermal statement printer (SDC+)			
W	57	Reserved	-	-	-
		This Device Identifier is never returned in the configuration field			

Device Identifier	ASCII Value (Hex)	Device Name and Associated Configuration Data	Data Length	Tally Group	Log Group
X	58	Reserved  This Device Identifier is never returned in the configuration field	-	-	-
Y	59	<b>Coin Dispenser *</b>  01 Reserved 02 Dispense by position - CDM present	var (2)	Y	C
Z	5A	<b>System Display</b>  01 2 x 40 display 02 Enhanced display (16 x 32)	var (2)	-	-
[	5B	<b>Media Entry Indicators</b>  01 Present	var (2)	-	-
\	5C	<b>Envelope Dispenser</b>  01 Envelope dispenser present 02 DP-ATM envelope dispenser present	var (2)	\	C
]	5D	<b>Document Processing Module *</b>	var (52)	]	C
		DPM Variant  00 5665 DPM present 01 DP-ATM present	2		
		DPM Number of Pockets (Bins Excluded)  00 No pockets 01 One pocket 02 Two pockets 03 Three pockets	2		
		DPM Image Processing Configuration  BIT 0 Identify supported BIT 1 Zone verification supported BIT 2 Write with confirmation supported BIT 3 Courtesy Amount Verification supported BIT 4 Omnifont/handprint recognition supported BIT 5 Barcode reading supported BIT 6 Cursive script recognition supported BITS 7-15 are reserved - always zero	4		

## Device Identifiers

### Device Identifiers

Device Identifier	ASCII Value (Hex)	Device Name and Associated Configuration Data	Data Length	Tally Group	Log Group
		DPM Hardware Configuration	4		
		BIT 0 Rear image camera installed BIT 1 Rear printer installed BIT 2 Encoder installed BIT 3 Magnetic ink sensor installed BIT 4 Escrow (document holding area) installed - 5665 only BIT 5 Pockets installed BIT 6 Recognition board installed BIT 7 Reject/envelope bin present (Bin 1) BIT 8 80 column capture bin present - 5665 only BITs 9-15 are reserved - always zero			
		DPM Read Fonts	4		
		BIT 0 CMC7 BIT 1 E13B BIT 2 OCRA Numeric BIT 3 OCRA Alphanumeric BIT 4 OCRB Numeric BIT 5 OCRBS BIT 6 OCRB Alphanumeric BIT 7 IBRO BIT 8 Farrington 7B BITs 9-15 are reserved - always zero			
		DPM Encode Fonts	4		
		BIT 0 E13B BIT 1 CMC7 BIT 2 OCRA BIT 3 OCRBS BITs 4-15 are reserved - always zero			
		DPM Custom Fonts	4		
		If a bit is set, the correspondingly numbered font, 'CUSTOMxx', is available. 'xx' is in the range 00-15, corresponding with each bit set in the bit-mapped word.			
		DPM Recognition Networks	16		
		This consists of four groups of four characters. Each group holds a unique identification number of a currently-loaded recognition net.			
		DPM Barcode Types	4		
		BIT 0 uss_128 BIT 1 uss_25 BIT 2 uss_39 BIT 3 uss_codabar BIT 4 uss_93 BITs 5-15 are reserved - always zero			

Device Identifier	ASCII Value (Hex)	Device Name and Associated Configuration Data	Data Length	Tally Group	Log Group
		DPM Custom Barcode Types	4		
		If a bit is set, the correspondingly numbered barcode, 'CUSTOMxx', is available. 'xx' is in the range 00-15, corresponding with each bit set in the bit-mapped word.			
		DPM Cursive Script Neural Networks	4		
		0000     None currently supported			
^	5E	<b>CDM Tamper Indicators **</b>	var (2)	-	-
	01	Present			
-	5F	<b>DPM Tamper Indicators **</b>	var (2)	-	-
	01	Present			
a	61	<b>Digital Audio Service*</b>	var (2)	-	C
	01	Present			

\* Native mode status messages can be received for these devices

\*\* These TI conditions are reported with an Alarms/TI Bins DIG (P)

## Supplies Data

The following table summarises the supplies data associated with each device.

Device Identifier	ASCII Value (Hex)	Device Name and Associated Configuration Data	Data Length	Tally Group	Log Group
A	41	<b>Time-of-Day Clock *</b>		A	A
		This Device Identifier is never returned in the supplies field			
B	42	<b>High Order Communications</b>		B	B
		This Device Identifier is never returned in the supplies field			
C	43	<b>System Disk</b>		C	C
		This Device Identifier is never returned in the supplies field			
D	44	<b>Magnetic Card Reader/Writer *</b>	var (1)	D	C
		Card capture bin	1		

## Device Identifiers

## Device Identifiers

Device Identifier	ASCII Value (Hex)	Device Name and Associated Configuration Data	Data Length	Tally Group	Log Group
E	45	<b>Cash Handler *</b>	var (5)	E	C
		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		
F	46	<b>Envelope Depository *</b>	var (1)	F	C
		Envelope deposit bin	1		
G	47	<b>Receipt Printer *</b>	var (4)	G	C
		Receipt printer paper	1		
		Receipt printer ribbon	1	1. See Note	
		Receipt printer print-head	1		
		Receipt printer knife	1		
H	48	<b>Journal Printer *</b>	var (3)	H	C
		Journal printer paper	1		
		Journal printer ribbon	1	1. See Note	
		Journal printer print-head	1		
I	49	Reserved		I	C
		This Device Identifier is never returned in the supplies field			
J	4A	Reserved		J	C
		This Device Identifier is never returned in the supplies field			
K	4B	<b>Night Safe Depository *</b>	var (1)	K	C
		Night safe bin	1		
L	4C	<b>Encryptor *</b>		L	C
		This Device Identifier is never returned in the supplies field			
M	4D	<b>Security Camera *</b>	var (1)	M	C
		Security camera film	1		
N	4E	<b>Door Access System *</b>		N	C
		This Device Identifier is never returned in the supplies field			
O	4F	<b>Off-Line Disk</b>		O	C
		This Device Identifier is never returned in the supplies field			
P	50	<b>TI Bins (Alarms) *</b>		-	-
		This Device Identifier is never returned in the supplies field			

Device Identifier	ASCII Value (Hex)	Device Name and Associated Configuration Data	Data Length	Tally Group	Log Group
Q	51	<b>Cardholder Keyboard</b>  This Device Identifier is never returned in the supplies field	-	-	-
R	52	<b>Operator Keyboard</b>  This Device Identifier is never returned in the supplies field	-	-	-
S	53	<b>Cardholder Display</b>  This Device Identifier is never returned in the supplies field	-	-	-
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	<b>Statement Printer</b> *  Statement printer paper Statement printer ribbon Statement printer print-head Statement printer knife Statement printer capture bin	var (5)	V	C
W	57	Reserved  This Device Identifier is never returned in the supplies field	-	-	-
X	58	Reserved  This Device Identifier is never returned in the supplies field	-	-	-
Y	59	<b>Coin Dispenser</b> *  Coin dispenser hopper 1 Coin dispenser hopper 2 Coin dispenser hopper 3 Coin dispenser hopper 4	var (4)	Y	C
Z	5A	<b>System Display</b>  This Device Identifier is never returned in the supplies field	-	-	-
[	5B	<b>Media Entry Indicators</b>  This Device Identifier is never returned in the supplies field	-	-	-
\	5C	<b>Envelope Dispenser</b>  Envelope dispenser hopper	var (1)	\	C

## Device Identifiers

### Device Identifiers

Device Identifier	ASCII Value (Hex)	Device Name and Associated Configuration Data	Data Length	Tally Group	Log Group
]	5D	<b>Document Processing Module *</b>	var (8)	]	C
		DPU encoder ribbon	1		
		DPU front printer inkwell	1		
		DPU rear printer inkwell	1		
		Reserved (0)	1		
		DPM Reject/Envelope Bin (Bin 1)	1		
		DPM Pocket A	1		
		DPM Pocket B	1		
		DPM Pocket C (0 on DP-ATM)	1		
^	5E	<b>CDM Tamper Indicators **</b>	-	-	-
		This Device Identifier is never returned in the supplies field			
-	5F	<b>DPM Tamper Indicators **</b>	-	-	-
		This Device Identifier is never returned in the supplies field			

\* Native mode status messages can be received for these devices

\*\* These TI conditions are reported with an Alarms/TI Bins DIG (P)

**Note:** Always 1 (Good State) for Thermal printers.

## 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.

Device Identifier	ASCII Value (Hex)	Device Name and Associated Configuration Data	Data Length	Tally Group	Log Group
A	41	<b>Time-of-Day Clock *</b>	var (1)	A	A
		Fitness Time of Day Clock	1		
B	42	<b>High Order Communications</b>	var (1)	B	B
		Fitness High Order Communications	1		
C	43	<b>System Disk</b>	var (1)	C	C
		Fitness system disk	1		
D	44	<b>Magnetic Card Reader/Writer *</b>	var (1)	D	C
		Fitness magnetic card	1		

Device Identifier	ASCII Value (Hex)	Device Name and Associated Configuration Data	Data Length	Tally Group	Log Group
E	45	<b>Cash Handler</b> *	var (5)	E	C
		Fitness cash handler	1		
		Fitness cassette type 1	1		
		Fitness cassette type 2	1		
		Fitness cassette type 3	1		
		Fitness cassette type 4	1		
F	46	<b>Envelope Depository</b> *	var (1)	F	C
		Fitness depository	1		
G	47	<b>Receipt Printer</b> *	var (1)	G	C
		Fitness receipt printer	1		
H	48	<b>Journal Printer</b> *	var (1)	H	C
		Fitness journal printer	1		
I	49	Reserved		I	C
		This Device Identifier is never returned in the fitness field			
J	4A	Reserved		J	C
		This Device Identifier is never returned in the fitness field			
K	4B	<b>Night Safe Depository</b> *	var (1)	K	C
		Fitness night safe depository	1		
L	4C	<b>Encryptor</b> *	var (1)	L	C
		Fitness encryptor	1		
M	4D	<b>Security Camera</b> *	var (1)	M	C
		Fitness security camera	1		
N	4E	<b>Door Access System</b> *	var (1)	N	C
		Fitness door access system	1		
O	4F	<b>Off-Line Disk</b>	var (1)	O	C
		Fitness off-line disk	1		
P	50	<b>TI Bins (Alarms)</b> *		-	-
		This Device Identifier is never returned in the fitness field			
Q	51	<b>Cardholder Keyboard</b>	var (1)	-	-
		Fitness cardholder keyboard	1		

## Device Identifiers

## Device Identifiers

Device Identifier	ASCII Value (Hex)	Device Name and Associated Configuration Data	Data Length	Tally Group	Log Group
R	52	<b>Operator Keyboard</b>  This Device Identifier is never returned in the fitness field	-	-	-
S	53	<b>Cardholder Display</b>  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	<b>Statement Printer *</b>  Fitness statement printer	var (1) 1	V	C
W	57	Reserved  This Device Identifier is never returned in the fitness field	-	-	-
X	58	Reserved  This Device Identifier is never returned in the fitness field	-	-	-
Y	59	<b>Coin Dispenser *</b>  Fitness coin dispenser Fitness hopper 1 Fitness hopper 2 Fitness hopper 3 Fitness hopper 4	var (5) 1 1 1 1 1	Y	C
Z	5A	<b>System Display</b>  This Device Identifier is never returned in the fitness field	-	-	-
[	5B	<b>Media Entry Indicators</b>  This Device Identifier is never returned in the fitness field	-	-	-
\	5C	<b>Envelope Dispenser</b>  Fitness envelope dispenser	var (1) 1	\	C

Device Identifier	ASCII Value (Hex)	Device Name and Associated Configuration Data	Data Length	Tally Group	Log Group
]	5D	<b>Document Processing Module *</b>	var (14)	]	C
		Fitness DPM core components	1		
		Fitness DPU rear camera	1		
		Fitness DPU front printer	1		
		Fitness DPU rear printer	1		
		Fitness DPU encoder	1		
		Fitness DPU magnetic ink detector	1		
		Fitness DPU recognition board	1		
		Fitness DPU printer interface	1		
		Fitness DPM Envelope/Reject Bin (Bin 1)	1		
		Fitness DPM Pocket A	1		
		Fitness DPM Pocket B	1		
		Fitness DPM Pocket C	1		
		Fitness DPM escrow	1		
		Fitness DPU double document detect	1		
^	5E	<b>CDM Tamper Indicators **</b>	-	-	-
		This Device Identifier is never returned in the fitness field			
-	5F	<b>DPM Tamper Indicators **</b>	-	-	-
		This Device Identifier is never returned in the fitness field			
a	61	<b>Digital Audio Service *</b>	var(1)	-	C
		Fitness Digital Audio Service	1		

\* Native mode status messages can be received for these devices

\*\* These TI conditions are reported with an Alarms/TI Bins DIG (P)

Device Identifiers  
**Device Identifiers**

## Appendix O

# DPM Error Data

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Overview	O-1
<b>DPM Error Data</b>	<b>O-2</b>
<b>DPM Parameter Error</b>	<b>O-2</b>
<b>Data</b>	<b>O-2</b>
Error Data Field Length = 1	O-2
Error Data Field Length = 10	O-2
<b>DPM Dog-Eared Document Error Data</b>	<b>O-3</b>
Dog-Ear Error Detected During Zone Verification	O-3
Dog-Ear Error Detected During Image Lift	O-4
<b>DPM Error During Position 'W'</b>	<b>O-4</b>
<b>DPM Error Data During Archive</b>	<b>O-7</b>
<b>DPM Error Data During Read</b>	<b>O-8</b>

Table of Contents  
**DPM Error Data**

## Overview

In this appendix we give you more information about DPM error data.

## DPM Error Data

### DPM Parameter Error Data

When the Error Code returned in the DPM error status message is Parameter Error, '?', the Error Data field may be either one or ten characters long.

**Note:** Write Lists and Write and Confirm Lists are a special case. See passage "DPM Error During Position 'W'" for details.

The error data should be analysed in association with the Error Position. The following table describes the contents of this field for those conditions:

#### Error Data Field Length = 1

Value	Description
'1'	Invalid Selector. An Enable Code was supplied in the Transaction Reply message which could not be found in the DDF.  The Transaction Reply message requested that the DDF should supply the Pocket destination, but the Pocket in the DDF is either not within range or not present.
'5'	Invalid Data. The document name specified is not present in the DDF.
';'	Invalid Zone. The zone defined in the Courtesy Amount Verification List in the DDF is not a Courtesy Amount zone.
'<'	Device Unavailable. The DDF has requested a sub-device to be used which is not available.
'>'	Feature Unavailable. The DDF has requested a software feature to be used which is not available.

#### Error Data Field Length = 10

Zone lists may reference up to ten zones. Each of these zones is checked for validity before execution of the command. If one or more of these zones is found to be in error, ten characters are returned indicating, by position, which zone was in error and what the associated error was.

Value	Description
'0'	Good or Not Used. The zone definition is valid for this command or there is no zone defined for this position.
::	Unknown Zone. The zone name could not be found in the DDF.
::	Invalid Zone. The zone is not of a type acceptable to the command. For example, the command is Read and the zone type is Write.
'<'	Device Unavailable. The zone requires a hardware sub-device which is not available, for example, an Image Zone requiring the presence of the rear camera.
'='	Font Unavailable. A read zone specified a character font which is not available in the system.
'>'	Feature Unavailable. A zone has requested a software feature which is not available.

## DPM Dog-Eared Document Error Data

If it is detected during processing that the document has a 'dog-ear', (error code '='), an error message will be issued. A dog-eared document is one which has at least one of its corners folded or missing.

There is no error data included in the message if the dog-ear was detected during Identification (Position 'I').

The data in this field takes one of two forms, depending on the point at which the dog-ear was detected.

### Dog-Ear Error Detected During Zone Verification

The length of the error data field will be between one and ten characters. The error code warns Central that the zone verification that has just taken place may be subject to error, given that the document has at least one folded or missing corner.

The characters in this field are ordered in the same way as the zones in the document's associated Verify List in the DDF and indicate whether a zone is blank or not.

The following table summarises the values each character may take:

Value	Description
'B'	Zone is blank
'M'	Zone is not blank - zone is marked in some way

### Dog-Ear Error Detected During Image Lift

The length of the error data field will be 20. The error code warns Central that the document may be unprocessable because it has at least one folded or missing corner.

The characters in this field highlight the severity of the dog-ear problem. The field is divided into four groups of five characters, with the following meanings:

Group	Description
1	The (decimal) height of the last image lifted in pixels
2	The (decimal) length of the last image lifted in pixels
3	The (decimal) height of the dog-ear in pixels
4	The (decimal) depth of the dog-ear in pixels

**Note:** 1. There are 200 pixels to the inch.

**Note:** 2. The last image lifted is not necessarily the image containing the dog-ear.

**Note:** 3. The minimum dog-ear height reported is  $\frac{3}{8}$  inch.

### DPM Error During Position 'W'

The inclusion of error data in the DPM status message when the error position is 'W' indicates the condition of each of the selected print fields.

Each character in this field refers to the zone as it appears in the Transaction Reply or to the zone list. Each character may take the following values:

Value	Description
'0'	Good or Not Used - printing to this zone did not take place. The zone definition (in the list) is valid for this command or there is no zone defined for this position (in the list). However, at least one subsequent zone (in the list) is invalid.
'5'	Invalid Data - printing to this zone did not take place. The zone (in the list or otherwise) referenced an unavailable logo file.
':'	Unknown Zone - printing to this zone did not take place. The zone (in the list or otherwise) could not be found in the DDF.
';'	Invalid Zone - printing to this zone did not take place. The zone (in the list or otherwise) is not of a type acceptable to the command. For example, the zone type is Read.
'<'	Device Unavailable - printing to this zone did not take place. The zone (in the list or otherwise) requires a hardware sub-device which is not available, for example, a rear printer.
'='	Font Unavailable - printing to this zone did not take place. A zone (in the list or otherwise) specified a character font which is not available in the system.
'>'	Feature Unavailable - printing to this zone did not take place. A zone (in the list or otherwise) has requested a software feature which is not available.
'P'	Zone Printed - a print attempt was made to this zone. The zone has been printed on. No confirmation of whether the zone is now marked or not was requested.
'B'	Zone Remains Blank - a print attempt was made to this zone. The zone has been printed. However, confirmation was requested and the zone has remained blank.
'M'	Zone Is No Longer Blank - a print attempt was made to this zone. The zone has been printed. Confirmation was requested and the zone is now marked in some way.
'X'	Zone Has Not Been Printed On - printing to this zone did not take place. An error occurred before this zone could be printed on, or there is no zone specified in the list at this position or explicitly in the Transaction Reply message. Alternatively, it may indicate that the printer field is not a DPM printer field.

Value	Description
'!'	Zone Failed To Complete - a printing attempt may have been made to this zone. An error occurred during the printing of this zone.
'('	Zone Initial Lift Failed - printing to this zone did not take place. An error occurred during the first stages of a Write and Confirm command.
')'	Zone Secondary Lift or Verify Failed - a print attempt was made to this zone. An error occurred during the final stages of a Write and Confirm command.

### Example

The following printer fields are sent:

- a Print on Journal Device
  - b Print on DPM using explicit Write and Confirm Zone
  - c Print on DPM using explicit Write Zone
  - d Print on DPM using explicit Write and Confirm Zone
  - e Print on DPM using Write and Confirm List.
- 1 An error condition (other than a DDF type error) was detected during the printing of data specified in 'd' above. The Error Data will take the form:
- ```
XMP ! XXXXXXXXXXXXXXXXXXXXXXXXXX
```
- 2 The confirmation of printing in 'd' above indicates that the zone has remained blank. The Error Data will take the form:
- ```
XMPBXXXXXXXXXXXXXXXXXXXXXXXXXXXX
```
- 3 A zone in the Write and Confirm List in 'e' above is of the wrong type. The Error Data will take the form:
- ```
XMPM0000 ; 000XXXXXXXXXXXXXX
```
- 4 An error condition (other than a DDF type error or an Initial lift/Verify type error) was detected during the printing of the Write and Confirm List in 'e' above. The Error Data will take the form:
- ```
XMPM!!!!!! XXXXXXXXXXXXXXXXXX
```
- 5 An error condition was detected during the secondary image lift following the printing of the Write and Confirm List in 'e' above. The Error Data will take the form:

XMPM ) ) ) ) ) ) ) ) XXXXXXXXXXXXXXXXX

## DPM Error Data During Archive

If an archive attempt fails during the processing of a Process Document With Cash command, the error data associated with it will be 17 characters long, as summarised by the following table:

Character Position	Description	File Name
1	Image List - Image zone file n = 0	xxxxmmmm.mm0
2	Image List - Image zone file n = 1	xxxxmmmm.mm1
3	Image List - Image zone file n = 2	xxxxmmmm.mm2
4	Image List - Image zone file n = 3	xxxxmmmm.mm3
5	Image List - Image zone file n = 4	xxxxmmmm.mm4
6	Image List - Image zone file n = 5	xxxxmmmm.mm5
7	Image List - Image zone file n = 6	xxxxmmmm.mm6
8	Image List - Image zone file n = 7	xxxxmmmm.mm7
9	Image List - Image zone file n = 8	xxxxmmmm.mm8
10	Image List - Image zone file n = 9	xxxxmmmm.mm9
11	FRONTGLF.IMG (Full, Front, Grey)	xxxxmmmm.mmA
12	REARGLF.IMG (Full, Rear, Grey)	xxxxmmmm.mmb
13	FRONTGLR.IMG (Rescaled, Front, Grey)	xxxxmmmm.mmC
14	REARGLR.IMG (Rescaled, Rear, Grey)	xxxxmmmm.mmD
15	FRONTBIF.IMG (Full, Front, Binary image)	xxxxmmmm.mmE
16	REARBIF.IMG (Full, Rear, Binary image)	xxxxmmmm.mmF
17	Text File	xxxxmmmm.mmT

Field 'xxxx' is a number that uniquely identifies the archive which took place during the transaction. (It should not be confused with the TSN.) It will be in the range 0000-9999 and allows all the images which were archived at that point to be identified. It is incremented every time an attempt is made to archive a group of images. The number is set to 0000 on a 'cold start' and is held within NVRAM. It will roll over from 9999 to 0000 on the next increment.

Field ‘mmmm.mm’ is the Machine Number. This may be entered using the Supervisor function. Leading blanks will be replaced with ‘\_’.

The values that each character can take are as follows:

Value	Description
‘A’	Image has been successfully archived
‘!’	Archive error occurred during the archiving of this image
‘N’	Image has not been archived or was not selected to be archived

## DPM Error Data During Read

Error data will be present in the DPM Status Message if the error occurred during Position ‘R’ and the accompanying Error Code was DPM Failure ‘2’ or Misread ‘E’. In these cases the Error Data field may be up to ten characters long.

The length of the field will reflect the length of the Read List in the DDF associated with the current document definition. The position of each character in the field corresponds to the same position in the list.

Each character may take the following values:

Value	Description
‘0’	Read of this zone was successful or no zone in corresponding position in list
‘1’	Read was successful but may contain misread characters
‘2’	The data could not be read
‘4’	The barcode could not be read

## Appendix P Document Processing

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Overview	P-1
Document Processing	P-2
Introduction	P-2
A Typical DPM Transaction	P-2
Document Definition File	P-4
Document Zones	P-4
Zone Lists	P-6
A Typical Cheque	P-7
Printing Restrictions	P-8
DDF Overview	P-8
Identify Feature File	P-8
Lifting Document Images	P-8
Archiving Document Images	P-9
Example	P-12
Displaying Document Images	P-13
Printing Document Images	P-13

Table of Contents  
**Document Processing**

## Overview

In this appendix we give you more information about the document processing capability of NDC+ with a DPM.

# Document Processing

## Introduction

The DPM controls document processing with two files:

- The document definition file (DDF)
- The identify feature file (IFF).

Both files are created using a PC-based application referred to as D-Scribe. See *D-Scribe User Guide* for more information.

The document definition file describes the zones or areas of a document which may be read, printed on, imaged, have completion verified or courtesy amount read. The DDF must be present if a DPM is present.

The identify feature file contains information relating to the identification of each document which the DPM can recognise. The IFF must be present if the Identification Feature is present.

The initial DDF and IFF should be loaded onto each SST as part of the diskbuild process. See Appendix K, “NDC+ Diskbuild/2 Requirements”, for more information. When a terminal is updated with NDC+ version 5.00 software or beyond and a DPM is present, these files should also be installed.

**Note:** During the diskbuild process, PC interrupts will be allocated for the Document Processing Service. Please refer to the note on page 2 of Appendix K of this manual.

## A Typical DPM Transaction

The following example illustrates one simple transaction when using the DPM, and assumes a previously downloaded state flow. The state that the SST is in at each step is given in [square brackets].

- 1 The cardholder wishes to deposit a salary cheque and cash part of it. [CARD READ STATE]
- 2 At the INSERT CARD idle loop, the cardholder enters his card. [CARD READ STATE]
- 3 The screen changes to a suitable ENTER PIN screen and the cardholder enters a valid PIN. [PIN ENTRY STATE]
- 4 The screen changes to an FDK SELECTION screen and the cardholder selects and FDK indicating that he wishes to cash a cheque. [EIGHT FDK SELECTION STATE]

- 5 A PLEASE WAIT screen is displayed while Central accepts and replies to the cardholder's request. [TRANSACTION REQUEST STATE]
- 6 The DPM shutter is opened and the screen changes to an ENTER DOCUMENT screen requesting the cardholder to insert his cheque. The screen shows the required orientation of the cheque. A beeper is sounded while the deposit is awaited. [TRANSACTION REQUEST STATE, FUNCTION 'S' BEING EXECUTED]
- 7 The cardholder enters the document. The DPM shutter closes, the beeper stops and the screen changes to a PLEASE WAIT WHILE YOUR DOCUMENT IS PROCESSED screen. [TRANSACTION REQUEST STATE, FUNCTION 'S' BEING EXECUTED]
- 8 After a few seconds, the screen changes to a prompt screen which contains an image of the front of the cardholder's cheque. The cardholder is prompted to ENTER CASH REQUIRED. [ENHANCED AMOUNT ENTRY STATE]
- 9 The cardholder enters the desired sum. [ENHANCED AMOUNT ENTRY STATE]
- 10 The screen is changed to a READING COURTESY AMOUNT screen, indicating that the courtesy amount on the cheque is being checked against the amount entered. [COURTESY AMOUNT VERIFICATION STATE]
- 11 After a few seconds, the screen is replaced with a screen informing the cardholder to PLEASE WAIT while Central accepts and replies to the cardholder's request. [TRANSACTION REQUEST STATE]
- 12 Cash is then presented and the screen changes to a TAKE CASH screen. [TRANSACTION REQUEST STATE, FUNCTION 'S' BEING EXECUTED]
- 13 The cardholder takes the cash and the screen changes to YOUR DOCUMENT IS BEING ENDORSED. [TRANSACTION REQUEST STATE, FUNCTION 'S' BEING EXECUTED]
- 14 After a few seconds, the screen changes to a thank you screen informing the cardholder to TAKE CARD AND RECEIPT - YOUR CHEQUE HAS BEEN DEPOSITED. [CLOSE STATE]

- 15 The card and receipt are presented and the cardholder retrieves both.

This is only one example of a state flow, and many others are possible because of the flexibility in the Process Document With Cash Function, the Courtesy Amount Verification state and the DPM Accept Document state. See Chapter 2.1, “State Tables”, and Chapter 4.4, “Transaction Reply Commands”, for details.

## Document Definition File

The document definition file will contain descriptions of the types of documents that may be processed by the DPM. Each document defined within the DDF has an associated class, name and enable code.

Each document is associated with a class and therefore also with a set of zone lists. Each document defines the physical position of the zones within the lists uniquely. Each document may also define a set of additional zones external to the list.

For example, a class of class name CHEQUE may have a read list which includes a zone name CODELINE. A document identified by the document name MYBANK may define the position of this zone as the top right corner, while a document identified by the document name YOURBANK may define the position of this zone as the bottom left corner.

**Note:** The document name, class name and zone name must all be in uppercase characters for NDC+.

## Document Zones

The various document zones defined in the DDF for a particular document represent areas which are to have a particular function carried out on them, for instance, read, verify, write, write and confirm, image. These zones can be formed into lists. See “Zone Lists” passage later in this appendix. The following describes the various types of zones and their typical usage:

- 1 Read Zones are used to read information from the document. These zones allow printed or encoded information to be read from the document. The zone will specify the location and font of the read to be performed. Unreadable characters are returned as question marks and blank areas are returned as spaces. The read information is then masked using and ‘edit mask’ if one has been provided in the DDF. The read information is passed to Central in the Transaction Request message. See Chapter 3.1, “Transaction Request Messages”, for details.

- 2 Verify Zones are used to check whether an area of the document is blank or not. These zones are used to verify that specified zones are either blank or not blank. They are useful when determining whether a document has already been endorsed or not. They are not used to check the content of zones, but simply to see if a specified area contains a mark of any type. The usage of zone verification is detailed in the Transaction Reply message. See Chapter 4.4, "Transaction Reply Commands".
- 3 Image Zones are used to define areas to be used for display and/or forwarding purposes. These zones define which areas of the document may be lifted for displaying and/or archiving. Each image zone has associated with it a filename. This filename is allocated through the use of the D-Scribe tool. See *D-Scribe User Guide* for details. It is important not to assign a full path name to such filenames when constructing the DDF because this will conflict with NDC+'s usage of the DDF. A full path name would potentially cause the image lifted to be placed in an area that is inaccessible to NDC+. Therefore, when filenames are associated with image zones, it is important that only the filename is given. The usage of image zones is detailed later in this appendix.
- 4 Write Zones are used to write data to specified areas of the document. These zones may be used for encoding purposes such as printing machine-readable data onto a document, for instance, an amount. They may also be used to print text or graphics onto a document, for example, the logo of the 'Bank Of First Deposit'. Further usage includes the endorsement of documents to show to what extent the document has been processed, for example, PAID, together with the date and time of endorsement. See Chapter 4.4, "Transaction Reply Commands", for more details of printing data on documents.
- 5 Write And Confirm Zones are used to write data to a specified area and then verify that the area is no longer blank. These zones may be used in the same way as write zones. They are preferable to write zones because they have an inbuilt ability to confirm that a printing activity has taken place. The confirmation of printing indicates that a zone now contains a mark of some kind, although it does not guarantee that the zone was successfully printed. While they are preferable to conventional write zones they are slower to execute due to the intensive processing which takes place before and after the printing activity. See Chapter 4.4, "Transaction Reply Commands", for more details of printing data with confirmation.

- 6 The Courtesy Amount Verification Zone is used to read the handwritten or printed numbers representing the value of the document. The courtesy amount on a cheque holds the amount in a numerical form. It should not be confused with the legal amount which is the amount written or printed in words. In order that the courtesy amount can be read, the document must have an associated ‘Courtesy Amount List’ . This list is different from the others in that it contains only one zone, because there is only one courtesy amount zone per document. See Chapter 2.1, “State Tables”, for details.

### Zone Lists

The various types of zone defined within the DDF may be grouped into lists as follows:

- Read Lists
- Verify Lists
- Image Lists
- Courtesy Amount Lists
- Write Lists
- Write And Confirm Lists.

Each document definition has one list of each type.

These lists are generated using the D-Scribe tool and are associated with the class of the document. See *D-Scribe User Guide* for details. Each list, except the Courtesy Amount List, can contain up to ten zone entries. The Courtesy Amount List contains only one zone.

You must use such lists to perform the following activities:

- Reading
- Verifying
- Imaging
- Courtesy Amount Verifying

It is necessary, therefore, for each class and document defined in the DDF to have lists defined for these functions. Failure to include such lists will result in a status message being issued to Central when the associated function is attempted. See Chapter 2.1, “State Tables”, and Chapter 4.4, “Transaction Reply Commands”, for more details.

You do not have to use these lists to perform the following activities (although they are allowed):

- Write
- Write And Confirm

NDC+ allows Central to write explicitly to an individual, or group of individual, write and/or write and confirm zones. NDC+ also allows Central to request explicitly that the write list and/or write and confirm list for that document be actioned. See Chapter 4.4, "Transaction Reply Commands", for details.

### A Typical Cheque

To highlight what form a zone may take, consider a typical cheque:

---

Figure P-1  
A typical cheque

A typical cheque from First National Bank. The fields filled in are:  
Pay \_\_\_\_\_  
or Order  
£  
A. N. Other \_\_\_\_\_  
010015 80 0724 00718726 11

If we had two print zones defined for this typical cheque, say Print\_Zone\_1 and Print\_Zone\_2, they may appear in the following positions:

---

Figure P-2  
Print zones

The same typical cheque as above, but with two print zones labeled:  
Print\_Zone\_1 points to the date field (80-07-24, October 23 19 92).  
Print\_Zone\_2 points to the amount field (£ 279.00).

The positioning, size and font of these print zones would be defined in the DDF entry for this document. Default data to be printed may also be included in the DDF.

The example given above is for write zones but it may also apply to the other types of zone.

## Printing Restrictions

You must take care when you stipulate the use of write or write and confirm zones. If a zone is too small for the text to be printed on, the zone will be ‘overrun’ and areas outside the zone will be printed on but this will not be reported as an error. However, if the data would have to pass beyond the boundary of the document, this would result in an error. See Chapter 3.5, “Device Fault Status Information - Native Mode”, for more information.

## DDF Overview

The DDF can be summarised as follows:

- The DDF consists of a number of document classes
- Each document class has a unique name
- Each document class consists of a number of zone lists
- Each zone list consists of a number of zones
- Each document belongs to a document class
- Each document has a unique document name
- Each document defines the contents of the zones in the lists for its own use
- Each document may have additional zones
- Each document has a unique enable code.

**Note:** Certain filenames are reserved by the utilities supporting the DPM. See *D-Scribe User Guide* for details.

---

## Identify Feature File

The identify feature file contains descriptions of documents. These descriptions are used to identify and classify cardholder-entered documents. This file must be present if the DPM identification feature is supported but otherwise it is optional.

---

## Lifting Document Images

Each image zone in the image list specifies per document the position of the zone to be lifted. The zone also has a filename associated with it. It is the file referenced by the filename which holds the lifted image and it is this filename which is used when displaying or archiving the image.

**Note:** Only NCR Format images can be displayed on the terminal.

Full front and rear images may also be lifted, and this is carried out independently of the image list.

The lifting of images is controlled using the Transaction Reply message or the DPM Document Accept state. See Chapter 2.1, “State Tables”, or Chapter 4.4, “Transaction Reply Commands”, for details.

The following table summarises the filenames and respective contents for the independently lifted front and rear images:

Filename	Scaling	Side	Resolution
FRONTGLF.IMG	Full	Front	Grey level image (100 dots/inch)
REARGLF.IMG	Full	Rear	Grey level image (100 dots/inch)
FRONTGLR.IMG	Rescaled 2/3	Front	Grey level image (100 dots/inch)
REARGLR.IMG	Rescaled 2/3	Rear	Grey level image (100 dots/inch)
FRONTBIF.IMG	Full	Front	Binary image (200 dots/inch)
REARBIF.IMG	Full	Rear	Binary image (200 dots/inch)

Images lifted using the image list define their own attributes:

- Format Image Storage (NCR or TIFF)
- Image Type (grey level 100 dots/inch, grey level 200 dots/inch or binary 200 dots/inch)
- Compression (none or CCITT groups 4, 3 1D, 3 2D K2 or 3 2D K4).

**Note:** TIFF and compressed formats cannot be displayed by the terminal. See *D-Scribe User Guide* for more information.

## Archiving Document Images

When Function ID 'S' (Process Document With Cash) is executed, images of the document may optionally be archived.

When an image list is defined for a class, the image zones defined within it may optionally be lifted after the document has been successfully entered and identified. This is controlled by the DPM Image Lift field in the Transaction Reply message or by the appropriate entry in the DPM Document Accept state. See Chapter 2.1, "State Tables", and Chapter 4.4, "Transaction Reply Commands", for details. This lifted image may be used for display purposes but may also be archived.

Each image zone in the image list specifies per document the position of the zone to be lifted. The zone also has a filename associated with it. It is the file referenced by the filename which is used to archive the lifted image.

If the images lifted using the image list are to be archived for future reference, for example, checking the deposited documents at the end of the day, the filename associated with the image zone should be given a name of the form 'STOREn.IMG', where 'n' is different for each image in the image list and is in the range 0-9. In this way, NDC+ can identify whether a lifted image is to be archived or not.

At a point defined by the DPM Process Document With Cash Function, NDC+ searches for files of the type 'STOREn.IMG'. If it finds any, it copies them to a group of files named 'xxxxmmmm.mmn' where:

'xxxx' is a number that uniquely identifies the archive which took place during the transaction. It has a valid range of 0000-9999 and allows all the images which were archived at that point to be identified. It is incremented every time an attempt is made to archive a group of images. It is set to 0000 on a 'cold start' and maintained in NVRAM. After reaching 9999, it will roll over to 0000.

'mmmmmm' is the machine number, which may be entered using Supervisor Mode. See *NDC+ Supervisor's Reference Manual* for details. Leading blanks are replaced by '\_'.

The position marked by 'n' holds the same value as the corresponding value in the STOREn.IMG filename.

After the files STOREn.IMG are copied to xxxxmmmm.mmn, another file is generated by NDC+. This file will have the name xxxxmmmm.mmT. 'xxxx' and 'mmmmmm' are defined as above. 'T' in the extension identifies this file as the file containing the Text Document Default Message. This file holds various information such as the TSN, date and time, to allow the images and transaction data to be cross-referenced.

Full front and rear images may be lifted and archived independently of the image list. These front and rear images will be archived, if requested, as follows:

Filename	Scaling	Side	Resolution
xxxxmmmm.mmA	Full	Front	Grey level image (100 dots/inch)
xxxxmmmm.mmB	Full	Rear	Grey level image (100 dots/inch)
xxxxmmmm.mmC	Rescaled 2/3	Front	Grey level image (100 dots/inch)

Filename	Scaling	Side	Resolution
xxxxmmmm.mmD	Rescaled 2/3	Rear	Grey level image (100 dots/inch)
xxxxmmmm.mmE	Full	Front	Binary image (200 dots/inch)
xxxxmmmm.mmF	Full	Rear	Binary image (200 dots/inch)

‘xxxx’ and ‘mmmmmm’ have the same meanings as above. The characters ‘A’ - ‘F’ indicate to which front/rear image they refer.

All of these archivable files are placed in a storage directory on the system disk, \NDCARCH. If this directory cannot be created, any subsequent attempt to use it results in a solicited error message being issued.

All non-archived image files lifted during Function ‘S’ will be flushed from the system:

- On entry to the Card Read state
- When the DPM has been enabled to accept a document
- During the Close state.

Images lifted using the image list will also be flushed if the current document definition changes.

If any part of the storage operation fails, a DPM solicited status message is sent to Central. If the area allocated for the storage of images is approaching capacity (90% full), a DPM unsolicited status message will be issued.

If the storage area becomes full, Central may switch off image storing until further notice, thus inhibiting any further solicited messages associated with the storage operation.

To recover the archived files and to restore the available storage area, the supervisor function ‘Dump Images’ must be used. See *NDC+ Supervisor’s Reference Manual* for details.

## Example

The following shows how the above storage mechanism works. It assumes that Central has requested that the zones identified for saving in the image list should be saved and that full front and rear grey level images of the document are archived.

- 1 The document has already been entered and has been successfully identified such that the current document definition is:

CHQ\_SOME BANK\_1

- 2 This document's class has an image list associated with it containing the following zone names:

IZONE\_CODELINE

IZONE\_NAME

IZONE\_WRTNAMOUNT

- 3 These zones each have an associated filename which NDC+ uses to identify whether the image is to be archived or not.

IZONE\_CODELINE                   assoc. filename = CODELINE.IMG

IZONE\_NAME                        assoc. filename = NAME.IMG

IZONE\_WRTNAMOUNT                assoc. filename = STORE1.IMG

- 4 NDC+ examines the filenames and produces the following archived files:

12345555.55A (containing the full, front, grey-level image)

12345555.55B (containing the full, rear, grey-level image)

12345555.551 (containing the image defined by  
IZONE\_WRTNAMOUNT)

12345555.55T (containing the default message, TSN, date, time)

Where 1234 is the archive number and 55555 is the machine number.

- 5 The files are later dumped to disk using the supervisor function 'Dump Images'. These images may then be inspected at a remote PC.

## Displaying Document Images

Images of part or all of a document may be lifted during a transaction or during a DPM Document Accept State.

This lifting may be done using image lists, where each zone in the list defines the name of the file into which the image is to be placed. In addition, images of the front and rear of the document may also be lifted.

The NCR-formatted lifted images may then be displayed using the 'Display Image Files' control sequence:

DCS 'E' (45 hex ASCII) P1 ST

Where P1 is an ASCII string containing the filename of the image file, for example, AMOUNT.IMG is the filename associated with an image zone defining the position of the handwritten amount. When a screen containing this control sequence is displayed, the image either will be drawn starting from the top left corner or will be centred around the current cursor position.

This escape sequence may be summarised as:

DCS <control string command> <control string parameters> ST

Where DCS is ESC 'P' (1B hex 50 hex ASCII) and ST is ESC '/' (1B hex 5C hex ASCII).

The image files available for display purposes are held either in the root directory of the DPM RAM drive (if one was set up at installation time) or in the \S4DPMIMG directory of the system disk.

All non-archived image files lifted during Function 'S' will be flushed from the system:

- On entry to the Card Read state
- When the DPM has been enabled to accept a document
- During the Close state.

Images lifted using the image list will also be flushed if the current document definition changes.

## Printing Document Images

Document images may be printed on the receipt and journal printers using the standard Print Graphics control sequence

ESC 'G' *filename* ESC '\'

where *filename* is the name of the file that holds the image you want to print. The file will be in uncompressed NCR Image 1 format.

In order to determine whether the file named by *filename* is a document image or a pre-loaded Epson graphics file, the system looks for *filename* in the three reserved screens K11, K12 and K13. If found in these screens, the *filename* is treated as a document image; otherwise it is treated as an Epson graphics file. The reserved screens also specify single or double density printing, the rotation of the document image, and the compression ratio. By default, screen K11 refers to the file CAZONE.IMG; screens K12 and K13 contain no characters.

For full details, refer to section 2.4, *Print Graphics*, in this manual.

Appendix Q

# Calculating Touch Screen Positions

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Overview

Q-1

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Calculating Touch Screen Positions

Q-2

The Unary Co-Ordinate System

Q-2

Co-Ordinate Format

Q-3

Example

Q-4

Table of Contents

## Calculating Touch Screen Positions

## Overview

In this appendix we show the format of the co-ordinates that are used to define touch areas on the screen and explain how to calculate them.

Alternatively, you can use the NDC+ Keyboard Tool. See the *NDC+ Keyboard Tool, User's Guide* for details.

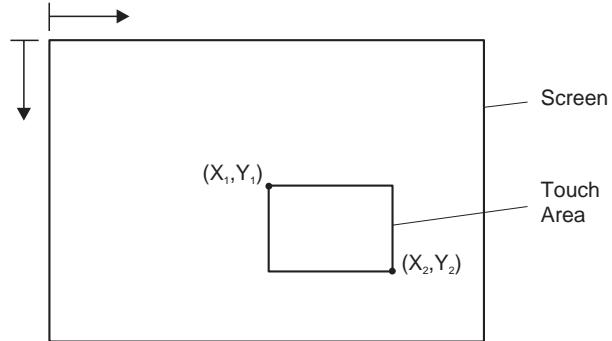
# Calculating Touch Screen Positions

## 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),  $0 \leq (X, Y) < 1$ . Thus each co-ordinate is defined as decimal fractions of the width and height of the physical screen.

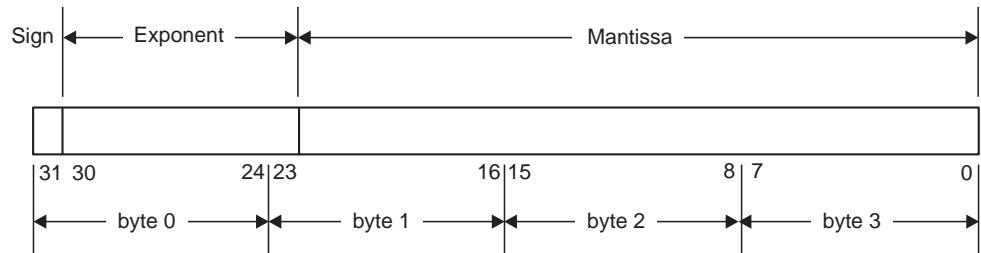
Figure Q-1 Co-ordinates



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 Q-2 Format For Floating Point Numbers



A co-ordinate is calculated using the following formula:

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

where:

exp is a value in the range 0-255

mant is a value in the range 0-2<sup>23</sup>

## 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:

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

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

## Calculating Touch Screen Positions

### Calculating Touch Screen Positions

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

## Example

In this example, we convert the number 0.635 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 exp:

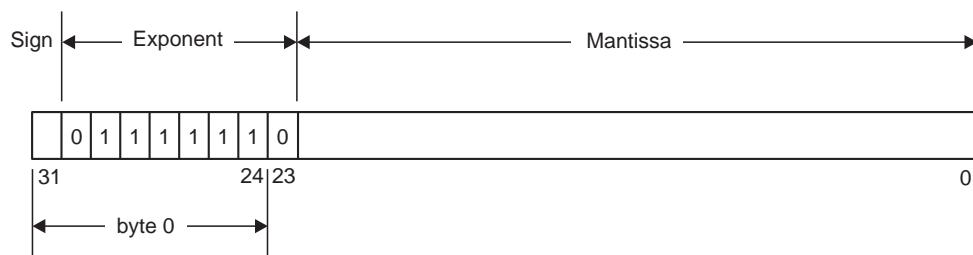
$$A = \text{exp} - 127 = -1$$

$$\text{exp} = 126 = 7E \text{ hex}$$

$$\text{exp} = 01111110 \text{ bin}$$

---

Figure Q-3 Calculate Exponent



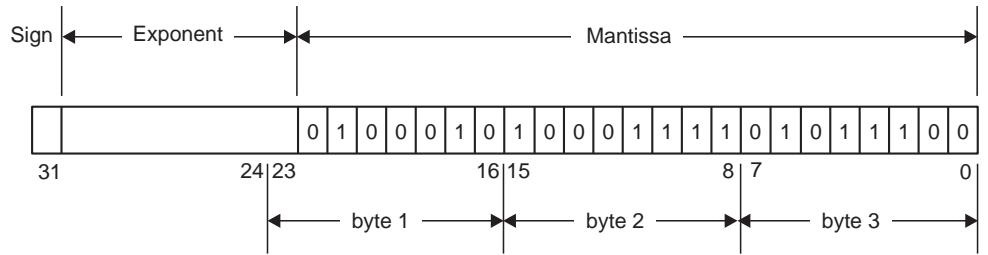
4 To calculate mant:

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

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

$$\text{mant} = 0100010\ 10001111\ 01011100 \text{ bin}$$

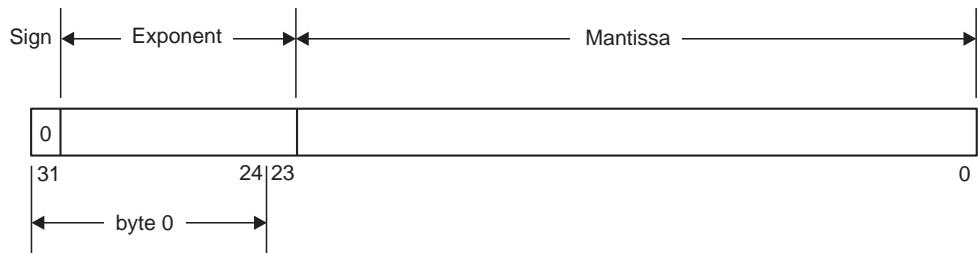
Figure Q-4 Calculate Mantissa



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

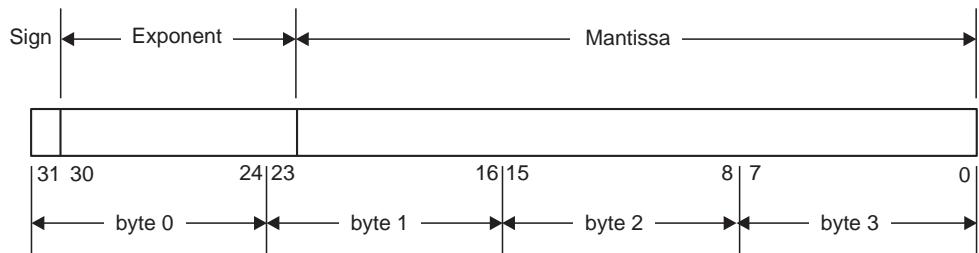
$$\text{sign} = 0$$

Figure Q-5 Sign



**6** Putting all these together, we have the following:

Figure Q-6 Co-ordinate Calculation



## Calculating Touch Screen Positions

### Calculating Touch Screen Positions

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?.

Appendix R

# Understanding the Digital Audio Service

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## Overview

R-1

Understanding the Digital Audio Service	R-2
What the Digital Audio Service Is	R-2
How to send messages for annunciation	R-2
File numbers	R-3
Numerical data	R-3
Example	R-4
Privacy Features	R-4
Audio Jack	R-4
Suppression of audible echo in sensitive states	R-4
Volume levels	R-4
Volume levels as supplied	R-5
Default volume set by Supervisor	R-5
Volume Set by Cardholder	R-5
Close State	R-5
Time-out State	R-5
Files and Directories	R-6
Files Required	R-6
The NDC+ Audio File	R-6
Multiple language services	R-7
Default local language	R-8
States affecting choice of language	R-8
Disk space requirement	R-8
How to prepare your own audio files	R-8
Recording new audio messages	R-8
Numbers in foreign languages	R-9

Table of Contents

**Understanding the Digital Audio Service**

# Overview

This appendix tells you about the Digital Audio Service (DAS). It contains the following sections:

- **What the Digital Audio Service offers**

This section explains the purpose of the Digital Audio Service and describes it briefly.

- **How to send messages for annunciation**

This section explains how to send messages which the Digital Audio Service announce to the cardholder.

- **Privacy features**

This section explains the features of the system which help maintain a user's privacy and the security of PIN numbers.

- **Volume levels**

This section explains how the terminal operator and the cardholder can adjust Digital Audio Service volume levels.

- **Files and directories**

This section lists and explains the files that must be present on the terminal in order for the Digital Audio Service to operate. It also explains what files must be provided in order to provide multi-language spoken messages.

- **How to prepare your own audio files**

This section explains the procedures you must follow in order to create new audio files.

# Understanding the Digital Audio Service

## What the Digital Audio Service Is

The Digital Audio Service (DAS) is available in NDC+ as of Release 6.00. It provides spoken messages which help visually impaired cardholders to use the terminal confidently and with ease. Messages are spoken through a loudspeaker and/or an audio jack fitted to the facia of the terminal. DAS has been developed as part of the American Access For All (AFA) program.

Before the Digital Audio Service was introduced, it was possible to supply standard audio messages which were played when a particular screen was displayed. With the Digital Audio Service you can provide two further types of message:

- Audible echo (of key pressed)

Audible echoes are digits which are spoken when a key is pressed. For example, when the cardholder keyboard is being audibly echoed, keying **100** will cause the Digital Audio Service to say ‘one’, ‘zero’, ‘zero’ as the keys are pressed.

- Spoken responses

Spoken responses are messages spoken to the cardholder in response to his actions or enquiries. For example, a typical spoken message in response to a balance enquiry is: ‘*Your balance is one thousand four hundred thirty dollars*’.

Audible echoes are turned off by default. The host can turn them on for specific transactions by setting Enhanced Configuration Option 31 to **001**. See “Enable Audible Echo of Keyboard” on page 2.6-9.

The Digital Audio Service does not provide any support for supervisor operations. It does not provide any echo for the rear interface at any time.

**Note:** During the diskbuild process, PC interrupts will be allocated for the Digital Audio Service. Please refer to the note on page 2 of appendix K.

## How to send messages for annunciation

The component parts of spoken responses are held in audio files. These reside in special directories on the terminal. Each audio file is identified by a number. Messages from the host tell the Digital Audio Service which files to play. A typical spoken response to the cardholder is made of several audio files played consecutively.

The host sends spoken responses to the terminal in the printer fields of Transaction Reply messages. Printer fields take effect in sequence: therefore, if a message is to be spoken before a second message is printed, the spoken message should precede the printed message in the Transaction Reply.

The next state in the state flow will not be executed until all audio messages have been played.

Spoken responses begin with the printer flag '>' (3E hex). This is followed by a sequence of *file numbers* and *numerical data*. You may interleave file numbers and numerical data. Both appear in the transaction reply message as ASCII digits separated by commas. *Numerical data* is enclosed in double quotation marks.

### File numbers

File numbers identify an audio file. If the sequence sent to the terminal were

>702,704

then the terminal would play the file identified by the number 702 followed by the file identified by the number 704. Typically a file will hold a phrase such as '*Your balance is*', '*dollars*' or '*Thank you for banking with us*'.

We explain how a file number identifies an audio file in the section "Files and Directories" on page R-6 .

### Numerical data

Numerical data is spoken to the cardholder as a number. It appears in a Transaction Reply message enclosed in double quotation marks. For example, if the sequence sent to the terminal were

>"1234"

then the terminal would speak to the cardholder '*one thousand two hundred thirty four*'. The *and* which is usually inserted after *hundred* is omitted, to simplify multi language support.

A number that is to be spoken to the cardholder must be fifteen or fewer digits in length. Extra digits will be ignored. Characters other than ASCII digits will also be ignored.

Two or more numbers may appear within double quotation marks, provided they are separated by commas, e.g.

>"1234,5678"

This would be spoken as '*one thousand two hundred thirty four, five thousand six hundred seventy eight*'.

## Example

If the sequence sent to the terminal in the Transaction Reply message were

>7 , "500" , 702 , 704

then the Digital Audio Service would play file number 7, speak the number '*five hundred*', and play files 702 and 704.

---

## Privacy Features

The privacy and security of the cardholder are assisted in two ways:

- An audio jack enables the cardholder to listen to audible echoes and spoken responses through headphones instead of through the terminal loudspeaker.
- The cardholder keyboard is not echoed in sensitive states. For example the PIN is not spoken aloud as the cardholder enters it.

## Audio Jack

In addition to a loudspeaker, the terminal is equipped with an audio jack. This enables the cardholder to listen to messages in privacy.

An entry in the State Table of the Audio Control State turns the loudspeaker and the audio jack on and off independently. If the Audio Jack is turned on, then the cardholder may insert the jack of a standard headset into the socket. See "i - Audio Control State" on page 2.1-80.

## Suppression of audible echo in sensitive states

NDC+ disables audible echo in sensitive states. Pressing a valid key causes a standard beep, while pressing an invalid key causes a distinctive tone to be played.

Sensitive states are:

- PIN related states
- Any state in which the keys are displayed on the cardholder keyboard as '\*'.

---

## Volume levels

The operator can set default audio volumes for the loudspeaker and the audio jack to suit local conditions. In addition, the Audio Control State gives the cardholder an opportunity to adjust the volume to a comfortable level.

A volume setting is a number between 0 (quietest) and 9.

## Volume levels as supplied

In the DEFALT file supplied with NDC+, the loudspeaker and audio jack volumes are both set to 5.

## Default volume set by Supervisor

The Supervisor can use options 31 and 32 on the Configure menu to adjust the default loudspeaker volume and the default audio jack volume to suit local conditions. The Supervisor can also use Option 11 of the Configure menu, SET DEFAULT, to save these defaults in the DEFALT file.

The default volumes set by the Supervisor are held in NVRAM. When recovering after a power failure, the terminal will attempt to set the default volumes to the levels held in NVRAM. If NVRAM has become corrupted, it will use the values held in the DEFALT file.

For details of how to set default volume levels in Supervisor mode, refer to the section 4 of the *Supervisor's Reference Manual*.

## Volume Set by Cardholder

Entries in the Audio Control State Table can enable and disable cardholder adjustment of the loudspeaker volume and of the audio jack volume.

If the state is set to allow the volume to be adjusted, the cardholder can adjust the volume of the loudspeaker and the audio jack to a comfortable level by pressing selected FDKs. The State Table specifies which FDKs will increase and decrease the volume. The cardholder presses Enter to set the volume level and go on to the next state.

The cardholder may also press the Cancel key. This sets the volume back to the default and exits the Audio Control State.

Full details of the Audio Control State are given elsewhere in this manual, under "Audio Control State" on page 2.1-3.

## Close State

On exit from the Close State, the terminal volume levels are returned to the defaults set by the Supervisor.

The loudspeaker is turned on in the Close State, and the audio jack is turned off.

## Time-out State

If there is no cardholder activity within the time specified by Timer 0, then the Time-out State Exit will be taken. You should ensure that the screen associated with this Time-out State has been modified for users with access difficulties, that is FDKs have been mapped to the PIN Pad and a suitable audio message is played.

## Files and Directories

The set of files you need depends on the standard of articulation that you want to achieve. Three types of articulation are possible:

**Minimum articulation:** This is sufficient to speak numbers digit by digit. For example, 1234 would be articulated as ‘one two three four’.

**Standard articulation:** This speaks numbers in the normal English form, except that ‘and’ is omitted after ‘hundred’. For example, 1234 would be articulated as ‘one thousand two hundred thirty four’.

**Fluent articulation:** In standard articulation, a distinct gap can be heard between the tens digit and the units: that is, between ‘thirty’ and ‘four’ in the above example. In fluent articulation, additional files enable the Digital Audio Service to speak numbers like ‘thirty four’ seamlessly. This form of articulation is also recommended for languages in which compound numbers (e.g. twenty-five) are formed in a different way from English.

### Files Required

The files required for articulation are provided with S4 and are detailed in the NCR publication *Programmer’s Manual for Digital Audio*.

### The NDC+ Audio File

The NDC+ audio file, NDCAUD, relates the file number sent in Transaction Reply messages to the actual pathname of the file which the Digital Audio Service will play.

This file is not provided with NDC+ and you will need to create it if you use the Digital Audio Service. NDCAUD must be held in the \SYSTEM directory.

It is an ASCII file containing entries with the following structure:

Field Name	Field Length	Content	Description
File Number	3	Three ASCII digits	File number
File Name	var	ASCII characters	File name enclosed in double quotation marks
Field separator	1	1C hex	

### The File Name

- must be enclosed in double quotation marks

- may be a complete path name
- should include the file extension, which will usually be .SPC.

For example, the following sequence is made up of two valid entries in the format of the NDCAUD file. It specifies the files that will be identified by the numbers 000 and 001:

000"C:\AUDIO0\ENTERAMT.SPC"fs001"C:\AUDIO0\THANKYOU.SPC"fs

Where *fs* is Field Separator.

NDC+ will ensure at power up that the directory \AUDIO0 is present and create it if required. If you wish to support multiple language audible echo, you will need to create directories for the other languages \AUDIO1, \AUDIO2, \AUDIO3, etc. See the section 'Multiple Language Services' later in this appendix for information on supporting multiple languages.

**Note** If there is an error in the three digit file number or if the Digital Audio Service is requested to play a file which is not in the table, the request will be ignored.

## Multiple language services

The mechanism for offering different spoken languages is analogous to the mechanism that offers different written languages on the terminal screen. Each language is associated with a directory and a group base. The Digital Audio Service adds the file number to the group base for the current language and looks up the total in the configuration file NDCAUD to find the name of the required file.

The directories \AUDIO0, \AUDIO1, \AUDIO2 etc. should each hold a complete set of speech files for a single language. This means that files representing numbers in different languages may have identical file names; for example, 1.SPC

### Default local language

The default language of the terminal has the group base **0**. Audio files in the default language must be held in the directory \AUDIO0.

### States affecting choice of language

**Language Select From Card** State **V**, Language Select From Card, determines the language group base and the associated audio directory.

**Language Code Switch** State **S**, Language Code Switch, does not determine the language group base nor the associated audio directory.

**Eight FDK Selection Function** State Y, Eight FDK Selection Function, may determine the language group base and the associated audio directory. This state is limited to FDK A selecting language 0, FDK B selecting language 1 and so forth.

### Disk space requirement

Audio files are large. For example, the file that invites the cardholder to type his secret number is about 30 KB in length. You should ensure that there is sufficient space available on the disk.

## How to prepare your own audio files

You are free to replace any of the audio files supplied with S4, or you can prepare your own audio files. Note that you should not delete or replace the file DAUDIO12.MSG. (For further information see the *Programmer's Manual for Digital Audio*).

### Recording new audio messages

You can record audio files using the Antex VP635 Sound Card. These files are SoundBlaster compatible.

In order to record new audio files:

- 1 Record the message onto audio tape using good quality sound recording facilities.
- 2 Instal the Antex VP635 Sound Card in a suitable PC and configure the Antex software as directed by the Antex manuals.
- 3 Connect the LINE IN socket on the Antex Sound Card to the LINE OUT socket of the audio tape player.
- 4 Follow the instructions provided with the Antex Sound Card for recording messages at 16 kHz and at the required volume.
- 5 Rename the audio files to the filenames that you require in your application.

### Numbers in foreign languages

The grammar of numbers in foreign languages may differ from the English grammar. If you intend articulating numbers in a foreign language, consider the following points:

- What names are given to the units, e.g. *hundred, thousand, million*?
- Do the units come before or after the numbers, e.g. do speakers say *five thousand* or *thousands five*?

- Is there a special grammar for numbers between 21 and 99? For example, in German, the units come before the tens: *funfundzwanzig*. If so, create and use a fluent articulation file set.
- Are there any special exceptions in the numbering system you are considering? For example, French says *deux cents* but *cent*, not *un cent*.

Understanding the Digital Audio Service  
**Understanding the Digital Audio Service**

## Appendix S

# Understanding the Digital Camera System

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## Overview

S-1

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Understanding the Digital Camera System	S-2
What The Security Camera Is	S-2
The Camera Control State	S-2
The Fill Camera Function	S-2
Film Cameras	S-3
The Digital Camera System	S-3
File Expiry	S-3
Power Supply Interruption	S-3
The Camera Delay Period	S-3
Data Stored With Picture	S-4
Swapping cameras	S-4

Table of Contents

**Understanding the Digital Camera System**

# Overview

This appendix explains the operation of the Digital Camera System (DCS). It covers

- **What the Security Camera is**

This section explains what the security camera is and what it is for.

- **Film Cameras**

This section explains the use of a film camera.

- **Digital Cameras**

This section explains the use of a digital camera.

- **Data stored with Picture**

This section explains what information can be stored along with pictures taken by the security camera.

- **How to swap cameras**

This section explains the precautions you must take if you need to replace the security camera, or if you want to upgrade it.

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# Understanding the Digital Camera System

## What The Security Camera Is

The security camera takes pictures of cardholders as they use the terminal.

Cameras may be film or digital. A film camera takes a photograph on film; a digital camera takes a photograph which is held in an electronic form. As well as a picture of the cardholder, the DCS can also include the following information on the picture:

- Date and Time. The DCS supports four different date formats, these are discussed later in this appendix.
- Primary Account Number (PAN).

The camera takes a picture:

- When the terminal enters the Camera Control State
- When the operator performs the Fill Camera function.

If Automatic Picture Taking is turned on, then the camera also takes a picture

- In the Card Read state
- During a Transaction Reply.

A configuration option and an enhanced configuration option control automatic picture taking. See pages 4.2-8 and 4.2-17.

### The Camera Control State

The camera takes a picture when the terminal enters the Camera Control State (State N).

The information stored with the picture depends on the type of camera installed and on the picture type. The picture type is controlled by an entry in the State Table.

For full details of the Camera Control State, refer to “N - Camera Control State” on page 2.1-39.

### The Fill Camera Function

The camera takes a picture after the operator replaces the film or electronic recording medium. This is done in order to test that the camera is working properly.

Some data is also stored with this picture. What is stored depends on the type of camera that is installed on the terminal:

For full details of the Fill Camera function, refer to Section 3 of the *NDC+ Supervisor's Reference Manual*.

## Film Cameras

Two types of film camera are supported: the 3M camera and the D/A camera. Both can take either a Type 0 or a Type 1 picture. The 3M is a *fixed format* camera; the D/A is a *variable format* type.

## The Digital Camera System

The Digital Camera System is the only type of digital camera supported. It does not use film, but stores pictures and data directly in an electronic form on optical disk.

### File Expiry

The optical disk used by the DCS can be re-used. Timer 83, the File Expiry Timer, can be set so that pictures on a used optical disk are deleted automatically when it is inserted in the terminal. The File Expiry Timer can be set to a value between 0 and 999. A value of 0 means that no deletion takes place. A value between 1 and 999 is the number of days after a picture has been taken that it can be deleted. NDC+ will store this value whether or not the Digital Camera System is configured.

Those pictures on the optical disk that are at least as old as the number of days set by the File Expiry Timer, will be deleted.

The Central application can find out how much optical disk space is left by requesting a Send Supply Counters message. For more information, see "Status Messages" in section 3.2 of this publication.

### Power Supply Interruption

When the terminal is recovering from a power supply interruption, it will reconfigure the Digital Camera Service. The configuration data will take the default values if there has been no download, or if the download has not been maintained.

### The Camera Delay Period

Each time the camera takes a picture, it is checked to make sure that it is still working properly. The terminal performs the test after a camera delay period which is 1/10 second by default; the purpose of the delay is to enable the camera to wind on the film. Timer 82, which sets the delay in tenths of a second, can be set to a number between 001 and 050. Values outside this range will be ignored. A timer setting of 030, 3 seconds, is recommended. Legal values for Time 82 will be stored by NDC+ regardless of whether a digital camera is configured or not.

## Data Stored With Picture

The data stored with a picture depends on the type of camera and on the type of picture. For information on the data stored see “N - Camera Control State” on page 2.1-39.

**Date formats** The Digital Camera System supports four formats for the date, while film cameras support two. You can select the date format by setting Enhanced Configuration Option 3, which can take the following values:

001	MMDD(YY)
002	DDMM(YY)
003 (DCS only)	YYMMDD
004 (DCS only)	YYDDMM

The date is used on photographs and also:

- when the DISP CONFIG function is used in the Configure Menu
- when the PRINT CONFIG option is used in the Configure Menu
- when the date printed is on the PPD
- when the date is printed by the DPM Envelope Depository action and by the DPM proper
- in the date header when the Electronic Journal is being dumped
- when the Replenish Menu’s Last Cleared date is displayed or printed
- in the security header on the journal

## Swapping cameras

If you need to replace the security camera, you should turn the terminal off before beginning work. When you have replaced the camera and turned the terminal on, you may want to change the date format: in particular, if the date format is 3 or 4 and you have replaced a digital camera with a film camera, the date format will be reset automatically to 1.

Appendix T

# Understanding Monitor Burn-In

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Grey Scale Monitor Burn-In	T-1
What is Monitor Burn-In ?	T-1
Example of Monitor Burn-In	T-1
How Do I Prevent Monitor Burn-In ?	T-2
Implementation	T-2

## Table of Contents

### **Understanding Monitor Burn-In**

## Grey Scale Monitor Burn-In

### What is Monitor Burn-In ?

The inside of a CRT (Cathode Ray Tube) is coated with phosphor. This element, when excited by electrons, will glow, producing an image on screen. With this continued electron bombardment, the phosphor coating will deteriorate. This shows itself as a 'browning' of the phosphor particles in the areas which have had the highest level of activation, that is, the parts of the screen which have shown the most white. This 'browning' is known as **BURN-IN**.

If an image or a number of images are displayed on a CRT constantly, or as part of a cycle of screens, the image or images will cause screen Burn-In. The severity of which will depend on:

- Intensity of graphics displayed
- Length of time spent in idle loop(s)
- Number of screens shown in idle loops(s)
- Phosphor choice on tube
- Brightness level of the display.

### Example of Monitor Burn-In

The screen starts with no image (Figure 1). An image is then displayed on screen, in this example (Figure 2), it is made up of the left half in black and the right half in full intensity white. This means only the white half has its phosphors activated and as such, these phosphors will deteriorate. Next, this image is shown for a period of time, allowing burn-in.

After the image has been burnt-in to the monitor, the right hand side will have a brownish look to it when the monitor is switched off. If a full white screen is displayed (Figure 3), the right hand side of the screen will appear duller than the left. This shows the effect of the deterioration of the phosphor coating on the right side of the screen.

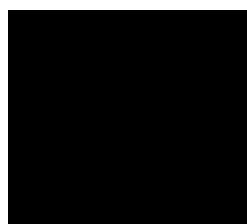


Figure 1

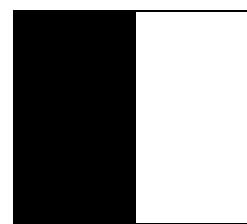


Figure 2

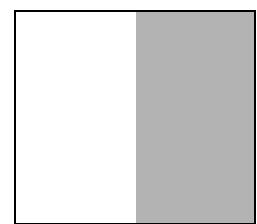


Figure 3

## How Do I Prevent Monitor Burn-In ?

Each graphic screen displayed in the idle loop should have a corresponding **negative** image which is also displayed during the idle loop **AND** for the same timespan as the **positive** image. This will exercise each pixel on screen to the same extent.

For example, a black pixel displayed in one image will be displayed as a white pixel in the corresponding negative image. A mid-grey pixel will remain the same in both original and negative image screens.

These guidelines should also be followed when choosing background and text colours and displaying partial pictures in the idle loop.

New screens should be designed with the negative image in mind.

## Implementation

To implement the CRT Screen Management Techniques:

- Create **negative** picture images using a graphics utility such as “Paint Shop Pro”
- Create screens using reversed background and text colours
- Create and install either a new or update disk suite that will incorporate the new images in your application on the terminal
- Modify the idle loop, at the host level, to reference the new screens

Equalise the length of time of the negative and positive image displays.

## Appendix U

# Smart Card Handling

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Smart Card Handling	U-1
Smart FIT Checks	U-1
Example Chip Data Read State	U-4
Some Possible Transaction Sequences	
Involving Smart Cards	U-4
Magnetic Smart Card, FIT Check on Magnetic Data	U-5
Non-Magnetic Smart Data, FIT Check on Smart Data	U-5
Magnetic Smart Data, FIT Check on Smart Data	U-6
Recommendations	U-6

Table of Contents

**Smart Card Handling**

## Smart Card Handling

The Smart Card functionality introduced to NDC+ at Release 6.02, allows a mixture of magnetic stripe cards, magnetic smart cards and non-magnetic smart cards to be used on the same terminal. The default condition is to only accept cards with a magnetic stripe (these may or may not also have a chip). If a terminal is set-up to accept non-magnetic cards, it will also accept magnetic cards.

There are some pre-conditions to being able to read non-magnetic card data :

- 1 The card reader hardware must be a smart card reader.
- 2 Byte 39 of the Enhanced Configuration Parameters Load message must be set to 001 (magnetic and non-magnetic cards accepted) to trigger non-magnetic accept commands for the card reader and enable the card reader to accept non-magnetic as well as magnetic cards. If this parameter is set to anything other than 001 or is missing, only magnetic accept commands will be sent to the card reader.
- 3 The text 'NON MAGNETIC ACCEPT = 1' must be present in the file \S4ini\mcrw.ini. If this configurable parameter is not set to 1, or is missing, a non-magnetic accept command sent to the card reader will cause a system escape as the command data will be invalid. The parameter must be set up at Diskbuild by manually editing the file on a diskbuild PC.

### Smart FIT Checks

Once the pre-conditions for non-magnetic cards have been met, FIT checks on smart data can be implemented using a combination of standard NDC+ states and user defined C-Exit states, as detailed below.

Refer also to the flow diagram that follows.

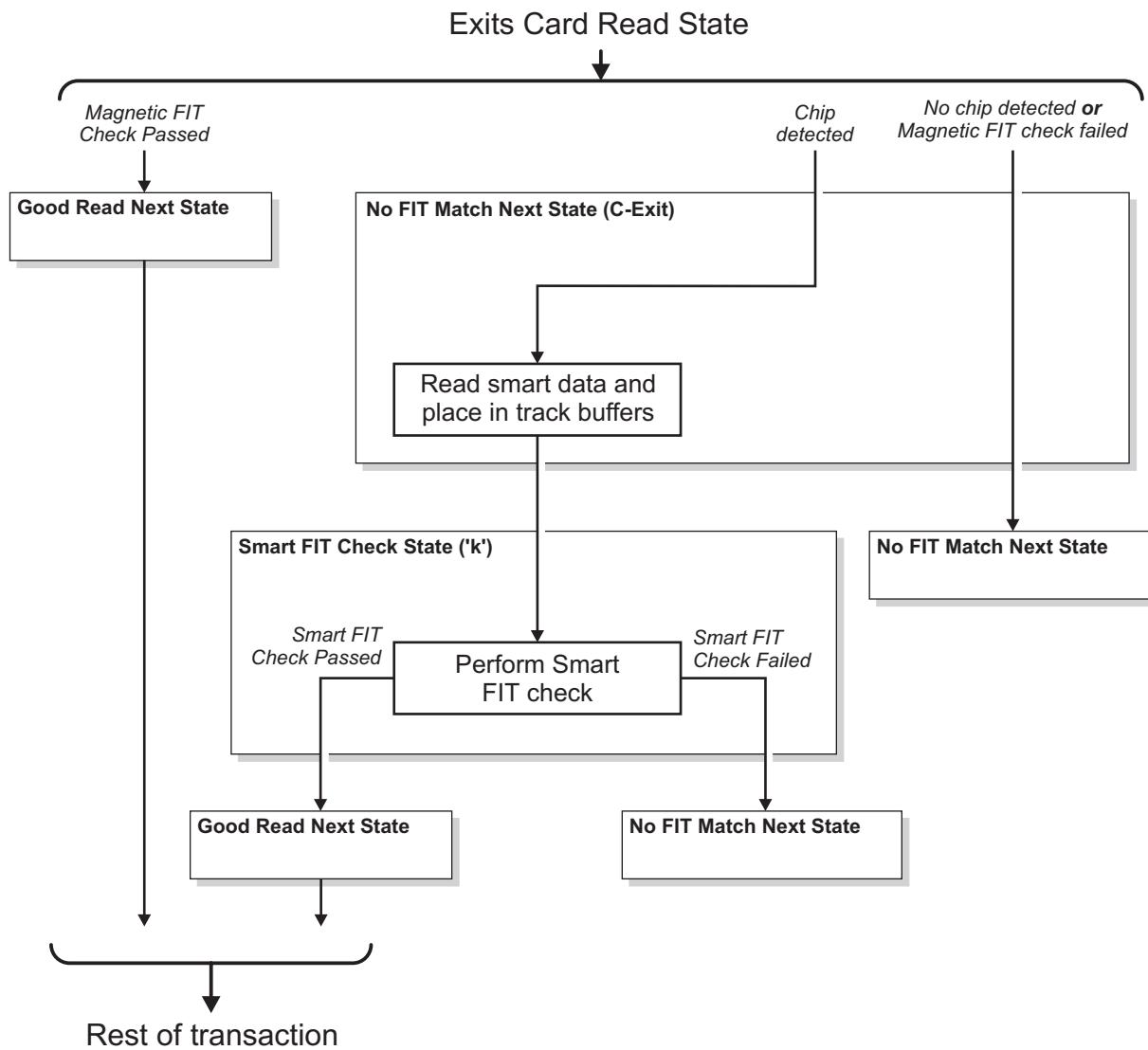
- State A 'Card Read' allows card entry and can read any combination of tracks 1, 2 and 3 from a card and will detect a chip. Read conditions are evaluated in order.
  - If all read conditions are magnetic only, the card tracks are read, the read conditions are evaluated in order and a FIT check is carried out. If the FIT check was successful, the transaction can proceed as usual. If the FIT check failed the next state will be the No FIT Match Next state.
  - If one or more of the read conditions has the chip connect bit set, the read conditions are handled slightly differently. If the current read condition being attempted has the chip connect bit set, the magnetic data necessary to meet that read

condition is read. If all the magnetic tracks required are present, the magnetic data for any subsequent read condition(s) is then read too. Only then is the card staged in the smart card position and the contacts engaged. This gathering of all the magnetic data for current and future read conditions is to save time spent moving the card in and out of the smart card position in the card reader as magnetic or smart data is needed.

- If a chip is not found on the staged card, it will be released and a check made for any magnetic only read conditions which have not already been evaluated. Where a magnetic read condition is found, a FIT check will be performed. Where no magnetic read conditions are found, the state will exit to the No FIT Match next state.
- If a chip is found the card will be left in the staged position and the next state specified as the No FIT Match next state.
- The No FIT Match next state should be a C-Exit state which would have two functions. If a chip has been detected, it would read 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 would exit, probably to a close state.  
Refer to NCR publication B006-0000-5102, '*Using NDC+ Exits*' for details of creating C-Exit states. For more details on how a No FIT Match next state might work, see the example of the C-Exit State 'Chip Data Read' state 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 2.1 'State Tables'.

**Note :** Amendments have been made to Close and Card Write States to enable smart card handling. These changes are invisible to the user, but allow the states to check a card's position and release it from the smart card stage position if necessary.

Figure U-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 should they be required.

Table Entry	Number of Characters	Contents	Description
1	1	State Type	This should be a letter chosen from those available for C-Exit States. See Chapter 2.1 'State Tables' for a list of state types.
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 in the wrong orientation.
5	3	Cancel Next State Number	State to which the terminal proceeds if the cardholder presses the Cancel key.

## Some Possible Transaction Sequences Involving Smart Cards

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 Parameter 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') - 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 NDC+ and C-Exit states may then be executed. See Note.
- Close State ('J') - card is returned to the cardholder and the transaction ends.

## Non-Magnetic Smart Data, FIT Check on Smart Data

This transaction involves a non-magnetic smart card only. A FIT check is performed on the smart data.

- Card Read State ('A') - cardholder enters a non-magnetic smart card. First read condition has only the chip connect bit set. 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.
- 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 NDC+ and C-Exit states may then be executed. See Note.
- 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 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') - 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.
- 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 NDC+ and C-Exit states may then be executed. See Note.
- 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 NDC+.

### Recommendations

Do not use non-magnetic card accept commands unless you have to handle non-magnetic smart cards. This means keeping enhanced configuration parameter 39 (Non-magnetic Card Accept) at its default value.

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 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 NDC+.

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.

# Glossary

## A

**ABA** American Bankers Association.

**ADI** Application Device Interface.

**ADM** Auto Depository Module. This allows cheques and other documents to be deposited in the terminal but it is only supported by NDC RMX.

**American Standard Code for Information Interchange (ASCII)** This is a computer code for representing alphanumeric characters.

**ASCII** See American Standard Code for Information Interchange.

**ATM** Automated Teller Machine.

**ATM/E** Automated Teller Machine/Emulation.

## B

**BAPE** See Basic Alpha PINpad and Encryptor.

**Basic Alpha PINpad and Encryptor** This provides a sub-set of the features of the Encryptor Keyboard Controller.

**BOP** Basic Operator Panel.

## C

**Card Display Translator (CDT)** This allows VGA applications written for a 56XX SST to be extended to include a range of VGM functionality.

**Cathode Ray Tube (CRT)** The screen on a terminal, monitor, television set or oscilloscope.

**CAV** See Courtesy Amount Verification.

**CDM** Coin Dispenser Module.

**CDT** See Card Display Translator.

**CIM86** Card Identification Module.

**Cold Start** This is the first time the terminal is powered up, with no previously downloaded software.

**Courtesy Amount Verification (CAV)** An NCR image processing utility that recognises the handwritten and machine-printed numeric courtesy amount field and verifies the read amount against the amount entered by the cardholder.

**cpi** characters per inch.

**CROPF** Card Return on Power Fail

**CRT** *See Cathode Ray Tube.*

**CSP** Customer Selectable PIN.

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D

**D/A** Digital/Analogue.

**DAS** Digital Audio Service.

**DCS** Digital Camera System.

**DDF** *See Document Definition File.*

**DEA2** Data Encryption Algorithm 2.

**DES** Data Encryption Scheme.

**DID** Device Identifier.

**DIG** Device Identifier Graphic.

**DLL** Dynamically Linked Library.

**Document Definition File (DDF)** The file that contains a definition of each type of document that is to be processed by the terminal and is created using D-Scribe.

**Document Processing Automated Teller Machine (DP-ATM)** An NCR 5675, 5685, 5688, or *persona*<sup>75/88</sup> Self-Service Terminal with a document processing module fitted.

**Document Processing Module (DPM)** The document processing module that fits into an NCR Self-Service Terminal.

**Document Processing Unit (DPU)** This is the 7731/7732 unit of the DPM which is responsible for document processing.

**DP-ATM** *See Document Processing Automated Teller Machine.*

**DPM** *See Document Processing Module.*

**DPU** *See Document Processing Unit.*

**D-Scribe** The NCR, PC-based authoring tool that runs under the OS/2 operating system. D-Scribe is used to create the DDF and the IFF.

---

E

**EBCDIC** *See Extended Binary-Coded Decimal Interchange Code.*

**EJ** *See Electronic Journal.*

**EKC** *See Encryptor Keyboard Controller.*

**Electronic Journal (EJ)** 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.

**Encryptor Keyboard Controller (EKC)** This provides high-level security for information entered at the keyboard.

**EOP** Enhanced Operator Panel.

**Exits** The general term covering user defined states, supervisor features, Virtual Controllers, and special synchronization routines called Hooks.

**Exit State** A state defined and programmed by the user.

**Exit Supervisor** A supervisor function defined and programmed by the user.

**Extended Binary-Coded Decimal Interchange Code (EBCDIC)** An eight-bit character code.

## F

**FDK** *See Function Display Key.*

**FIID** Financial Institution Identification Number.

**Financial Institution Table (FIT)** This contains details of where and how information is stored on the magnetic strip of the card and how a transaction should be processed.

**FIT** *See Financial Institution Table.*

**Function Display Key (FDK)** 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.

## G

**GBP** German Bank Pool.

## H

**HRI** Human Readable Interface characters.

**Hooks** General term for miscellaneous exits detailed in *MISCONT* file. See the NCR publication “Using NDC+ Exits.”

## I

**IBM** IBM Corporation.

**ID** Identifier.

**Identify Feature File (IFF)** The file that contains a description of the image features for each document in the DDF.

**IFF** *See Identify Feature File.*

**INTERBOLD** IBM/Diebold.

**Intercept routine** *See: Virtual Controller.*

**ISO** International Standards Organisation.

**ISS** In Service Supervisor.

**L**

**lpi** lines per inch.

**LRC** Linear Redundancy Check.

**LUNO** Logical Unit Number.

**M**

**MAC** See Message Authentication Code.

**Magnetic Card Reader/Writer (MCRW)** 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.

**Magnetic Stripe Reader (MSR)** 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.

**MCRW** See Magnetic Card Reader/Writer.

**MEI** Media Entry Indicator.

**Message Authentication Code (MAC)** This is a method of protecting messages which pass between the terminal and Central from interference.

**MISCONT** A rule file detailing miscellaneous Exits: Hooks.

**MINTS** Mutual Institutions Transfer System.

**MM** See Moduliertes Merkmal.

**Moduliertes Merkmal (MM)** A German card security system.

**MSR** See Magnetic Stripe Reader.

**N**

**NBS** National Bureau for Standards.

**NCR Direct Connect (NDC)** An NCR application that works in conjunction with a Central system to perform self-service transactions.

**NDC** See NCR Direct Connect.

**NDC RMX** This is third generation NDC on an RMX operating system.

**Non-Volatile Random Access Memory (NVRAM)** This kind of RAM retains information when the power is switched off.

**NVRAM** See Non-Volatile Random Access Memory.

**O**

**OS/2** An industry standard operating system.

**P**

**PAN** Primary Account Number.

**PCB** Printed Circuit Board.

**Personal Identification Number (PIN)** A secret identification number that is issued to each cardholder.

**PIN** *See* Personal Identification Number.

**PIN Verification Key Indicator** This is part of the PIN offset data used in VISA PIN verification.

**PIN Verification Value** This is part of the PIN offset data used in VISA PIN verification.

**PPD** *See* Programmable Printing Depository.

**Programmable Printing Depository (PPD)** This is one of the types of printer supported by NDC+.

**PVKI** *See* PIN Verification Key Indicator.

**PVV** *See* PIN Verification Value.

**R**

**RMX** This is the operating system used by third generation NDC.

**Rule File** A file which 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**

**SCSI** Small Computer Systems Interface.

**SDC** Serial Distributed Control.

**SM** Software Management. Software Management Installation Activity Messages.

**SOH** *See* State of Health.

**SST** Self-Service Terminal.

**State of Health (SOH)** This gives information to allow you to anticipate and prevent media shortages and device failures.

**Smart Card** A plastic card which operates with a microchip rather than a magnetic stripe.

**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.

T

**TABS** Total Automatic Banking Services.

**TCM** Terminal Control Module.

**Terminal Management (TM)** This application monitors the status of the terminal and ensures that it is open and ready for business for the maximum possible time.

**TI** Tamper Indication.

**TIFF** Tagged Image File Formats.

**TM** *See* Terminal Management.

**TOD** Time-of-Day.

**TPA** Transaction Processing Application (NDC Application).

**TSN** Transaction Serial Number.

**TVN** Time Variant Number.

V

**VC** *See:* Virtual Controller.

**VCCONT** A rule file used by Exits when Virtual Controllers are added.

**VEROP** VGA Enhanced Rear Operator Panel.

**VGA** *See* Video Graphics Adaptor.

**VGM** *See* Video/Graphics Manager.

**Video Graphics Adaptor (VGA)** This provides an interface through which you can communicate with the display features of the terminal.

**Video/Graphics Manager (VGM)** This provides an interface through which you can control the colour graphics and videodisc display features of the terminal.

**Virtual Controller** (or Intercept Routine) A routine defined and programmed by the user which can intercept and respond to messages.

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# Index

---

## Numerics

5665 statement printer 2.4-3  
911 hardware configuration (solicited message) 3.6-25

---

## A

Acknowledge and Stop EJ 4.5-6  
Acknowledge EJ Upload Block 4.5-4  
Alarm (unsolicited message) 3.6-16  
Amount check state 2.1-19  
Amount entry state 2.1-17  
Animation 2.2-32  
ANSI PIN block 5.1-3  
Archiving document images P-9  
Audio control state 2.1-80

---

## B

BANKSYS PIN block 5.1-4  
Basic and enhanced operator interface display characters 2.2-15  
Buffers  
    Amount 2.1-17, 2.1-43  
    FDK 2.1-69  
    FDK switch state 2.1-68  
    General purpose 2.1-20, 2.1-43  
    Operation code 2.1-11, 2.1-72  
    Track 3 data 2.1-34, 2.1-36  
Burn-in T-1

---

## C

Camera (unsolicited message) 3.5-16  
Camera control state 2.1-39  
Camera type  
    Variable format 2.1-40  
Card before cash function 4.4-26  
Card before parallel dispense and print function 4.4-28  
Card read - PIN entry initiation state 2.1-63  
Card read state 2.1-4  
Card reader (unsolicited message) 3.6-14  
Card reader/writer (solicited/unsolicited message) 3.5-3  
Card write state 2.1-34  
Card writer (unsolicited message) 3.6-15  
Cardholder display reserved screens  
    Formatting rules 2.2-14  
    International currency display format 2.2-33  
Cardholder display reserved screens - 'C' 2.2-3  
Cash handler - 910/920 emulation (solicited message) 3.6-4  
Cash handler - 911/921 emulation (solicited message) 3.6-8  
Cash handler (solicited/unsolicited message) 3.5-5  
Central application  
    Commands and messages used 1.1-6  
    Description 1.1-3

Central to terminal messages  
Customisation data commands 4.2-1  
EJ Commands 4.5-1  
EJ commands 4.5-1  
    Acknowledge and Stop EJ 4.5-6  
    Acknowledge EJ Upload Block 4.5-4  
    EJ Options and Timers 4.5-2  
IBM 3600 loop messages 4.6-13  
Message exception handling 4.6-1  
Messages received in wrong operational mode 4.6-9  
Terminal commands 4.1-1  
Transaction reply commands 4.4-1  
Changing display in idle 2.2-27  
Character sets B-2  
Checksum security feature 5.1-19  
CIM86 5.1-17  
    Card read - PIN entry initiation state 2.1-64  
    Card read state 2.1-5  
    Enhanced PIN entry state 2.1-36  
    PIN entry state 2.1-8  
    Transaction request state 2.1-23  
Close state 2.1-27  
Coin dispenser (solicited/unsolicited message) 3.5-23  
Configuration ID (solicited message) 3.6-18  
Configuration ID number load message 4.2-29  
Configuration parameters  
    Configuration parameters load message 2.6-2, 4.2-8  
    Enhanced configuration parameters load message 2.6-5  
    Further configuration 2.6-14  
    Introduction 2.6-1  
    Configuration parameters load message 4.2-8  
    Camera control 2.6-2  
    Card read error threshold 2.6-2  
    Card write error threshold 2.6-2  
    Logical unit number - LUNO 2.6-3  
    Number of 800 millisecond ticks per timer field 2.6-4  
    Supply mode, ready status and amount buffer length options 2.6-2  
    Timer descriptions 4.2-11  
    Timer number 2.6-3  
Control characters 2.2-16  
Courtesy amount verification state 2.1-43  
CRT display characters 2.2-14  
CRT screen layout E-2  
Customisation data  
    Description 1.1-5  
Customisation data commands  
    Configuration ID number load 4.2-29  
    Configuration parameters load 4.2-8  
    Date and time load 4.2-37  
    Diebold PIN information load 4.2-30  
    Encryption key load 4.2-38  
    Enhanced configuration parameters load 4.2-16  
    FIT data load 4.2-26

- Initialise EKC 4.2-41
- Message authentication field selection load 4.2-31
- Override reserved screens command 4.2-43
- Screen/keyboard data load 4.2-4
- State tables load 4.2-2
- Types of 4.2-1
- Customised screens
  - Definition 2.2-1
  


---

- D
  - Date and time load message 4.2-37
  - Defining a keyboard
    - Example 2.3-6
    - Physical keyboard 2.3-5
    - Touch screen keyboard 2.3-5
  - Deposit and print function 4.4-22
  - Depository
    - 910/920 emulation (solicited message) 3.6-11
    - 911/921 emulation (solicited message) 3.6-13
  - Depository (solicited/unsolicited message) 3.5-8
  - Device fault
    - Diebold Emulation mode 3.2-36
    - Native mode 3.2-32
  - Device fault status information
    - Diebold Emulation mode 3.6-1
  - Device identifiers
    - Fitness data N-10
    - Hardware configuration data N-2
    - Supplies data N-7
  - Diebold Emulation mode 1.1-2
  - Diebold mode device status information
    - 911 hardware configuration (solicited) 3.6-25
    - Alarm (unsolicited) 3.6-16
    - Card reader (unsolicited) 3.6-14
    - Card writer (unsolicited) 3.6-15
    - Cash handler - 910/920 emulation (solicited) 3.6-4
    - Cash handler - 911/921 emulation (solicited) 3.6-8
    - Configuration ID (solicited) 3.6-18
    - Depository - 910/920 emulation (solicited) 3.6-11
    - Depository - 911/921 emulation (solicited) 3.6-13
    - Door access (unsolicited) 3.6-20
    - Emulated vandal guard (unsolicited) 3.6-25
    - Journal and acknowledgement printers (solicited/unsolicited) 3.6-2
    - Night safe depository (solicited) 3.6-19
    - Statement printer (solicited/unsolicited) 3.6-22
    - Supervisor and supply switch (unsolicited) 3.6-17
    - Tamper indication (unsolicited) 3.6-19
    - Time-of-day clock/encryptor/camera (unsolicited) 3.6-21
  - Diebold PIN block 5.1-1
  - Diebold PIN information load message 4.2-30
  - Diebold PIN information without FITs
    - Algorithm locator / identifier field 2.7-17
    - Offset index data field 2.7-18

Performing Diebold PIN verification without FITs 2.7-17  
Using the offset index data 2.7-18  
Digital audio R-1  
Card read - PIN entry initiation state 2.1-64  
Close state 2.1-28  
Enhanced PIN entry state 2.1-36  
Guidelines on using multiple screens 2.2-23  
PIN entry state 2.1-8  
Pre-recorded messages 2.2-22  
Transaction request state 2.1-22  
Digital Camera System S-1  
Diskbuild  
SOH/Fitness Option K-5  
Diskbuild/2 requirements K-2  
Dispense and print function 4.4-23  
Display and print function 4.4-24  
Display image files control 2.2-32  
Displaying document images P-13  
Document definition file P-4  
Document zones P-4  
Overview P-8  
Printing restrictions P-8  
Typical cheque P-7  
Zone lists P-6  
Document processing P-1  
Document definition file P-4  
Identify feature file P-8  
Typical DPM transaction P-2  
Document processing module (solicited/unsolicited message) 3.5-27  
Door access (unsolicited message) 3.5-16, 3.6-20  
DP-ATM deposit envelope function 4.4-31  
DP-ATM envelope depository (solicited/unsolicited message) 3.5-9  
DPM default print 2.4-6  
DPM document accept state 2.1-46  
Exception handling 2.1-50  
Operational description 2.1-46  
DPM error data 3.5-33, O-2  
DPM reserved screens - 'D' 2.2-4

---

E

Eight FDK selection function state 2.1-72  
EJ commands  
Acknowledge and Stop EJ 4.5-6  
Acknowledge EJ Upload Block 4.5-4  
EJ Options and Timers 4.5-2  
EJ Options and Timers 4.5-2  
EJ Upload D-2  
EJ Upload Message 3.4-1  
EJ Upload message  
Introduction 3.4-1  
EKC  
Communications failure 5.1-6  
Features 5.1-5

PIN entry 5.1-6  
States 5.1-5  
Electronic journal printer (unsolicited message) 3.5-13  
Emulated vandal guard (unsolicited message) 3.6-25  
Encryption key load message 4.2-38  
Encryptor (unsolicited message) 3.5-15  
Enhanced amount entry state 2.1-59  
Enhanced configuration parameters load message  
    Auto voice 2.6-5  
    Camera control option 2.6-5  
    Card read error threshold option 2.6-6  
    Card write error threshold option 2.6-6  
    Date format 2.6-5  
    Diebold status reporting for vandal guard 2.6-6  
    Enable Audio Echo of Keyboard 2.6-9  
    Enhanced EJ backup 2.6-11  
    Envelope dispenser status option 2.6-7  
    Extended status control option 2.6-6  
    Include PAN in DCS data 2.6-9  
    Journal printer backup log tamper option 2.6-7  
    Journal printer backup print operations option 2.6-7  
    Journal printer backup time option 2.6-7  
    Left column 2.6-5  
    MCN Range 2.6-11  
    Media entry indicators flash rate option 2.6-8  
    Non-Magnetic Card Accept 2.6-11  
    Number of seconds per timer field 2.6-13  
    Optical sensor option 2.6-7  
    Print Track 2 to Journal 2.6-11  
    Remote relay option 2.6-8  
    Report DAS Errors 2.6-9  
    Report dual mode EJ and hardcopy backup unsolicited  
        messages 2.6-11  
    Roll width 2.6-5  
    Send enhanced/TI sensor status unsolicited message option 2.6-8  
    SOH/Fitness Option 2.6-9  
    Specific command reject option 2.6-6  
    Supply mode, ready status and amount buffer length options 2.6-5  
    Tamper indicating control option 2.6-6  
    Timer number 2.6-12  
    Touch screen error reporting option 2.6-8  
    TPA informed of SM activity option 2.6-8  
    Track 1 format 2.6-6  
    Transaction status information option 2.6-6  
Enhanced PIN entry state 2.1-36  
Enhanced Printer Control Codes  
    Define Downloadable Bit Image 2.4-18  
    Define Downloadable Character Set 2.4-17  
    Print Barcode 2.4-14  
    Print Downloadable Bit Image 2.4-13  
    Print Epson Graphics 2.4-15  
    Select Arabic Character Sets 2.4-13  
    Select Horizontal Height of Barcode 2.4-20

Select International Character Set 2.4-12  
Select OS/2 Code Page 2.4-12  
Select Printing Position of HRI Characters 2.4-18  
Select Width of Barcode 2.4-19  
Set Left Margin 2.4-10  
Set Right Margin 2.4-11  
Envelope dispenser (unsolicited message) 3.5-26  
Envelope dispenser state 2.1-11  
Exits 1.1-6, K-3  
Expanded FIT switch state 2.1-32  
Extended screen controls reserved screens - 'K' 2.2-6

---

F

FDK information entry state 2.1-69  
FDK switch state 2.1-68  
Financial Institution Tables  
    Data 2.7-2  
    Fields 2.7-5  
    FITs on terminals with door access control 2.7-16  
    Introduction 2.7-1  
    Linked FITs 2.7-15  
    FIT data load message 4.2-26  
    FIT fields  
        Algorithm/bank ID index (PAGDX) 2.7-6  
        Decimalisation table (PDCTB) 2.7-11  
        Encrypted PIN key key (PEKEY) 2.7-11  
        GBP data B index (PVBDX) 2.7-14  
        GBP data B length (PVBLN) 2.7-14  
        Index reference point (PINDX) 2.7-11  
        Indirect next state index (PSTDX) 2.7-5  
        Institution ID (PFIID) 2.7-5  
        Institution ID index (PIDDX) 2.7-5  
        Language code index (PLNDX) 2.7-13  
        Maximum PIN digits checked (PCKLN) 2.7-7  
        Maximum PIN digits entered (PMXPN) 2.7-6  
        MM sensor flag (PMMSR) 2.7-14  
        PAN data index (PANDX) 2.7-9  
        PAN data length (PANLN) 2.7-9  
        PAN pad (PANPD) 2.7-10  
        PIN offset data (POFDX) 2.7-11  
        PIN pad (PINPD) 2.7-7  
        Second index reference point (PREF2) 2.7-14  
        Track 3 PIN (PRCNT) 2.7-10  
    FIT switch state 2.1-31  
    Four FDK selection state 2.1-15

---

G

Graphic pictures reserved screens - 'G' 2.2-6  
Graphics pictures C-2

---

I

IBM 3600 loop messages  
    Central to terminal messages 4.6-14  
    Error logs and tallies 4.6-14

- Message structure 4.6-13
- Terminal to Central messages 4.6-13
- Transaction request messages 4.6-13
- Identify feature file P-8
- Images
  - Archiving P-9
  - Displaying document images P-13
  - Lifting P-8
- Information entry state 2.1-19
- Initialise EKC message 4.2-41
- Interactive transaction response
  - Format 4.4-33
- International currency display format 2.2-33
  


---

- J**
  - Journal and acknowledgement printers (solicited/unsolicited message) 3.6-2
  - Journal printer (unsolicited message) 3.5-11
  - Journal printer backup 5.1-18
    - Checksum security feature 5.1-19
  


---

- K**
  - Keyboard data
    - Associating screens and keyboards 2.3-14
    - Defining a keyboard 2.3-5
    - Introduction 2.3-1
    - Nested keyboards 2.3-6
    - Standard layouts E-3
    - States and keyboards 2.3-8
    - Touch screen FDK emulation 2.3-14
    - Traditional keyboard layouts 2.3-2
  


---

- L**
  - Language code switch state 2.1-61
  - Language select from card state 2.1-67
  - Left margin control 2.2-29
  - Lifting document images P-8
  - Linked FITs 2.7-15
  - Logo control 2.2-30
  - Logos reserved screens - 'L' 2.2-12
  


---

- M**
  - Message authentication 5.1-6
    - message authentication
      - message authentication code 5.1-7
  - Message authentication code
    - Full message authentication 5.1-8
    - Generation 5.1-7
    - Selective message authentication 5.1-10
    - Sending the MAC field from Central to the terminal 5.1-8
    - Sending the MAC field from the terminal to Central 5.1-7
    - Time variant number 5.1-8
  - Message authentication field selection load message 4.2-31
  - Message exception handling

Reasons for a command reject 4.6-1  
Message Types  
    Quick reference  
        Software Management installation status D-11  
        TM-Alert D-10  
    Message types  
        Quick reference D-2  
            Customisation data commands D-13  
            Software Management installation status D-2, D-11  
            Solicited status D-9  
            Terminal commands D-11  
            TM-Alert D-2, D-10  
            Transaction reply D-15  
            Transaction request D-2  
            Unsolicited status D-7  
    Messages received in wrong operational mode  
        Action taken 4.6-9  
        Customisation data commands 4.6-9  
        Terminal commands 4.6-10  
        Transaction reply command 4.6-10  
    Monitor burn-in T-1  
    Multi-language screens 2.2-35  
        spoken announcements 2.2-35

---

N

Native mode 1.1-2  
Native mode device status information  
    Camera (unsolicited) 3.5-16  
    Card reader/writer (solicited/unsolicited) 3.5-3  
    Cash handler (solicited/unsolicited) 3.5-5  
    Coin dispenser (solicited/unsolicited) 3.5-23  
    Depository (solicited/unsolicited) 3.5-8  
    Digital Audio Service (Unsolicited) 3.5-35  
    Document processing module (solicited/unsolicited) 3.5-27  
    Door access (unsolicited) 3.5-16  
    DP-ATM envelope depository (solicited/unsolicited) 3.5-9  
    Electronic journal printer (unsolicited) 3.5-13  
    Encryptor (unsolicited) 3.5-15  
    Envelope dispenser (unsolicited) 3.5-26  
    Journal printer (unsolicited) 3.5-11  
    Night safe depository (solicited/unsolicited) 3.5-14  
    Power failure (unsolicited) 3.5-2  
    Receipt printer (unsolicited) 3.5-10  
    Sensors (unsolicited) 3.5-17  
    Statement printer (solicited/unsolicited) 3.5-21  
    Supervisor keys (unsolicited) 3.5-20  
    Time-of-day clock (unsolicited) 3.5-2  
    Touch screen keyboard (unsolicited) 3.5-19  
NDC+  
    Central application 1.1-3  
    Diebold Emulation mode 1.1-2  
    Introduction 1.1-1  
    Native mode 1.1-2

**O**

Terminal application 1.1-3  
**Night safe**  
 deposit and print function 4.4-25  
 night safe depository (solicited message) 3.6-19  
 night safe depository (solicited/unsolicited message) 3.5-14

Override reserved screens command 4.2-43

**P**

PAGDX 2.7-6  
 PANDX 2.7-9  
 PANLN 2.7-9  
 PANPD 2.7-10  
 Parallel eject/dispense and print (fast cash) function 4.4-27  
 PCKLN 2.7-7  
 PDCTB 2.7-11  
 PEKEY 2.7-11  
 PFIID 2.7-5  
 Picture control 2.2-31  
 PIDDX 2.7-5  
 PIN block encryption  
   ANSI PIN block 5.1-3  
   BANKSYS PIN block 5.1-4  
   Diebold PIN block 5.1-1  
   EKC 5.1-5  
   Message authentication 5.1-6  
   Message authentication code (MAC) 5.1-7  
 PIN entry state 2.1-8  
 PINDX 2.7-11  
 PINPD 2.7-7  
 PLNDX 2.7-13  
 PMMSR 2.7-14  
 PMXPN 2.7-6  
 POFDX 2.7-11  
 Power failure (unsolicited message) 3.5-2  
 PPD default print  
   Eight character amount buffer 2.4-5  
   Twelve character amount buffer 2.4-5  
 PRCNT 2.7-10  
 PREF2 2.7-14  
 Pre-set operation code buffer state 2.1-11  
 Print immediate function 4.4-24  
 Print statement and set next state function 4.4-29  
 Print statement and wait function 4.4-29  
 Printer data  
   5665 statement printer 2.4-3  
   Character sets 2.4-21  
   DPM default print 2.4-6  
   Introduction 2.4-1  
   PPD default print 2.4-5  
   Printer control characters 2.4-8  
   Printer types supported by NDC+ 2.4-2  
   Simulated pre-printed receipt messages 2.4-29

Statement printer controls 2.4-24  
Process document with cash function 4.4-30  
PSTDX 2.7-5  
PVBDX 2.7-14  
PVBLN 2.7-14

**R** Receipt printer (solicited/unsolicited message) 3.5-10  
Reserved screens  
Cardholder display - 'C' 2.2-3  
Definition 2.2-1  
DPM - 'D' 2.2-4  
Extended screen controls - 'K' 2.2-6  
Graphic pictures - 'G' 2.2-6  
Logos - 'L' 2.2-12  
State of health - 'X' / 'Y' / 'Z' 2.2-12  
Supervisor menus - 'M' 2.2-12  
Types of 2.2-2  
Reserved screens default text  
'A' A-2  
'D' A-4  
'E' A-5  
'H' A-7  
'T' A-8  
'M' A-14  
'P' A-18  
'Q' A-20  
'S' A-23  
'T' A-26  
'X' A-30  
'Z' A-67

**S** Screens  
calculating touch screen positions Q-2  
Customised 2.2-1  
Definition 2.2-1  
Multi-language screens 2.2-35  
Reserved 2.2-1  
screen blinking and colour control 2.2-24  
screen display considerations M-2  
screen/keyboard data load message 4.2-4  
Control of associations/keyboard data 4.2-6  
Security features  
ANSI PIN block 5.1-3  
BANKSYS PIN block 5.1-4  
Checksum 5.1-19  
CIM86 5.1-17  
Diebold PIN block 5.1-1  
Full message authentication 5.1-8  
Journal printer backup 5.1-18  
Message authentication 5.1-6  
Message authentication code (MAC) 5.1-7  
PIN block encryption 5.1-1

Selective message authentication 5.1-10  
Select primary character set 2.2-28  
Select secondary character set 2.2-29  
Sensors (unsolicited message) 3.5-17  
Set display mode control 2.2-30  
Set next state and print function 4.4-25  
Simulated pre-printed receipt messages 2.4-29  
Smart Card Handling U-1  
Smart FIT Check state 2.1-82  
Software Management installation status messages 3.2-41, K-8  
SOH/Fitness Option 2.6-9, K-5  
Solicited status messages  
    EKC retrieve hallmark key 3.2-24  
    Exits 3.2-1  
    Fitness data 3.2-28  
    Format including status descriptor 3.2-1  
    Hardware configuration data 3.2-25  
    Introduction 3.2-1  
    Local configuration option digits 3.2-32  
    Send configuration ID 3.2-24  
    Send configuration information 3.2-7  
    Send date/time information 3.2-23  
    Send error log information 3.2-21  
    Send supply counters 3.2-16  
    Send tally information 3.2-20  
    Software ID and release number data 3.2-31  
    Specific command reject 3.2-3  
    Status descriptor field 3.2-1  
    Status information 3.2-3  
    Status information field 3.2-1  
    Supplies data 3.2-27  
    Tamper and sensor status data 3.2-30  
    Terminal state 3.2-6  
Special features  
    Animation 2.2-32  
    Changing display in idle 2.2-27  
    Display image files control 2.2-32  
    Left margin control 2.2-29  
    Logo control 2.2-30  
    Picture control 2.2-31  
    Screen blinking and colour control 2.2-24  
    Select primary character set 2.2-28  
    Select secondary character set 2.2-29  
    Set display mode control 2.2-30  
    Voice 2.2-22  
Specific command reject 3.2-3  
State of health reserved screens - 'X' / 'Y' / 'Z' 2.2-12  
State tables 2.1-1  
    Amount check state 2.1-19  
    Amount entry state 2.1-17  
    Audio control state 2.1-80–2.1-82  
    Card read - PIN entry initiation state 2.1-63  
    Card read state 2.1-4

Card write state 2.1-34  
Close state 2.1-27  
Courtesy amount verification state 2.1-43  
Customer selectable PIN state 2.1-76  
DPM document accept state 2.1-46  
Eight FDK selection function state 2.1-72  
Enhanced amount entry state 2.1-59  
Enhanced PIN entry state 2.1-36  
Envelope dispenser state 2.1-11  
Exit States 2.1-79  
Expanded FIT switch state 2.1-32  
FDK information entry state 2.1-69  
FDK switch state 2.1-68  
FIT switch state 2.1-31  
Four FDK selection state 2.1-15  
Information entry state 2.1-19  
Language code switch state 2.1-61  
Language select from card state 2.1-67  
PIN entry state 2.1-8  
Pre-set operation code buffer state 2.1-11  
Smart FIT Check state 2.1-82  
Time-out state 2.1-84  
Transaction request state 2.1-22  
Types of 2.1-2  
State tables load message 4.2-2  
Statement printer (solicited/unsolicited message) 3.5-21, 3.6-22  
Statement printer controls  
    Left margin control 2.4-24  
    Lines/inch control 2.4-25  
    Margin control use 2.4-25  
    Right margin control 2.4-24  
Supervisor and supply switch (unsolicited message) 3.6-17  
Supervisor keys (unsolicited message) 3.5-20  
Supervisor menus reserved screens - 'M' 2.2-12  
Supervisor messages  
    Automatic screen editing 2.5-7  
    Character sets 2.5-1  
    Check CDM report 2.5-14  
    Control codes 2.5-1  
    CRT layout 2.5-2  
    Introduction 2.5-1  
    Media status messages 2.5-13  
    Printer layout 2.5-7  
    Screen size limitations 2.5-1  
    Test cash report 2.5-14

---

## T

Tamper indication (unsolicited message) 3.6-19  
Terminal  
    application description 1.1-3  
    command format 4.1-1  
    How the terminal operates 1.1-4  
Terminal to Central messages

EJ Upload message 3.4-1  
Software Management installation status messages 3.2-40  
Solicited status messages 3.2-1  
Transaction request message 3.1-1  
Unsolicited status messages 3.2-39  
Time-of-day clock (unsolicited message) 3.5-2  
Time-of-day clock/encryptor/camera (unsolicited message) 3.6-21  
Time-out state 2.1-84  
Timers  
    Configuration parameters load 4.2-11  
    Enhanced configuration parameters load 4.2-11  
Touch screen FDK emulation 2.3-14  
    Amount entry state 2.1-17  
    Card read - PIN entry initiation state 2.1-63  
    Eight FDK selection function state 2.1-72  
    Enhanced PIN entry state 2.1-36  
    FDK information entry state 2.1-69  
    Four FDK selection state 2.1-15  
    Information entry state 2.1-20  
    PIN entry state 2.1-9  
    Time-out state 2.1-84  
    Touch areas 2.3-15  
Touch screen keyboards  
    Amount entry state 2.1-17  
    Card read - PIN entry initiation state 2.1-63  
    Eight FDK selection function state 2.1-72  
    Enhanced PIN entry state 2.1-37  
    FDK information entry state 2.1-69  
    Four FDK selection function state 2.1-15  
    Information entry state 2.1-20  
    PIN entry state 2.1-9  
    reset considerations M-4  
    Time-out state 2.1-85  
    unsolicited message 3.5-19  
Track 1 name display  
    ABA format cards 2.2-20  
    Auto select backwards search 2.2-19  
    Auto select forwards search 2.2-19  
    Formats 2.2-18  
    ISO format cards 2.2-19  
    Name display 2.2-20  
    VISA format cards 2.2-19  
Transaction reply  
    Card before cash function 4.4-26  
    Card before parallel dispense and print function 4.4-28  
    Deposit and print function 4.4-22  
    Dispense and print function 4.4-23  
    Display and print function 4.4-24  
    DP-ATM deposit envelope function 4.4-31  
    Format 4.4-2  
    Night safe deposit and print function 4.4-25  
    Parallel eject/dispense and print (fast cash) function 4.4-27  
    Print immediate function 4.4-24

Print statement and set next state function 4.4-29  
Print statement and wait function 4.4-29  
Process document with cash function 4.4-30  
Set next state and print function 4.4-25  
Transaction reply commands  
    Interactive transaction response 4.4-33  
    Types of 4.4-1  
Transaction request message  
    Format 3.1-1  
    Introduction 3.1-1  
Transaction request state 2.1-22

---

**U**

Unsolicited status messages  
    Format 3.2-40  
    Introduction 3.2-39  
Upload EJ Data 3.4-1



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