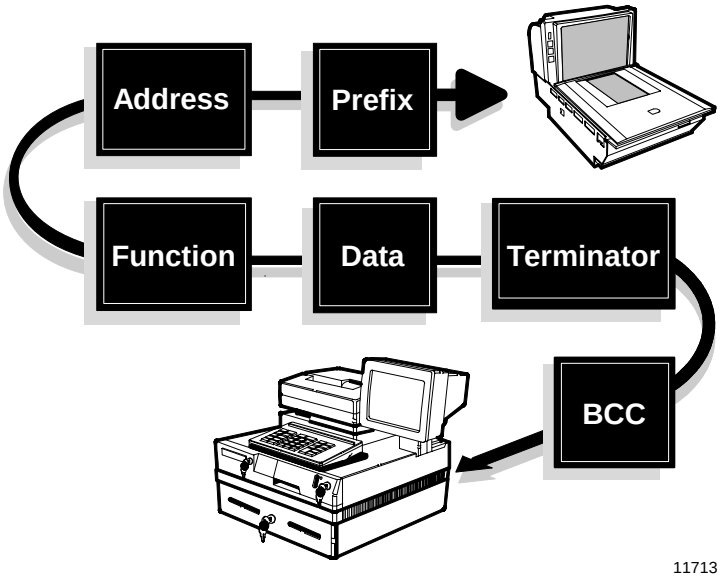
NCR Scanner/Scale Interface
Programmer's Guide



D2-1074-A
Issue F

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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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Preface

About this Book

This book is for the various people who write application programs to facilitate communications between an NCR scanner and a host terminal. The first two sections present the information that a programmer needs for working with RS-232 and the two OCIA long formats. The last two chapters contain step-by-step instructions for implementing the information in this book into a software program

After initially reading the sections that are relevant to the protocol you plan to use, the first six chapters should be used as reference source, while the last two chapters serve as examples.

Further Information

You can obtain further information about programming NCR's new generation of scanner products by contacting your NCR representative. The following lists identify additional information products and how to obtain them.

Web Sites

- http://inforetail.AtlantaGA.NCR.COM (NCR only)
- http://www.info.NCR.COM (Anyone)

Online Order

- Connect System (NCR only)

Phone Order

800-543-2010

Fax Order

- 770-831-2821

E-Mail

- ERI210013@exchange.DaytonOH.NCR.COM

Mail Order

NCR Corporation—Sales Service Center
3200 Shawnee Industrial Way
Suwanee, Georgia 30024

References

- *NCR 7875 Scanner/Scale Online Help*
  (BD90-1062-A)
- *NCR 7880 Scanner/Scale Programmer's Guide*
  (BD20-1060-A)
- *NCR 7890 Presentation Scanner User's Guide*
  (BD20-0901-A)
- *NCR 7870 Scanner/Scale User's Guide*
  (BST0-212-90)
- *RealScan 72 User Guide*
  (B005-0000-1179)
- *RealScan 75 User Guide*
  (B005-0000-1085)
- *RealScan 76 User Guide*
  (B005-0000-1513)
- *RealScan 83 User Guide*
  (B005-0000-1436)
- *RealScan 92 User Guide*
  (B005-0000-1605)

Table of Contents

Revision Record

Issue	Date	Remarks
A	Aug 1993	First issue
B	Dec 1993	Corrected pin numbers in connector chart
C	Sep 1997	Complete Revision
D	Mar 2004	Change to Monitor command
E	Jun 2005	Added RSS-14 and RSS-14 Expanded in Label Identifiers chart
F	Feb 2007	Minor updates

Chapter 1: Introduction

Equipment

Slot Scanners

NCR scanners generally fall into two categories; slot scanners and presentation scanners. Both read data from bar coded labels; however, the intended use is different in the two types of machines. In addition to scanning capability, some models of slot scanners can be equipped with a scale. The scale can weigh an object and convert the weight into usable data for the terminal.

Slot scanning requires an operator to move labels across a laser light. The scanner needs this movement because its scan pattern is fixed and can only read a bar code when it passes thorough one of the scanner's scan lines.

Slot scanners are mounted into a checkstand near the terminal. They are used primarily in retail settings where a high volume of sales occurs, such as food distribution and mass merchandise. These types of scanners permit an operator to scan a large number of items quickly. With slot scanners, you have the option to add a scale and to add tag diagnostics with PACESETTER Plus.

Presentation Scanners

Presentation scanners read bar code labels in a new and interesting way. Because the scan pattern rotates, the operator only has to present the label to the scanner with no orientation. Presentation scanners can be mounted in an optional holder. This placement permits hands-free operation, because the operator only has to present the label of each item in front of the scanner. At times when an item is too large to place in front of the scanner, the unit can be removed from its holder and moved to the merchandise. Because the scanner is compact and lightweight, it is highly maneuverable. Its moving scan pattern permits quick and accurate scanning.

The presentation scanner's adaptability makes it an effective choice for retail applications that encounter a wide variety of product shapes and sizes. Department stores and specialty stores with diverse inventories should find that the presentation scanner enhances their productivity tremendously.

Bi-optic Scanners

Bi-optic Scanners use a single laser source to generate scan patterns in both a vertical and horizontal window. This creates a scan zone in both the vertical and horizontal planes that permit scanning on four sides of an item as it passes across the scanner. This type of scanning reduces the amount of bar code orientation needed, permitting higher scan rates.

NCR's latest generation Bi-Optic Scanner Scale provides customers with a platform to reduce transaction times, simplify the sales process and drive additional profits through shrink reduction. Its design focuses on improving ease of use which delivers higher productivity from Store Associates and the ability to leverage scan data to improve front-end performance. In addition it provides forward investment protection for the retailers through improvements in support and maintainability. When considering current performance and built-in future capabilities, Bi-optic Scanners allows you to address business issues more effectively than competing scanners available on the market today.

Bi-optic Scanners provide unmatched performance, usability, and checkout productivity to businesses. The productivity increases come from features, including:

- Super ASIC (SA) technology enables better scanner performance today as well as processing capabilities for future improvements.
- Superior performance through advanced optical and mechanical design which can process up to 10,000 scan lines per second.
- Optional Sensormatic ® Ultra•Max ® Deactivator 5220n integrated Electronic Article Surveillance (EAS) deactivation feature.
- Simple to use technology for cashiers, including NCR-patented features like Clean Window Indicator and Scan Doctor spoken-language diagnostics.
- NCR's PACESETTER software helps read damaged, underprinted, and overprinted bar codes to improve first-pass read rates and keep check-out queues moving.

The following table lists the different SuperASIC scanner models available in each scanner family:

Scanner Family	SuperASIC models (Major Models)
RealScan 72	MM 05xx, MM 06xx, MM 07xx, MM 12xx, MM 16xx, MM 22xx, MM 26xx, MM 52xx, MM 53xx, MM 54xx, MM 56xx, MM 62xx
RealScan 75	MM 12xx, MM 22xx, MM 27xx, MM 32xx, MM 42xx, MM 72xx, MM 82xx
RealScan 76	All models
RealScan 83	MM 12xx, MM 16xx
RealScan 92	MM 12xx, MM 16xx, MM 19xx

Note: Any future scanner model designed or released after 2003 are SuperASIC scanners.

Communication Protocols

The communication protocols that this manual covers are RS-232 and OCIA. The OCIA versions included are long format and single cable long format. RS-232 is a standard format and is widely available. This protocol is most likely used by individuals working with non-NCR terminals. These versions of OCIA are NCR-developed protocols.

RS-232

RS-232 is the standard format that is available in most NCR and non-NCR terminals. The protocol uses 7 or 8 bit ASCII to send tag and scale data to a terminal. RS-232 supports a variety of bar codes and the options associated with each bar code. In addition, the RS-232 protocol supports even and odd parity, as well as a BCC byte.

Note: Using RS-232, you cannot send either 8 bit data with parity and two-stop bits, or 7-bit data with no parity and one-stop bit.

OCIA

Note: NCR RealScan SuperASIC (SA) units do NOT support any form of OCIA.

NCR OCIA is an interface developed by NCR. Created as a protocol for use with NCR scanner/host terminal combinations, it is the standard format for interfacing between NCR scanners and terminals. OCIA has a long history with NCR scanners, but has been replaced by RS-232 in recent times.

OCIA is different from RS-232 because it is an optically coupled interface utilizing an optically coupled diode. The communications link between the two devices has no electrical connection, and therefore, the use of a common ground is not required.

OCIA NCR Long Format

OCIA NCR Long Format is a scanner-only protocol. This format can be used with both slot and presentation types of scanners. It supports 8 bit data with no parity and can handle alphanumeric data found in Code 39 and Code 128 bar codes.

Note: OCIA Long Format is also called Full Format. Also, label identifiers and tag check digits are fully programmable using OCIA Long Format with a 7890 scanner. Refer to Chapter 3, *RS-232 Message Structures* for information regarding these options.

Note: In order to accommodate the alphanumeric data of Code 39 and Code 128 bar codes, system software that supports these codes must be present in the host terminal.

OCIA NCR Single Cable Long Format

OCIA NCR Single Cable Long is the format for scanner/scale machines. Like standard OCIA Long Format, Single Cable Long Format can handle alphanumeric bar code data. However, unlike standard long format, it supports 7 bit data with an odd parity bit.

Note: In order to accommodate the alphanumeric data of Code 39 and Code 128 bar codes, system software that supports these codes must be present in the host terminal.

IBM-485

Both Release 1 and SuperASIC scanners support IBM-485 communications protocol. This is a completely proprietary interface, and therefore cannot be detailed in this document. Any questions about IBM-485 interface should be directed to IBM Corporation.

IBM documents referenced in developing this interface include:

- IBM 4696 Point of Sale Scanner-Scale to IBM 4683 and 4684 POS Terminals Product Attachment Information, August 1992.
- IBM 4697-001 Point of Sale Scanner to IBM 4683 and 4684 POS Terminals Product Attachment Information, May 1993.
- Reference Information: WWR19990203 4690 OS Configuration Interface for OEM Scanners, Version 0.3
- Hand Held Bar Code Reader Attachment Information. Attachment of Feature Code 4500 and 4501 Readers to the IBM 468x and 469x POS Terminals (for 7892 Release 1 only).
- IBM 4680 Point of Sale System, IBM 1520 Bar Code Reader Product Attachment Information, January 1987 (for 7892 Release 1 only).

USB

All SuperASIC and **some** Release 1 scanners will communicate through USB. There are three kinds of USB:

1. **IBM-USB** — Like IBM-485, IBM-USB is a proprietary interface and cannot be described in this document. Refer to the following IBM documents for more information regarding this interface:
   - Universal Serial Bus, OEM Point-of-Sale Device Interface Specification, Version 2.0
   - Universal Serial Bus, OEM Point-of-Sale Device Interface Specification, Version 2.1

2. **EPiC USB** — Sometimes referred to as "NCR-USB". EPiC USB is a repackaging of the standard Serial RS-232 interface already supported by NCR scanners into a USB protocol through a "virtual" COM port (a virtual COM port is one which uses either physical port COM1 or COM2, but labels it as COM4, COM5, or any other number). It is based on and is implemented over USB using the proprietary EPiC (EdgePort Compatible) interface protocol under license from Digi (www.digi.com).

   Changes made to the serial interface described in Scanner User Guides such as termination, prefix characters, checkdigits, and others are reflected in the data passing through the EPiC USB(NCR-USB) interface.

   The following Scanner User Guides are available:

   - *RealScan 72 User Guide* (B005-0000-1179)
   - *RealScan 75 User Guide* (B005-0000-1085)
   - *RealScan 76 User Guide* (B005-0000-1513)
   - *RealScan 83 User Guide* (B005-0000-1436)
   - *RealScan 92 User Guide* (B005-0000-1605)

3. **HID Keyboard Emulation** (currently not supported)

Chapter 2: RS-232 Options

Terminal/Scanner Setup

When you decide to use the RS-232 protocol for communications between your NCR scanner and a host terminal, there are a number of parameters that have to be set in the scanner. In order for the scanner and terminal to communicate, both devices must have the same parameter settings. These options give you the ability to make your RS-232 communications more reliable by insuring greater data integrity.

Your responsibility in using the RS-232 interface is to set your scanner and RS-232 terminal to use the same parameters. The settings are programmable to give you options in your communications. You should use the same settings to promote ease of use and maintain data integrity.

RS-232 Options

A number of parameter setting options are available with RS-232. These options include the baud rate of data transmission, parity, character length, stop bits, handshake, BCC, and interface control. RS-232 also supports the use of standard label identifiers and gives you the capability to create unique identifiers.

Note: Your NCR scanner and RS-232 host device should have the same parameter settings to help maintain good communication between the two devices.

Baud Rate

RS-232 gives you the following baud rate options for scanner/terminal communication. Remember that both devices must communicate at the same speed.

300 600 1200 2400 4800 9600 19200

Parity

The following parity options are available with RS-232 communication:

- Odd
- Even
- None

Note: When setting up communication using an NCR scanner/scale, you must select parity. If you select no parity, the scanner/scale uses odd parity in its communications with the host terminal.

Character Length

RS-232 supports character lengths of 7 or 8 bits. This choice is determined by the terminal that you are connecting to the scanner.

Stop Bits

In using RS-232, you have the choice of operating with 1 or 2 stop bits. The following are the rules regarding their use:

- If you select 7-bit character length with no parity, two stop bits are sent by the scanner and must be received.
- If you select 8-bit character length and parity, only one stop bit is used.

RTS/CTS Handshake

RS-232 permits the following options for controlling data exchange between devices with RTS/CTS:

- RTS Low, CTS ignored
- RTS High, CTS ignored
- Raise RTS, wait for CTS
- Raise RTS, ignore CTS
- RTS Low, wait fro CT
- RTS High, wait for CTS

RTS identifies a **R**equest **T**o **S**end line, while CTS is the **C**lear **T**o **S**end line. The scanner raises RTS and the terminal responds by raising CTS when it is ready to receive.

Note: NCR recommends that you use handshaking because without it you can lose data between the terminal and the scanner without receiving any indication from the terminal.

BCC Options

RS-232 gives you the ability to Enable or Disable the Block Check Characters (BCC). In scanner-only models the default is Disable the BCC byte, while in scanner/scale models, the default is Enable. You can change either of these default settings. The BCC byte is the exclusive or of all bytes in a message except the prefix byte and it uses parity.

Interface Control

In determining how to control RS-232 interface between your terminal and your NCR scanner, you have the following options:

- None
- ACK/NAK
- XON/XOFF

Note: Scanner/scales have a fixed acknowledge format for many of the messages sent to them. Such acknowledgments take precedence over an ACK. Also, note that an ACK is not sent to a reset command. A NAK message can be sent, however. Furthermore, you should note that any scanner/scale acknowledgment is considered a message and must receive an ACK or NAK from the host terminal in response.

The interface control options are not necessary for RS-232 communications, thus the selection of no interface control is a legitimate choice. Remember that the terminal and the scanner must have the same settings.

Understanding Your Options

Your application program should be able to open the communication port for these options. This gives you the ability to change parameter settings internally.

RS-232 gives you a high level of flexibility and control over terminal/scanner communications. If you select RS-232 as the communication protocol that you plan to use in your application program, you cannot ignore these options. Before you select any of the options, find out what RS-232 selections are present in your host terminal. When you know how your terminal communicates in RS-232, then you can determine what scanner selections are appropriate for your application.

Model Differences

The 7870, 7875, 7880, and 7890 scanner models all support these options with some exceptions. The 7890 has two additional parity options in Mark and Space, and VLI and EOM options are available.

VLI and Bit 6 EOM

The Variable Length Indicator (VLI) and Bit 6 End of Message (EOM) parameters are two additional RS-232 options available to the 7890 scanner. These options permit you to identify the length, or end, of each message sent to the terminal. Use of VLI or EOM removes the need to send a terminating character.

The VLI includes itself and all bytes through the BCC. It immediately follows the Prefix Byte. If you do not use a Prefix Byte, the VLI is the first byte in the data message. Figure 2-1 presents possible placements for the VLI.

Figure 2-1 Placement of VLI

Prefix Byte	VLI	. . . . .

If you select to use a Prefix Byte, the VLI immediately follows; otherwise the VLI is the first byte of the message as shown in the following

VLI	. . . . .

Bit 6 EOM identifies the end of a message. If you select to use this option, Bit 6 of the last byte in the message determines the end of the message. When you use EOM and VLI, you are no longer required to use a terminating character in your messages.

Note: NCR recommends that you not use these options with your RS-232 communications because they remove full alphanumeric capability and it is possible for the VLI to be the same as a protocol character.

Chapter 3: RS-232 Message Structures

Command Message Format

Note: All characters are written in hexadecimal (Hex) format. All ASCII characters have double quotation marks around them.

The command message format is the structure for creating RS-232 commands with supported function codes. Use this format to instruct the scanner to perform a desired function. The message structure for tag data is different and is explained later in this chapter.

Characters sent are all ASCII and utilize the full ASCII set available for each bar code. For example, only numeric characters are used for UPC/EAN bar-coded data.

Note: Optional items in the message diagrams illustrated throughout this chapter are highlighted in gray shading like this:

Your scanner verifies the terminal BCC. Likewise, your application should verify the scanner BCC.

Scanner-Only Format

Figure 3-1 is the command message format for systems with a scanner-only configuration. The message map contains all the necessary components.

Figure 3-1 Scanner-Only Command Message Format

Prefix Byte	Function Code	Data	Terminator Byte	BCC Byte

Prefix Byte

The prefix byte is an optional part of the message, but NCR recommends that you include it in your message constructions. The default prefix byte is an "STX" (02).

Function Code

In the function code portion of the message, insert a command from the RS-232 list of commands in Chapter 4, *RS-232 Commands*. This directs the scanner to execute the function you have chosen. The host terminal is the only device that can issue a command. Keep in mind that the scanner may or may not respond to the command initiated by a function code. Some function codes demand responses from the scanner, while others do not.

Note: Function codes are not included in tag data messages that are sent to the host terminal.

Data

Data bytes are not a required component of all messages. The data bytes that are sent depend on the function code or command. Most command messages do not include data.

Terminator Byte

Any byte can be used as a terminator, however, NCR recommends that you use an RS-232 control character. Examples of these are: "ETX" (03), "EOT" (04), or "CR" (0D).

Note: NCR recommends that you not use alphanumeric characters, because they could be present in the data.

BCC Byte

The BCC byte is an optional part of the message. It is the exclusive or of all bytes in a message except for the prefix byte.

Scanner/Scale Format

Figure 3-2 is the command message format for systems with a scanner/scale configuration. The message map contains all necessary components.

Figure 3-2 Scanner/Scale Command Message Format

Prefix Byte	Address Byte	Function Code	Data	Terminator Byte	BCC Byte

Prefix Byte

The prefix byte is an optional part of the message, but NCR recommends that you include it in your message constructions. The default prefix byte is an "STX" (02).

Address Byte

The address byte is a necessary structural component that determines the specific device within the scanner/scale that receives the message. Each address is the logical address that is common in all firmware. The following is a list of valid addresses.

- Scanner (30)
- Scale (31)
- Display (32)
- Special Function Address (33)

Function Code

The function code portion of the message is where you include a command from the RS-232 list of commands featured in Chapter 4, *RS-232 Commands*, in order to have the scanner or scale perform some function. Commands can be single or multiple bytes and are issued only by the host terminal.

Note: Function codes are not included on tag data messages that are sent to the host terminal.

Data

Data bytes are not a required component of all messages. The data bytes that are sent depend on the function code or command. Most commands do not include data.

Terminator Byte

Unlike the command message structure for scanner-only systems, messages in scanner/scale systems must include a terminator byte. You must include a terminator byte because the host needs to know which byte is the last in a message. NCR recommends that you use RS-232 control characters for the terminator byte. Examples of such control characters are: "ETX" (03), "EOT" (04), or "CR" (0D). Still, any byte can be used as the terminator byte of a message.

Note: NCR recommends that you not use alphanumeric characters, because they could be present in the data.

BCC Byte

The BCC byte is optional and it is the exclusive or of all bytes in a message except for the prefix byte. The BCC byte is enabled as the default on scanner/scales, but it can be disabled by programming. NCR does, however, recommend that you use a BCC byte to help maintain data integrity.

Tag Message Format

The tag message format is the structure that is used by the scanner to send tag data from bar-coded labels to a host terminal through the communications link. This section clarifies the structure of these messages so that you can set up an application program to expect tag data in this format.

Note: The memory buffer in the scanner holds only two tags. Once it is filled, if tags are not transmitted, the scanner no longer reads tags. Also, be aware that when the scanner is enabled, tag data can be sent to the terminal at any time.

Scanner-Only Format

Figure 3-3 is the tag message format for systems with a scanner-only configuration. The message map contains all necessary components.

Figure 3-3 Scanner-Only Tag Message

Prefix Byte	Label Identifier	Tag Data	PPD	Terminator Byte	BCC Byte

Prefix Byte

In the scanner-only tag message format, the prefix byte is optional. NCR, however, recommends that you use the prefix.

Label Identifier

The label identifier field is optional. Label identifiers and the structure for each type of tag data are discussed in the next section.

Tag Data

Tag data contains the contents of the label as read by the scanner. The structure for tag data is given in the next section of this chapter.

PPD

PPD stands for the PACESETTER Plus data field. It consists of PACESETTER Plus Mode 3 Trailer data. PACESETTER Plus data is an optional field which is only available with UPC or EAN tag data; it can only be used with scanner models that are equipped with PACESETTER Plus capability. The PPD can be enabled and disabled by the Enable PACESETTER Plus Mode 3 Trailer and the Disable PACESETTER Plus Mode 3 Trailer commands that are issued from the terminal, or by programming the scanner. You can find all PACESETTER Plus commands in Chapter 4, *RS-232 Commands*.

The PACESETTER Plus data field of the tag data message has a specific structure. The format for PACESETTER Plus data is the following.

1. 3Y 3Z

Note: Refer to Appendix B, *PACESETTER Plus Data* for information regarding the interpretation of PACESETTER Plus data contained in Y and Z.

As with the entire tag message, your application program must expect PACESETTER Plus data in this format.

Terminator Byte

Although the terminator byte is not required for sending tag data, if the scanner is going to accept commands, the terminator byte must be included in the message. The terminator byte is necessary because it signifies the end of a message.

BCC Byte

The BCC byte is an optional part of the message. It is the exclusive or of all bytes in a message except for the prefix byte.

Scanner/Scale Format

Figure 3-4 is the tag message format for systems with a scanner/scale configuration. The message map contains all necessary components.

Figure 3-4 Scanner/Scale Tag Message Format

Prefix Byte	30	38	Label Identifier	Tag Data	PPD	Terminator Byte	BCC Byte

Prefix Byte

In the scanner/scale tag message format, the prefix byte is optional. NCR, however, recommends that you use the prefix.

30 and 38

30 is the scanner address, and 38 is the function code that indicates tag data follows. As with the command message format for scanner/scale configurations, the tag message must include an address byte. Since the address is constant in this message format, the address byte never changes.

Label Identifier

The label identifier field is optional. Label identifiers and the structure for each type of tag data are discussed in the next section.

Tag Data

Tag data contains the contents of the label as read by the scanner. The structure for tag data is given in the next section of this chapter.

PPD

PPD is the PACESETTER Plus data field. It consists of PACESETTER Plus Mode 3 Trailer data. PACESETTER Plus data is an optional field which is only available with UPC or EAN tag data; it can only be used with scanner models that are equipped with PACESETTER Plus capability. The PPD can be enabled and disabled by the Enable PACESETTER Plus Mode 3 Trailer and the Disable PACESETTER Plus Mode 3 Trailer commands that are issued from the terminal, or by programming the scanner. You can find all PACESETTER Plus commands in Chapter 4, *RS-232 Commands*.

The PACESETTER Plus data field of the tag data message has a specific structure. The format for PACESETTER Plus data is the following.

2. 3Y 3Z

Note: Refer to Appendix B, *PACESETTER Plus Data* for information regarding the interpretation of PACESETTER Plus data contained in Y and Z.

As with the entire tag message, your application program must expect PACESETTER Plus data in this format.

Terminator Byte

With the scanner/scale, the terminator byte is a necessary component of the message structure. Used by the scanner to determine the end of a message, it is necessary because the scanner must be able to send and receive messages.

BCC Byte

The BCC byte is an optional part of the message. It is the exclusive or of all bytes in a message except for the prefix byte.

Using Label Identifiers

Each bar code that is used with RS-232 has an optional prefix label identifier that is associated with that bar code. With RS-232, you have the option to select a label identifier to be sent with your tag data messages. The label identifier precedes tag data as indicated in the previous section of this chapter

In using label identifiers with RS-232, you have several levels of choices. NCR scanners give you the ability to select the default label identifiers, unique prefix identifiers, or no label identifiers. In addition, you have two programmable common byte options.

Both the default label identifiers and the unique identifiers have changeable options.

Default Label Identifiers

Note: Label identifiers and tag check digits are fully programmable when you are using OCIA Long Format with the 7890 presentation scanner.

The following table provides all available bar codes, the label identifiers for the bar codes, and the structure for tag data in each format.

Bar Code Type	Label Identifiers	Structures for Tag Data (Y=add-on digit)
UPC-A	41	NS X1 X2 C3 X4 X5 X6 X7 X8 X9 X10 CK
UPC-A + 2 (periodicals)	41	NS X1 X2 X3 X4…X10 CK Y1 Y2
UPC-A + 5 (coupons and periodicals)	41	NS X1 X2 X3 X4…X10 CK Y1 Y2 Y3 Y4 Y5

Bar Code Type	Label Identifiers	Structures for Tag Data (Y=add-on digit)
UPC-A + Code 128 (coupons)	42 33 41	38 31 30 X1 X2 X3 X4…35 X1 X2 X3 X4…X10 CK
UPC-D	44 3X	NS X1 X2 X3 X4…
UPC-E	45	30 X1 X2 X3 X4 X5 X6
EAN-8	46 46	X1 X2 X3 X4 X5 X6 X7 CK
EAN-13	46	X1 X2 X3 X4 X5 X6 X7 X8 X9 X10 X11 X12 CK
EAN-13 + 5 (coupons with 99)	46	39 39 X1 X2 X3 X4…X12 CK Y1 Y2 Y3 Y4 Y5
EAN-13 + 128 (coupons with 99)	42 33 46	38 31 30 X1 X2 X3 X4…39 39 X1 X2 X3 X4…X12 CK
Code 39	42 31	X1 X2 X3 X4…
Interleaved 2 of 5	42 32	X1 X2 X3 X4…
Code 128	42 33	X1 X2 X3 X4…
RSS-14	5D 65 30	X1 X2 X3…
RSS-14 Expanded	5D 65 30	X1 X2 X3…

The 3X in the UPC-D label identifier represents the field for the UPC-D version number. This field can be 31 through 35 and it is optional.

The table shows you what label identifiers and what message structures for tag data to expect if you select the default prefix label identifiers. You must program the terminal to expect data in this format if you plan to use the default setting.

Programmable Common Bytes

As you are programming with common bytes, you have the following options.

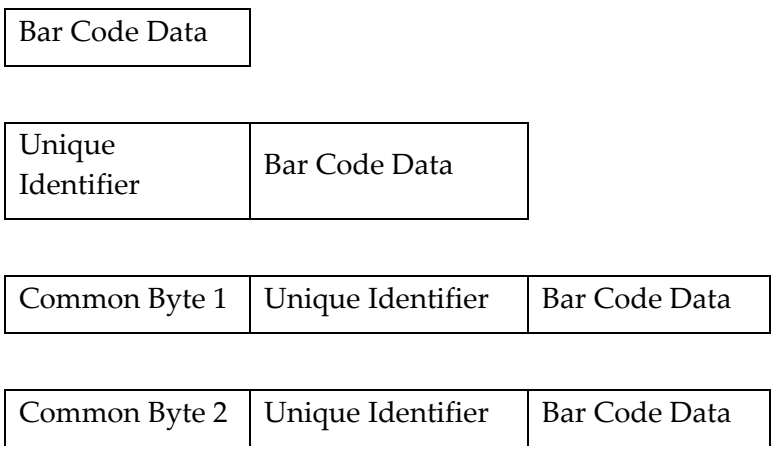
- None
- Common Byte 1
- Common Byte 2
- Both Common Bytes

Note: Unique prefixes can be programmed to use one, two, or no common bytes. UPC-D users should also note that an additional byte can be used to indicate the UPC-D version number. The version number is sent in ASCII. For example, "1" would be 31.

Unique Prefix Identifiers

Unique prefix identifiers always precede the bar code data in a tag message. In addition, common bytes precede the unique identifier that you select. Figure 3-5 illustrates the correct placement of unique identifiers and common bytes in tag messages.

Figure 3-5 Unique Prefix Identifiers



Common Byte 1	Common Byte 2	Unique Identifier	Bar Code Data

Note: The UPC-D version number always precedes bar code data and follows the unique identifier.

In addition to programmable common bytes, you have flexibility in selecting unique prefix identifiers. As with the default label identifiers, each bar code has a unique prefix identifier that is associated with it. These are provided in following table. The selections are given to help guide you in your choices and can be changed. There are a number of options available to users of unique prefix identifiers. You can find these options in the user's or programmer's guide for your model.

Bar Code Type	Unique Byte		Common Byte Used
	HEX	ASCII	
UPC-A	41	A	None
UPC-D	44	D	None
UPC-E	45	E	None
EAN-8	46	F	None
EAN-13	47	G	None
Code 39	31	1	2
Interleaved 2 of 5	32	2	2
Code 128	33	3	2

Note: In addition to the options discussed under the three previous headings, you have the option to set your scanner so that no label identifiers are sent with tag data.

Using Tag Check Digits

With the various bar codes that are available to RS-232 communications, a number of tag check digit options exist. The tag check digit options are listed below.

Note: Label identifiers and tag check digits are fully programmable when you are using OCIA Long Format with the 7890 presentation scanner.

- Disable with UPC and EAN bar codes.
- Enable with UPC-A, EAN-8, and EAN-13. Disable with UPC-E.
- Disable with UPC-A, EAN-8, and EAN-13. Enable with UPC-E.
- Enable with UPC and EAN bar codes.

In addition, the Code 39 and Interleaved 2 of 5 bar codes have optional tag check digits as explained in the user's or programmer's guide for your model.

Chapter 4: RS-232 Commands

Using RS-232 Commands

The command byte exists as the function code portion of messages from the host terminal to the scanner. The format for these types of command messages is given in the first two sections of Chapter 3: *RS-232 Message Structures*.

As the application programmer, you must have methods for controlling the operation of the scanner. The commands discussed in this chapter give you the ability to manipulate the scanner by directing it to perform necessary functions. It is with these commands that you control the scanner through the RS-232 communications link managed by your application program.

Note: All command codes are shown without parity. In addition, there are timing restrictions that apply to resets and commands that receive responses. You should not send another command after a reset until an interval of at least 2 seconds has elapsed. This restriction permits the scanner to reset before it receives additional commands. When issuing commands that require a response, your terminal should not send another command until the response has been received. The response should be immediate. The exception is the weigh command in scanner/scales.

Scanner-Only Commands

The table that is presented below gives you a description of each command that is available to RS-232 communications in a scanner-only configuration, as well as the command byte that you insert as the function code of your terminal-to-scanner messages.

Command Description	Function Codes
Soft Reset, No indication	32 30
Hard Reset	32 31
Disable Scanner, Red light flashes	32 42
Disable Scanner with no indication	32 44
Enable Tone	32 46
Enable Scanner (early 7870s do not support this command)	32 33
Beep Good Tone	33 34
Configuration Request (7890-0200)	30 41
Device Configuration Request (7890-0200)	30 42
Send Status to host	33 36
Start Scanner (7890 only)	33 38
Program (7890 only)	33 45
Disable Tone	33 39
Read ROM version number	33 31 **30 32 30 30**
Not-On-File	33 46

Note: The PACESETTER Plus commands are also scanner-only commands. They are presented in this chapter under *PACESETTER Plus Commands*. In addition, the four byte data field for the Read ROM version number is included.

Warning: Asynchronous use of the reset commands can cause data loss.

Soft Reset

The soft reset command is interpreted as an Enable command on SuperAsic and later versions of Release 1 scanners. No buffers are cleared. The terminal receives no acknowledgement of this command.

Hard Reset

The hard reset causes the scanner to go through its initial power up sequence. No acknowledgment is sent as a response to this command and all data in the scanner is lost.

Disable Scanner, Red Light Flashes

This command prevents the scanner from processing new tag data for the host terminal. The red flashing status indicator shows that this mode has been engaged. To recover from a disable scanner mode, one of the two reset commands or an enable command must be sent to the scanner.

Disable Scanner with No Indication

This command performs the same functions as the previous disable command; however, it gives the operator no indication that it is in this mode. Recovery is the same for both disable commands.

Enable Tone

The Enable tone command enables the sounding of the scanner's good read tone. This command recovers the scanner from any tone disable command.

Enable Scanner

The Enable Scanner command enables the scanner for reading labels. Use this command to enable the scanner after a Not-On-File or Disable command has shut it down.

Note: This command is available in all scanners EXCEPT early 7870s.

Disable Good Tone

Note: Be aware that when the scanner is enabled, tag data can be sent to the terminal at any time.

The Disable Good Tone command disables the sounding of the scanner's good read tone. The scanner's tone no longer sounds when the scanner sends a good read to the terminal.

Beep Good Tone

The Beep Good Tone command directs the scanner to sound the good read tone for the default period of time.

Configuration Request

The response from the device for this command contains basic information about the unit such as the Class #, Firmware Part and Firmware version numbers.

Device Configuration Request

The response from the device for this command contains particular information for the type of scanner such as symbologies, configuration default, display configuration, state of the unit, good tone parameters, etc.

Note: For more detailed information about the responses for the Configuration Request and Device Configuration Request, see Appendix A.

Send Status to Host

The Send Status command asks the scanner to send its current status to the host terminal. Valid responses from the scanner are presented in the following table.

Scanner Status	Response Codes
Normal Mode (30)	33 30
Disable Mode (2B)	32 42
Toad Mode (3A)	33 41

Start Scanner (RealScan 90 Only)

Use this command to turn the scanner on without having to present a tag to the scan window. This command can be sent to the scanner at the start of a transaction. Also, in order to use this command, the scanner must be enabled.

Program (RealScan 90 Only)

Use this command to program the scanner just as you would using tags. For an example of how to use this program method, see "Using the Program Command" in this chapter. Valid responses from the scanner are shown in the following table.

Scanner Status Description	Response Codes (Hex)
Good	30
Failed	31
Scanner not in disable mode	32

Disable Tone

Use this command to disable the tone on the scanner. The scanner's tone does not sound until an enable tone is issued by the terminal.

Read ROM Version Number

Use this command to read the ROM version number from the scanner. The scanner sends 30 bytes containing the version number from PROM in response to this message.

Note: This data is sent in a special format where each byte is sent one nibble (4 bits) at a time. A Hex character 34 byte would be broken into nibbles and sent as first 33 and then 34.

Not-On-File

Use this command to disable the scanner when a label is read that is not on file in the terminal. The command disables the scanner, causes the red light to flash, and sounds the tone. As with any disable mode, you need to use a reset or an enable command to bring the scanner back to normal operation.

Using the Program Command

The Program command causes the NCR scanner to interpret the data in the message as information to program itself. The scanner must be in the disable mode for the scanner to act on the message.

The command format for Program is:

Prefix Byte	FC1	FC2	Data	Terminator Byte	BCC Byte

To create a Program command message:

1. Select the prefix byte, if enabled.
2. Select and insert function code 33H 45H.
3. Enter the data that is to be sent from the host to the scanner. The following table contains examples of tag data you can send to the host.

Tag	Data sent (Hex)
End	51H ”N”
Save and Reset	53H “S”
Hex 0 –Hex F	30H – 3FH or 30H – 39H, 41H – 46H

Note: If the last character is an ‘S,’ no response is provided unless there is an error in the data. If the power –up message is enabled, this is sent after successfully completing power-up diagnostics.

4. Insert the terminator byte.
5. Add the BCC byte, if enabled. (The BCC byte is an exclusive OR of all bytes in the message except the prefix byte.)

The following is an example of what a Program message would look like.

02	33	45	16221C32310DS	03	E
Prefix Byte	FC1	FC2	Data	Terminator Byte	BCC Byte

This example programs the scanner for no label identifiers, check digits sent with all UPC/EAN labels and CR (0DH) for terminator.

(The ASCII data in the example would be 31, 36, 32, 32, 31, and so on in Hex)

PACESETTER Plus Commands

The following table gives the available PACESETTER Plus commands.

Command Description	Function Codes
Read PACESETTER Tally (3X = 31 to 35 – Code for type of read)	3D 32 3X
Reset PACESETTER Tallies	3D 3C
Enable PACESETTER Plus Mode 3 Trailer Tallies	3D 3E 3E
Disable PACESETTER Plus Mode 3 Trailer Tallies	3D 3F 3F

The 3X portion of the function code byte in the Read PACESETTER Tally stands for the type of tally that you want sent to the host terminal. The following table shows the available PACESETTER tallies.

Tallies	Codes
Good Reads	31
No reads due to lack of a full label	32
Good reads with very highly overprinted bars	33
Good reads with very highly underprinted bars	34
Good reads with missing margins	35

The four commands that you can use in your application program to access and control PACESETTER Plus data are described below.

Read PACESETTER Tally

The Read PACESETTER Tally command directs the scanner to output the tally that the terminal requested. The response sent back to the terminal is in the following format.

3D 3X 3Y 3Y 3Y 3Y 3Y 3Y 3Y

Note: This message does not show the prefix, terminator, or BCC bytes.

The 3X stands for the code number of the tally requested, while 3Y stands for the value of the tally. Notice that all numbers are sent in ASCII.

Reset PACESETTER Tallies

The Reset PACESETTER Tallies command causes the scanner to reset the PACESETTER tallies. The memory buffer that holds this data is cleared.

Enable PACESETTER Plus Mode 3 Trailer

The Enable PACESETTER Plus Mode 3 Trailer command permits trailer PACESETTER Plus data to be sent with each UPC or EAN tag read. With this command, tag quality information is sent to the host and can be stored for quality analysis. Trailer data is sent in the format 43 3Y 3Z. Refer to Appendix B, *PACESETTER Plus Data* for information regarding the interpretation of PACESETTER Plus data in Y and Z.

Disable PACESETTER Plus Mode 3 Trailer

The Disable PACESETTER Plus Mode 3 Trailer command prevents trailer data from being sent with tag reads.

Note: To use PACESETTER Plus commands with a scanner/scale, add the special function address byte (33) to the message. The address and command portion of a message to Reset PACESETTER Tallies would be 33 3D 3C. PACESETTER Plus is an optional feature. It is only available in models that have been equipped with PACESETTER Plus at the factory.

Scanner/Scale Commands

The following commands are supported by NCR scanner/scale models. Notice that when you create messages with these commands, you must always include an address byte before the function code in the message structure. The examples in this section do not include parity, the prefix byte, or the BCC byte in their descriptions. Chapter 3: *RS-232 Message Structures* gives you the format for including these components in your message structure.

Note: Scanner/scale models respond to commands in scanner-only format and with an address byte of 33.

Including the Address Byte with Commands

In order for your scanner/scale to respond to the commands that you send through the host terminal, all function codes must be preceded by an address byte. When constructing command messages, use the peripheral device address to receive the message as the address byte portion of your message. The following table provides a list of devices that receive commands and their corresponding addresses.

Devices	Address
Scanner	30
Scale	31
Display	32
Special Function	33

Scanner/Scale Common Commands

Common commands can be sent to any device in the scanner unit. The two common commands that are available are listed in the following table.

Command Description	Function Codes
Hard Reset	30
Send Status to host	33

Hard Reset

The Hard Reset command causes the scanner to go through its initial power up sequence. No acknowledgment is sent as a result of this command.

Send Status to host

The Send Status to host command asks the device to send its current status to the host terminal. Since the response message format changes depending on the device addressed by the command, each command section features the Send Status to host command.

Scanner/Scale Scanner Commands

Your application program can send these commands from the terminal to control the operation of only the scanner. The commands listed in the following table must be preceded by an address byte of 30.

Command Description	Function Codes
Enable Scanner	31
Disable Scanner with no indication	32
Send Status to host	33

Command Description	Function Codes
Not-On-File	35
Disable Scanner, Red light flashes	36

Enable Scanner

The Enable Scanner command permits the scanner to send tag data to the host terminal. You can use the command to bring the scanner back into normal operation mode after a Not-On-File or Disable with or without indication command has been issued. The command is acknowledged with the standard acknowledgment message (30 30).

Note: Be aware that when the scanner is enabled, tag data can be sent to the terminal at any time.

Disable Scanner with no indication

The Disable Scanner with no indication command disables the scanner by preventing it from sending tag data to the terminal. This disable function gives the operator no indication that the scanner is in a disable mode. To recover from a disable mode, the terminal must send an Enable Scanner or Reset command. The scanner acknowledges this command with the standard 30 30.

Send Status to host

The Send Status to host command asks the scanner to send its current status to the host terminal. The response message is in the following format.

3. 33 3W 3X 3Y 3Z

The four data bytes return the status of the scanner. Possible responses for the data bytes are listed in the following table.

Data Bytes	Response Description	Codes
3W	Not-On-File Enabled	30
3X	Gateless Scanner	31
3Y	Scanner Disabled	30
	Scanner Enabled	31
3Z	No Scan Data Present	30

Not-On-File

The Not-On-File command disables the scanner when a label is read that is not on file in the terminal. The command disables the scanner and causes the red light to flash and the tone to sound. As with any disable mode, you need an Enable Scanner or a Reset command to bring the scanner back to normal operation.

Disable Scanner, Red light flashes

The Disable Scanner, Red light flashes command prevents the scanner from processing new tag data for the host terminal and alerts the operator by flashing the red light on the scanner. An Enable Scanner or Reset command brings the scanner unit back to normal operation.

Scanner/Scale Scale Commands

Your application program sends these commands from the terminal to control the operation of the scale. The commands listed in the following table must be preceded by an address byte of 31.

Command Description	Function Codes
Weigh	31
Cancel	32
Send Status to host	33

Command Description	Function Codes
Monitor	34

Weigh

The Weigh command directs the scale to send a weight value to the host terminal to determine the price. The command remains in effect until the scale has a stable non-zero weight or it receives a Cancel command to stop the function.

The recommended procedure is that the item be placed on the scale before the weigh command is sent. This should reduce errors and speed the weighing process. If desired, either the status or monitor command can be used to determine when a stable weight is available.

When a weight request is sent, the scale responds in the following format.

4. 31 3V 3W 3X 3Y 3Z

Values for the five data bytes are presented in the following table.

Data Bytes	Measure		
	Pounds	Kilograms (9.995 kgs max)	Kilograms (13.995 kgs max)
3V	Tens Unit	Ones Unit	Tens Unit
3W	Ones Unit	Tenths Unit	Ones Unit
3X	Tenths Unit	Hundredths Unit	Tenths Unit
3Y	Hundredths Unit	Thousandths Unit	Hundredths Unit
3Z	not present	not present	Thousandths Unit

Cancel

The Cancel command cancels the Weigh command immediately preceding it. The scanner acknowledges the message with the standard response code of 30. The response message including the address byte would be 31 30.

Send Status to host

With the address byte for the scale included, the scanner sends the following response message after the Send Status to host command.

31 33 3V 3W 3X 3Y 3Z

The five data bytes return the status of the scale. Possible responses for the data bytes are listed in the following table.

Data Bytes	Response Description	Codes
3V	Weight is presented in lbs	30
	Weight is presented in kgs	31
3W	Scale enabled	30
	Scale disabled	31

Data Bytes	Response Description	Codes
3X	Zero weight display after 5 seconds	31
3Y	Timers always disabled	32
3Z	Scale not ready	30
	Non-stable weight	31
	Stable weight over 30.0 lbs (9.995 kgs)	32
	Stable zero weight	33
	Stable non-zero weight available	34
	Stable weight above zero has been sent	35

Scale Not Ready Status

The Scale not ready status implies that the scale will not weigh an item because the scale needs to be reset to zero or needs calibration, or the scanner/scale is configured without a scale.

Assuming the scale function is enabled; operators can depress the reset switch to zero the scale. If the scale still is not ready, operators should clean debris around and under the weight plate and depress the reset switch again.

The unit will show on its display (integrated or remote) if it requires calibration. If the scale continues to send a not ready status, the scale may need calibration or to be serviced.

Monitor

The Monitor command directs the scale to output a stable non-zero weight or the scale status if the scale does not have a stable non-zero weight. This command is intended for use by a POS-driven remote scale weight display (live weight). The stable weight returned must not be used for determining the price of an item. The responses that are possible from this command are the following.

31 34 34 3Y 3Y 3Y 3Y 3Y (3Y)

OR

5. 34 3X

The first response message contains the stable non-zero weight. The scale responds with the second message when a stable non-zero weight is not available. 3X denotes the current scale status, while 3Y represents the value for the weight.

Possible status values are listed in the following table.

Data Bytes	Sent with weight value Response Description	Codes
3X	Stable non-zero weight	34

Data Bytes	Sent without weight value Response Description	Codes
3X	Scale not ready	30 H
	Scale unstable	31
	Scale over capacity	32
	Stable zero weight	33
	Scale under zero weight	35

Scanner/Scale Display Commands

Your application program sends these commands from the terminal to control the display. The commands listed in the following table must be preceded by an address byte of 32.

Command Description	Function Codes
Display LCD data	31
Send Status to host	33

Display LCD data

The Display LCD data command displays the 7 ASCII characters that follow the 31. A period may be sent to show the price and will not count as one of the characters. The command is acknowledged with a 32 30 response.

Send Status to host

With the address byte for the display included, the response message for the Send Status to host command is the following.

6. 33 3X

The following table shows the possible values for 3X.

Data Byte	Response Description	Codes
3X	LCD display shows weight or amount	30
	LCD display shows weight only	31
	Alphanumeric display, not supported	32

Scanner/Scale Special Functions Commands

The Special Function commands are the same as the commands for NCR scanner-only models. The difference in using these commands is that you must include an address byte of 33 in the message structure. Special Function commands are useful because they give the scanner/scale programmer the same commands as the scanner-only models. The scanner/scale does not acknowledge these commands unless the ACK/NAK option has been activated. You must use parity and a terminator byte with these types of messages.

Note: For commands to the scanner in a scanner/scale model, you should use the scanner commands with an address of 30.

Model Differences

With the variety of scanner products that NCR produces, there are some commands that are available with some scanners and not available with others. This section discusses the commands that are available with certain models and includes model-specific commands.

7870, 7875, and 7880

With the exception of Start Scanner, Configuration and Device Configuration Requests, all of the commands discussed in this chapter are available to these three slot scanners.

The 7870 utilizes bi-optic scanning technology by reading tags through two scan windows. This capability increases the amount of successful reads on the first pass.

The 7880 scanner is a new generation vertically or horizontally mounted unit. This model is also available as a scanner/scale. The 7880 is available with optional PACESETTER Plus and PACESETTER Plus III.

The 7875 utilizes bi-optic scanning technology while including significant areas of performance improvement. New features include the addition of top-side read, a larger bottom window, and greatly enhanced presentation scanning to facilitate check-out cashiers by increasing their productivity with minimal risk of occupational injury.

PACESETTER Plus is a standard feature on the NCR 7875. PACESETTER Plus III is an optional feature which augments PACESETTER Plus.

7890

The 7890 presentation scanner has the capability to use all scanner-only commands except for the PACESETTER Plus commands. This scanner model does not offer a scale or PACESETTER Plus like the 7870, 7875 and 7880 scanner/scales. Read ROM version number is available in 7890 scanners with versions of firmware 497-0301339 and higher. The 7890 is the only scanner model that uses the Start Scanner command.

7890-0200 models also support the Configuration and Device Configuration Request commands.

7890-5800 models support the Program command.

Chapter 5: OCIA with NCR Scanners

Using OCIA

Note: NCR RealScan SuperASIC (SA) units do NOT support any form of OCIA.

Unlike RS-232, the OCIA formats are fixed format protocols. As a result, no options are available in parameter settings, and the terminal determines the rate of transmission. You do not have to set equal parameters or use the same message structure options (except with PACESETTER Plus data) between scanner and terminal because these options do not exist. You do, however, have to set up your application program so that the terminal and scanner communicate using an OCIA format.

Note: The factory sets the Communications Protocol to a default setting. You should change the protocol if it is not the one you are planning to use for your communications.

If you are more familiar with RS-232 communications, keep in mind that you need to send messages in an OCIA-supported format and use OCIA function codes to issue commands to the scanner.

Your scanner verifies the terminal BCC. Likewise, your application should verify the scanner BCC.

OCIA Message Structures

Note: All information shown in this section includes proper parity.

The two OCIA formats covered by this programmer's guide use different message structures for transmitting data between the scanner and the terminal. This section of Chapter 5 describes the command message format and then covers the tag message format for each version of OCIA long format communications.

Note: All characters are written in Hex format. Any ASCII characters have double quotation marks around them.

The command message format is the structure for sending OCIA command messages to the scanner.

The tag message format is the structure that is used by the scanner to send tag data to a host terminal through the communications link. This section clarifies the structure of these messages so that you can set up an application program to expect tag data in this format.

Note: Optional items in the message diagrams illustrated throughout this chapter are highlighted in gray shading like this:

In addition, the BCC byte in your messages is not calculated automatically. You must determine the BCC based on the codes present in your messages.

Messages in OCIA Long Format

Each message in OCIA long format contains the function code for the command to be sent. You construct single byte command messages by sending only the function code. To create multiple byte command messages, however, you must include the function code and a block check character (BCC). Tag messages consist of a label identifier, tag data, and a BCC byte.

Command Message Format

Command messages utilize function codes to control the operation of the scanner. To construct messages in this format, you only need to include the function code in single byte messages and the function code and BCC byte in multiple byte messages as illustrated in Figure 5-1.

Figure 5-1 OCIA Long Format Command Message Structures

Single Byte Messages
Function Code

Multiple Byte Messages	
Function Code	BCC Byte

In the **Function Code** portion of the message, include a command from the OCIA long format list of commands. These commands direct the scanner to perform a function. Commands can be single or multiple bytes and are issued only by the host terminal.

The **BCC Byte** is a necessary component of the multiple byte command message. This byte helps assure accurate data during the transmission of a message. The BCC is the exclusive or of all bytes sent, including the parity bit.

Tag Message Format

The scanner sends all data from the bar-coded labels that it reads to the host terminal in this format. It constructs the tag message in OCIA long by sending the tag label identifier, tag data, and any PACESETTER Plus data with a BCC byte to the host terminal. Figure 5-2 provides a message map of the tag message format.

Note: Your application program must be configured to accept tag data in this format if you plan to use OCIA long. Also, be aware that when the scanner is enabled, tag data can be sent to the terminal at any time.

Figure 5-2 OCIA Long Format Tag Message Structure

Label Identifier	Tag Data	PPD	BCC Byte

Note: Function codes are not included on tag messages sent to the host terminal.

The **Label Identifier** field tells the terminal what type of bar code the scanner has read. Label identifiers and the structure for each type of tag data are discussed in the next section.

The **Tag Data** portion of the message transports data that the scanner has read from a bar-coded label. Tag data has various message structures that are dependent on what type of label the data comes from. The structure for tag data is given in the next section of this chapter.

PPD stands for the PACESETTER Plus data field. It consists of PACESETTER Plus Mode 3 Trailer data. PACESETTER Plus data is optional in the tag data message; it can only be used with scanner models that are equipped with PACESETTER Plus capability. The PPD can be enabled and disabled by the Enable PACESETTER Plus Mode 3 Trailer and the Disable PACESETTER Plus Mode 3 Trailer commands that are issued from the terminal, or by programming the scanner. You can find all PACESETTER Plus commands in Chapter 6, *OCIA Commands*.

The PACESETTER Plus data field of the tag data message has a specific structure. The format for PACESETTER Plus data is the following.

0C 0Y 0Z

Note: Refer to Appendix B, *PACESETTER Plus Data* for information regarding the interpretation of PACESETTER Plus data contained in Y and Z.

As with the entire tag message, your application program must expect PACESETTER Plus data in this format.

The **BCC Byte** is a necessary component of the tag message. This byte helps assure accurate data during the transmission of a message. The BCC is the exclusive or of all bytes sent, including the parity bit.

Note: The memory buffer in the scanner holds only two tags. After the buffer is filled, no additional tags are read if the data cannot be sent to the host terminal.

Messages in OCIA Single Cable Long Format

The message structure for OCIA single cable long format is similar to that of RS-232. OCIA single cable long contains additional bytes that are not present in OCIA long format. The message has a set prefix byte of 80 and terminates with a BCC byte. Each message in OCIA single cable long must have a minimum of 4 bytes.

Command Message Format

Command messages utilize function codes to control the operation of the scanner. To construct messages in this format, you need to include the components illustrated in Figure 5-3.

Figure 5-3 OCIA Single Cable Long Format Command Message Structure

80	Address Byte	Function Code	Data	BCC Byte

The **80** in the message is the set prefix byte for all OCIA single cable long communications. It is labeled as 80 in the message structure because the prefix is always 80.

The **Address Byte** is a necessary structural component that determines the specific device within the scanner/scale that receives the message. The following is a list of valid addresses:

- Scanner (30)
- Scale (31)
- Display (32)
- Special Function Address (33)

The **Function Code** portion of the message is where you include a command from the OCIA list of commands featured in Chapter 6, *OCIA Commands*, in order to have the scanner or scale perform some function. Commands can be single or multiple bytes and are issued only by the host terminal.

Data bytes are not a required component of all messages. The data bytes that are sent depend on the function code or command. Most commands do not include data.

The **BCC Byte** is a necessary component of the command message. This byte helps maintain accurate data during the transmission of a message. The BCC is the exclusive or of all bytes sent, including the parity bit.

Tag Message Format

The scanner sends all data from the bar-coded labels that it reads to the host terminal in this format. It constructs the tag message in OCIA single cable long by sending data in the format illustrated in Figure 5-4.

Note: Your application program must be configured to accept tag data in this format if you plan to use OCIA single cable long. Also, be aware that when the scanner is enabled, tag data can be sent to the terminal at any time.

Figure 5-4 OCIA Single Cable Long Format Tag Message Structure

30	38	Label Identifier	Tag Data	PPD	BCC Byte

30 is the scanner address, and **38** is the function code that indicates data follows. As with the command message format for OCIA single cable long configurations, the tag message must include an address byte. Since the address is constant in this message format, the address byte never changes.

The **Label Identifier** field tells the terminal what type of bar code the scanner has read. Label identifiers and the structure for each type of tag data are discussed in the next section.

The **Tag Data** portion of the message transports data that the scanner has read from a bar-coded label. Tag data has various message structures that are dependent on what type of label the data comes from. The structure for tag data is given in the next section of this chapter.

PPD stands for the PACESETTER Plus data field. It consists of PACESETTER Plus Mode 3 Trailer data. PACESETTER Plus data is an optional field which is only available with UPC or EAN tag data; it can only be used with scanner models that are equipped with PACESETTER Plus capability. The PPD can be enabled and disabled by the Enable PACESETTER Plus Mode 3 Trailer and the Disable PACESETTER Plus Mode 3 Trailer commands that are issued from the terminal, or by programming the scanner. You can find all PACESETTER Plus commands in Chapter 6, *OCIA Commands*.

The PACESETTER Plus data field of the tag data message has a specific structure. The format for PACESETTER Plus data is the following.

0C XY XZ

The X in the data field is either an 8 or a 0. The code that maintains odd parity is the one that is sent in the message.

Note: Refer to Appendix B, *PACESETTER Plus Data* for information regarding the interpretation of PACESETTER Plus data contained in Y and Z.

As with the entire tag message, your application program must expect PACESETTER Plus data in this format.

The **BCC Byte** is a necessary component of the tag message. This byte helps assure accurate data during the transmission of a message. The BCC is the exclusive or of all bytes sent, including the parity bit.

Note: The memory buffer in the scanner holds only two tags. After the buffer is filled, no additional tags are read if the data cannot be sent to the host.

OCIA Single Cable Long Response Format

The response format is the structure of responses from the scanner that return data the host terminal has requested. This message structure only occurs in OCIA single cable long communications. A message map for the response format is presented in Figure 5-5.

Figure 5-5 Response Format in OCIA Single Cable Long Format

Address Byte	Response Data	BCC Byte

The **Address Byte** is a necessary structural component that determines the specific device within the scanner/scale that has sent the message. Response messages can be sent by the scanner, scale, and display.

The **Response Data** field of the message returns the information that the terminal has requested of the scanner. This field carries the response codes as well as any additional data that comprises an appropriate response. Only those commands that specifically request data from the scanner receive a message containing a data field.

The **BCC Byte** is a necessary component of the message. This byte helps assure accurate data during the transmission of a message. The BCC is the exclusive or of all bytes sent, including the parity bit.

PACESETTER Plus Differences

Note: The PACESETTER Plus commands can only be used in scanners that have PACESETTER Plus capability. PACESETTER Plus is a diagnostic tool that permits you to track bar code label problems and keep a record of good and bad reads.

The message structures for PACESETTER Plus commands are different from the general message structures presented in this chapter. PACESETTER Plus message structures are presented as commands in the OCIA Commands chapter. Although they are the PACESETTER commands, the entire message structure is included in each command.

Using Label Identifiers with OCIA

Each bar code that is used with an OCIA format has a prefix label identifier that is associated with that bar code. The label identifier precedes tag data in messages to the terminal. The label identifier is a necessary and important part of a tag message because it indicates to the terminal what type of bar code it is reading so that it can manipulate the data accordingly.

The following table provides the available bar codes, available OCIA formats, their label identifiers, and the message structure for tag data in each format.

Bar Code Type	Label Identifiers		Message Structures (Y=add-on digit)
	OCIA Long	OCIA Long Single Cable	
UPC-A	41	BA	NS X1 X2 X3 X4 X5 X6 X7 X8 X9 X10 CK
UPC-A + 2 (periodicals)	41	BA	NS X1 X2 X3…X10 CK Y1 Y2
UPC-A + 5 (coupons and periodicals)	41	BA	NS X1 X2 X3…X10 CK Y1 Y2 Y3 Y4 Y5
UPC-A + 128 (coupons)	42 33 41	C2 B3 BA	X1 X2 X3 X4 X5…NS X1 X2 X3…X10 CK
UPC-D	44	3D	NS X1 X2 X3 X4
UPC-E	45	3E	30 X1 X2 X3 X4 X5 X6
EAN-8	46 46	BF BF	X1 X2 X3 X4 X5 X6 X7 CK
EAN-13	46	BF	X1 X2 X3 X4 X5 X6 X7 X8 X9 X10 X11 X12 CK
EAN-13 + 5 (coupons with 99)	46	BF	X1 X2 X3 X4…X1 X2 X3 X4…X12 CK

Bar Code Type	Label Identifiers		Message Structures (Y=add-on digit)
	OCIA Long	OCIA Long Single Cable	
Code 39	42 31	C2 31	X1 X2 X3 X4…
Interleaved 2 of 5	42 32	C2 32	X1 X2 X3 X4…
Code 128	42 33	C2 33	X1 X2 X3 X4…

The table shows you what label identifiers and what message structures for tag data to expect from each type of bar code. You must program the terminal to expect data in this format in order for it to process data from the bar-coded labels the scanner sends to it. Remember that the label identifier has a specific position in the tag message structure as does the tag data that precedes it.

Note: Label identifiers are programmable in 7890 scanner models using OCIA long format and latter versions of firmware 497-0301339 and higher. In addition, tag check digit options are available. EAN-8, and EAN-13 can be enabled or disabled, and they use the same check digits as UPC-A.

Interface Requirements and Recommendations

The following diagrams present the hardware configurations for OCIA communications. Figure 5-6 presents a hardware schematic for a scanner and terminal OCIA communications link.

Figure 5-6 Transmitter/Receiver Circuit

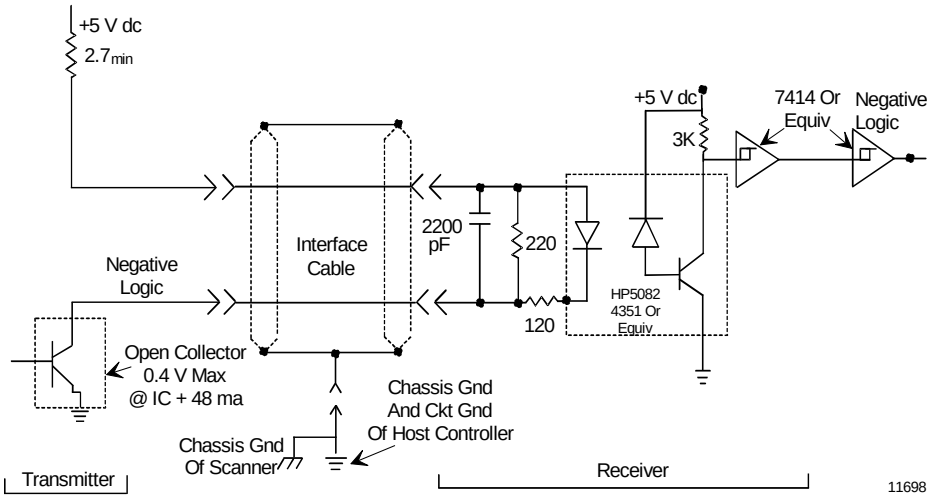
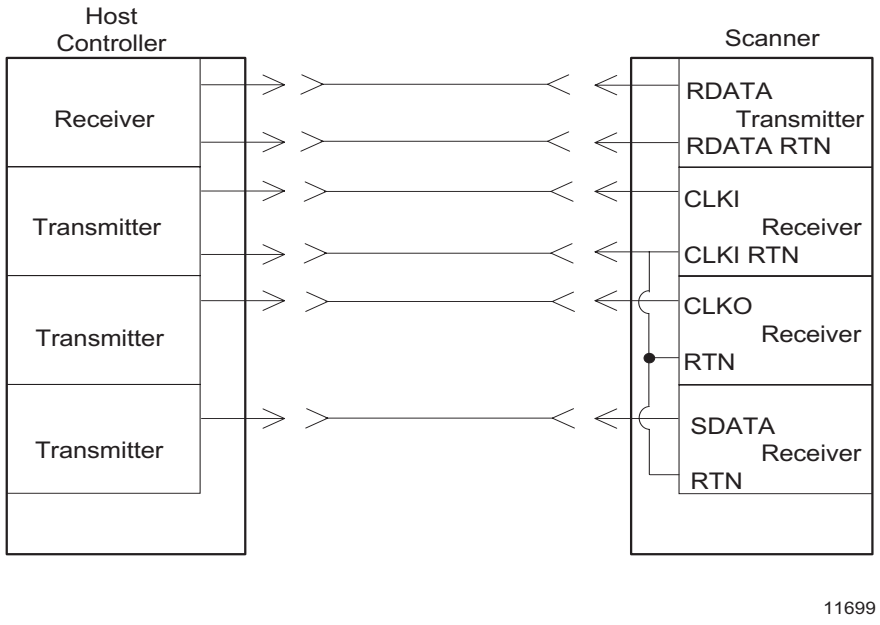


Figure 5-7 indicates the signal driver and receiver for each signal in the OCIA link. Notice that Clock In Return is the return signal for Clock In, Clock Out, and Send Data. In addition, Clock Out and Send Data return lines are not used.

Figure 5-7 Interface Wire/Pin Diagram



Pin numbers for the three scanner models are presented in the following table. If you are using a 7890, examine the note listed below the table.

	7870	7875	7880	7890
Connector	J3	J2	J1	J3
RDATA	2	2	2	5
RDATA RTN	1	1	1	6
CLKI	5	5	5	3
CLKI RTN	6	6	6	2

	7870	7875	7880	7890
CLKO	4	4	4	4
CLKO RTN	N/C	N/C	N/C	N/C
SDATA	3	3	3	1
SDATA RTN	N/C	N/C	N/C	N/C
Ground	10	10	10	8

Note: The 7890 uses Ref Box PCB Harness, number 250-0054045. The J3 pin designations for the 7890 refer to solder pins in the PCB.

Scanner Input Signals

Scanner input signals are measured between the signal return pin and the open collector. These input signals are optically isolated in the scanner. One common connection that you can use is a return line connected through a 2.7 ohm resistor to +5 volts. This is shown in Figure 5-7.

The available scanner input signals are the following. Each signal utilizes a transmitter and a receiver.

- Clock In (CLKI)
- Clock In Return (CLKI RTN)
- Clock Out (CLKO)
- Send Data (SDATA)

There are two signal levels available with these signals. These are input one level and input zero level. Input one is a low voltage signal, while input zero is a high voltage signal.

Scanner Output Signals

Scanner output signals are measured between the pin and the scanner chassis ground. The terminal can be electrically isolated from the scanner if it uses an optically isolated receiver for Receive Data (RDATA).

Output one level is a low voltage signal, while output zero level is a high voltage signal. RDATA RTN provides a current source of 5 volts through a 2.7 ohm resistor.

Chapter 6: Using OCIA Commands

Note: NCR RealScan SuperASIC (SA) units do NOT support any form of OCIA.

OCIA commands are used in the same way that RS-232 commands are used. In your application program, you insert these commands as the function code of your command messages to the scanner. The format for these types of command messages is given in Chapter 5: *OCIA with NCR Scanners*.

As the application programmer, you must have methods for controlling the operation of the scanner. The commands discussed in this chapter give you the ability to manipulate the scanner by directing it to perform necessary functions. It is with these commands that you control the scanner through the OCIA communications link managed by your application program.

Note: With the exception of PACESETTER Plus OCIA single cable long commands, all command codes are shown without parity. In addition, there are timing restrictions that apply to resets and commands that receive responses. You should not send another command after a reset until an interval of at least 2 seconds has elapsed. This restriction permits the scanner to reset before it receives additional commands. When issuing commands that require a response, your terminal should not send another command until the response has been received. The response should be immediate. The exception is the weigh command in scanner/scales.

Scanner-Only Commands

Scanner-only models that use an OCIA interface **must use OCIA long** function codes to create command messages. The table that is presented below gives you a description of each command that is available to OCIA long format communications, as well as the command byte that you insert as the function code of your terminal-to-scanner messages.

Command Description	Function Codes
Soft Reset, No indication	20
Hard Reset	21
Disable Scanner, Red light flashes	2B
Disable Scanner with no indication	2D
Enable Tone	2F
Enable Scanner (only early 7870s do not support this command)	23
Beep Good Tone	34
Configuration Request (7890-0200 models)	30 41
Device Configuration Request (7890-0200 models)	30 42
Send Status to host	36
Start Scanner (7890 Only)	38
Program (7890 Only)	33 45
Disable Tone	39
Read ROM version number	1F **30 32 30 30**
Not-On-File	3F

Note: The PACESETTER Plus commands are also scanner-only commands. They are presented in this chapter under *PACESETTER Plus Commands*. In addition, the four byte data field for the Read ROM version number is included.

Warning: Asynchronous use of the reset commands can cause you to lose data.

Soft Reset

The soft reset command clears the scanner's decode buffer. This command prepares the scanner for reading tags by allowing it to accept decode data after the reset. The terminal receives no acknowledgment to this command.

Hard Reset

The hard reset causes the scanner to go through its initial power up sequence. No acknowledgment is sent as a response to this command, and all data in the scanner is lost.

Disable Scanner, Red Light Flashes

This command prevents the scanner from processing new tag data for the host terminal. The red flashing status indicator shows that this mode has been engaged. To recover from a disable scanner mode, one of the two reset commands or an enable command must be sent to the scanner.

Disable Scanner, with No Indication

This command performs the same functions as the previous disable command; however, it gives the operator no indication that it is in this mode. Recovery is the same for both disable commands.

Enable Tone

The Enable tone command enables the sounding of the scanner's good read tone. This command recovers the scanner from any tone disable command.

Enable Scanner

The Enable Scanner command enables the scanner for reading labels. Use this command to enable the scanner after a Not-On-File or Disable command has shut it down.

Only early 7870s do not support this command.

Note: Be aware that when the scanner is enabled, tag data can be sent to the terminal at any time.

Disable Good Tone

The Disable Good Tone command disables the sounding of the scanner's good read tone. The scanner's tone no longer sounds when the scanner sends a good read to the terminal.

Beep Good Tone

The Beep Good Tone command directs the scanner to sound the good read tone for the default period of time.

Configuration Request (7890-0200 Only)

The response from the device for this command contains basic information about the unit such as the Class #, Firmware Part and version numbers.

Device Configuration Request (7890-0200 Only)

The response from the device for this command contains particular information for the type of scanner/device (verifier) such as symbologies, configuration default, display configuration, state of the unit, good tone parameters, etc.

Note: For both the Configuration Request and Device Configuration Request commands there is a version number of the response so that the software can tell how to parse the data and all data is in ASCII characters and is separated by commas. For more information on the Configuration Request and Device Configuration Request commands, see Appendix A.

Send Status to Host

The Send Status command asks the scanner to send its current status to the host terminal. Valid responses from the scanner are presented in the following table.

Scanner Status	Response Codes
Normal Mode (30)	30
Disable Mode (2B)	2B
Toad Mode (3A)	3A

Start Scanner (7890 Only)

Use this command to turn the scanner on without having to present a tag to the scan window. This command can be sent to the scanner at the start of a transaction. Also, in order to use this command, the scanner must be enabled.

Program (7890 Only)

Use this command to program the scanner just as you would using tags. For an example of how to use this program method, see "Using the Program Command" in this chapter. Valid responses from the scanner are shown in the following table.

Scanner Status Description	Response Codes (Hex)
Good	30
Failed	31
Scanner not in disable mode	32

Disable Tone

Use this command to disable the tone on the scanner. The scanner's tone does not sound until an enable tone is issued by the terminal.

Read ROM version number

Use this command to read the ROM version number from the scanner. The scanner sends 30 bytes containing the version number from PROM in response to this message.

Note: This data is sent in a special format where each byte is sent one nibble (4 bits) at a time. A Hex character 34 byte would be broken into nibbles and sent as first B3.

Not-On-File

Use this command to disable the scanner when a label is read that is not on file in the terminal. The command disables the scanner, causes the red light to flash, and sounds the tone. As with any disable mode, you need a reset or an enable command to bring the scanner back to normal operation.

Using the Program Command

The Program command causes the NCR scanner to interpret the data in the message as information to program itself. The scanner must be in the disable mode for the scanner to act on the message.

The command format for Program is:

Prefix Byte	FC1	FC2	Data	BCC Byte

To create a Program command message:

1. Select the prefix byte, if enabled.
2. Select and insert function code 33H 45H.
3. Enter the data that is to be sent from the host to the scanner.

Tag	Data Sent (Hex)
End	51H "N"
Save and Reset	53H "S"
Hex 0 –Hex F	30H – 3FH or 30H – 39H, 41H – 46H

Note: If the last character is an 'S,' no response is provided unless there is an error in the data. If the power –up message is enabled, this is sent after successfully completing power-up diagnostics.

4. Add the BCC byte.

The following is an example of what a Program message would look like

02	33	45	16221C3S	E
Prefix Byte	FC1	FC2	Data	BCC Byte

This example programs the scanner for no label identifiers and check digits sent with all UPC/EAN labels.

(The ASCII data in the example would be 31, 36, 32, 32, 31, and so on in Hex).

Scanner/Scale Commands

The following commands are those that are supported by NCR scanner/scale models. Notice that when you create messages with these commands, you must always include an address byte before the function code in the message structure. In most cases, the examples in this section do not include parity, the prefix byte, or the BCC byte in their descriptions. Chapter 5, *OCIA with NCR Scanners*, gives you the format for including these components in your OCIA message structure. All scanner/scale commands use **OCIA single cable long** format.

Note: Scanner/scale models respond to commands in scanner-only format and an address byte of B3. All commands are shown with no parity.

Including the Address Byte with Commands

In order for your scanner/scale to respond to the commands that you send through the host terminal, all function codes must be preceded by an address byte. When constructing command messages, use the peripheral device address to receive the message as the address byte portion of your message. The following table provides a list of devices that receive commands and their corresponding addresses.

Devices	Address
Scanner	30
Scale	31
Display	32
Special Function	33

Scanner/Scale Common Commands

Common commands can be sent to any device in the scanner unit. The two common commands that are available are listed in the following table.

Command Description	Function Codes
Hard Reset	30
Send Status to host	33

Hard Reset

The Hard Reset command causes the scanner to go through its initial power up sequence. No acknowledgment is sent as a result of this command.

Send Status to host

The Send Status to host command asks the scanner to send its current status to the host terminal. Since the response message format changes depending on the device addressed by the command, each command section features the Send Status to host command.

Scanner/Scale Scanner Commands

Your application program should send these commands from the terminal to control the operation of only the scanner. The commands listed in the following table must be preceded by an address byte of 30.

Command Description	Function Codes
Enable Scanner	31
Disable Scanner with no indication	32
Send Status to host	33

Command Description	Function Codes
Not-On-File	38 30
Disable Scanner, Red light flashes	38 31

Enable Scanner

The Enable Scanner command permits the scanner to send tag data to the host terminal. You can use the command to bring the scanner back into normal operation mode after a Not-On-File or Disable with or without indication command has been issued. The command is acknowledged with the standard acknowledgment message, 30 30 BCC (no parity shown).

Note: Be aware that when the scanner is enabled, tag data can be sent to the terminal at any time.

Disable Scanner with no indication

The Disable Scanner with no indication command disables the scanner by preventing it from sending tag data to the terminal. This disable function gives the operator no indication that the scanner is in a disable mode. To recover from a disable mode, the terminal must send an Enable Scanner or Reset command. The scanner acknowledges this command with the standard 30 30 (BCC, and parity not shown).

Send Status to host

The Send Status to host command asks the scanner to send its current status to the host terminal. The response message is in the following format.

7. 33 3W 3X 3Y 3Z

The four data bytes return the status of the scanner. Possible responses for the data bytes are listed in the following table.

Data Bytes	Response Description	Codes
3W	Not-On-File	30
3X	Gateless Scanner	31
3Y	Scanner Disabled Scanner Enabled	30 31
3Z	No Scan Data Present	30

Your application program sends these commands from the terminal to control the operation of the scale specifically. The commands listed in the following table must be preceded by an address byte of 31.

Command Description	Function Codes
Weigh	38 30
Cancel	38 31
Send Status to host	33
Monitor	34

Weigh

The Weigh command directs the scale to send a weight value to the host terminal to determine the price. The command remains in effect until the scale has a weight or it receives a Cancel command to stop the function.

The recommended procedure is that the item be placed on the scale before the weigh command is sent. This should help reduce errors and speed the weighing process. If desired, either the status or monitor command can be used to determine when a stable weight is available.

The scale responds in the following format.

31 38 3V 3W 3X 3Y 3Z

Values for the five data bytes are presented in the following table.

Data Bytes	Measure		
	Pounds	Kilograms (9.995 kgs max)	Kilograms (13.995 kgs max)
3V	Tens Unit	Ones Unit	Tens Unit
3W	Ones Unit	Tenths Unit	Ones Unit
3X	Tenths Unit	Hundredths Unit	Tenths Unit
3Y	Hundredths Unit	Thousandths Unit	Hundredths Unit
3Z	not present	not present	Thousandths Unit

Cancel

The Cancel command cancels the previous Weigh command. The scanner acknowledges the message with the standard response code of 30. The response message including the address byte would be 31 30 BCC.

Send Status to host

With the address byte for the scale included, the scanner sends the following response message after the Send Status to host command.

31 33 3V 3W 3X 3Y 3Z

The five data bytes return the status of the scale. Possible responses for the data bytes are listed in the following table.

Data Bytes	Response Description	Codes
3V	Weight is presented in lbs	30
	Weight is presented in kgs	31
3W	Scale enabled	30
	Scale disabled	31

Data Bytes	Response Description	Codes
3X	Zero weight display after 5 seconds	31
3Y	Timers always disabled	32
3Z	Scale not ready	30
	Non-stable weight	31
	Stable weight over 30.0 lbs (9.995 kgs)	32
	Stable zero weight	33
	Stable non-zero weight available	34

Scale Not Ready Status

The Scale not ready status implies that the scale will not weigh an item because the scale needs to be reset to zero or needs calibration, or the scanner/scale is configured without a scale.

Assuming the scale function is enabled; operators can depress the reset switch to zero the scale. If the scale still is not ready, operators should clean debris around and under the weight plate and depress the reset switch again.

The unit will show on its display (integrated or remote) if it requires calibration. If the scale continues to send a not ready status, the scale may need calibration or to be serviced.

Monitor

The Monitor command directs the scale to output a stable non-zero weight or the scale status if the scale does not have a stable non-zero weight. This command is intended for use by a POS-driven remote scale weight display (live weight). The stable weight returned is not intended for determining the price of an item. The responses that are possible from this command are the following.

31 34 34 3Y 3Y 3Y 3Y 3Y (3Y)

OR

8. 34 3X

The first response message contains the stable non-zero weight. The scale responds with the second message when a stable non-zero weight is not available. 3X denotes the current scale status, while 3Y represents the value for the weight. Possible status values follow.

Data Bytes	Sent with weight value Response Description	Codes
3X	Stable non-zero weight	34

Data Bytes	Sent without weight value Response Description	Codes
3X	Scale not ready	30 H
	Scale unstable	31
	Scale over capacity	32
	Stable zero weight	33
	Scale under zero weight	35

Not-On-File

The Not-On-File command disables the scanner when a label is read that is not on file in the terminal. The command disables the scanner and causes the red light to flash and the tone to sound. As with any disable mode, you need an Enable Scanner or a Reset command to bring the scanner back to normal operation.

Disable Scanner, Red light flashes

The Disable Scanner, Red light flashes command prevents the scanner from processing new tag data for the host terminal and alerts the operator by flashing the red light on the scanner. An Enable Scanner or Reset command brings the scanner unit back to normal operation mode.

Scanner/Scale Scale Commands

Your application program sends these commands from the terminal to control the operation of the scale specifically. The commands listed in the following table must be preceded by an address byte of 31.

Command Description	Function Codes
Weigh	38 30
Cancel	38 31
Send Status to host	33
Monitor	34

Weigh

The Weigh command directs the scale to send a weight value to the host terminal to determine the price. The command remains in effect until the scale has a weight or it receives a Cancel command to stop the function.

The recommended procedure is that the item be placed on the scale before the weigh command is sent. This should help reduce errors and speed the weighing process. If desired, either the status or monitor command can be used to determine when a stable weight is available.

The scale responds in the following format.

9. 38 3V 3W 3X 3Y 3Z

Values for the five data bytes are presented in the following table.

Data Bytes	Measure		
	Pounds	Kilograms (9.995 kgs max)	Kilograms (13.995 kgs max)
3V	Tens Unit	Ones Unit	Tens Unit
3W	Ones Unit	Tenths Unit	Ones Unit
3X	Tenths Unit	Hundredths Unit	Tenths Unit
3Y	Hundredths Unit	Thousandths Unit	Hundredths Unit
3Z	not present	not present	Thousandths Unit

Cancel

The Cancel command cancels the previous Weigh command. The scanner acknowledges the message with the standard response code of 30. The response message including the address byte would be 31 30 BCC.

Send Status to host

With the address byte for the scale included, the scanner sends the following response message after the Send Status to host command.

10. 33 3V 3W 3X 3Y 3Z

The five data bytes return the status of the scale. Possible responses for the data bytes are listed in the following table.

Data Bytes	Response Description	Codes
3V	Weight is presented in lbs	30
	Weight is presented in kgs	31
3W	Scale enabled	30
	Scale disabled	31
3X	Zero weight display after 5 seconds	31
3Y	Timers always disabled	32
3Z	Scale not ready	30
	Non-stable weight	31
	Stable weight over 30.0 lbs (9.995 kgs)	32
	Stable zero weight	33
	Stable non-zero weight available	34

Scale Not Ready Status

The Scale not ready status implies that the scale will not weigh an item because the scale needs to be reset to zero or needs calibration, or the scanner/scale is configured without a scale.

Assuming the scale function is enabled; operators can depress the reset switch to zero the scale. If the scale still is not ready, operators should clean debris around and under the weight plate and depress the reset switch again.

The unit will show on its display (integrated or remote) if it requires calibration. If the scale continues to send a not ready status, the scale may need calibration or to be serviced.

Monitor

The Monitor command directs the scale to output a stable non-zero weight or the scale status if the scale does not have a stable non-zero weight. This command is intended for use by a POS-driven remote scale weight display (live weight). The stable weight returned is not intended for determining the price of an item. The responses that are possible from this command are the following.

31 34 34 3Y 3Y 3Y 3Y 3Y (3Y)

OR

11. 34 3X

The first response message contains the stable non-zero weight. The scale responds with the second message when a stable non-zero weight is not available. 3X denotes the current scale status, while 3Y represents the value for the weight. Possible status values follow.

Data Bytes	Sent with weight value Response Description	Codes
3X	Stable non-zero weight	34

Data Bytes	Sent without weight value Response Description	Codes
3X	Scale not ready	30 H
	Scale unstable	31
	Scale over capacity	32
	Stable zero weight	33
	Scale under zero weight	35

Scanner/Scale Display Commands

Your application program sends these commands from the terminal to control the display. The commands listed in the following table must be preceded by an address byte of 32.

Command Description	Function Codes
Display LCD data	38 31
Send Status to host	33

Display LCD data

The Display LCD data command displays the 7 ASCII characters that follow the 31. A period may be sent to show the price and will not count as one of the characters. The command is acknowledged with a 32 30 response.

Send Status to host

With the address byte for the display included, the response message for the Send Status to host command is the following.

12. 33 3X

The following table shows the possible values for 3X.

Data Byte	Response Description	Codes
3X	LCD display shows weight or amount	30
	LCD display shows weight only	31
	Alphanumeric display, not supported	32

Scanner/Scale Special Function Commands

The Special Function commands are the same as the commands for NCR scanner-only models. The difference in using these commands is that you must include an address byte of 33 in the message structure. Special Function commands are useful because they give the scanner/scale programmer the same commands as the scanner-only models. The scanner/scale only responds to the Send Status to host and Read ROM version number commands.

Note: For commands to the scanner in OCIA single cable long, you should use the scanner commands with an address of 30. To send single byte scanner-only commands in single cable format, break the command code into two bytes. For example, 2B would be 32 3B.

PACESETTER Plus Commands

The following table gives the available PACESETTER Plus commands. The table includes the entire message structure for PACESETTER commands because the format for creating these types of messages is slightly different from the command structure given in the previous chapter.

Command Description	Function Codes	
	OCIA Long	OCIA Single Cable Long
Read PACESETER Tally (3X = 31 to 35–Code for type of read)	00 33 3D 32 3X BCC	80 B33D 32 3X BCC
Reset PACESETTER Tallies	00 03 0D 0C BCC	80 B3 0D 8C BCC
Enable PACESETTER Plus Mode 3 Trailer Tallies	00 33 3D 3E 3E BCC	80 B3 3D 3E 3E BCC
Disable PACESETTER Plus Mode 3 Trailer Tallies	00 33 3D 3F 3F BCC	80 B3 3D BF BF BCC

The 3X portion of the function code byte in the **Read PACESETTER Tally** command stands for the type of tally that you want sent to the host terminal. The following table shows the available PACESETTER tallies.

Tallies	Codes
Good Reads	31
No reads due to lack of a full label	32
Good reads with very highly overprinted bars	33

Tallies	Codes
Good reads with very highly underprinted bars	34
Good reads with missing margins	35

The four commands that you can use in your application program to access and control PACESETTER Plus data are described below.

Read PACESETTER Tally

The Read PACESETTER Tally command directs the scanner to output the tally that the terminal requested. The response sent back to the terminal is in the following format.

3D 3X 3Y 3Y 3Y 3Y 3Y 3Y 3Y

Note: This message does not show the prefix, terminator, or BCC bytes.

The 3X stands for the code number of the tally requested, while 3Y stands for the value of the tally. Notice that all numerals are sent in ASCII.

Reset PACESETTER Tallies

The Reset PACESETTER Tallies command causes the scanner to reset the PACESETTER tallies. The memory buffer that holds this data is cleared.

Enable PACESETTER Plus Mode 3 Trailer

The Enable PACESETTER Plus Mode 3 Trailer command permits trailer PACESETTER Plus data to be sent with each UPC or EAN tag read. With this command, tag quality information is sent to the host and stored for quality analysis. Trailer data is sent in the format shown in Chapter 5, *OCIA with NCR Scanners*. Refer to Appendix B, *PACESETTER Plus Data* for information regarding the interpretation of PACESETTER Plus data.

Disable PACESETTER Plus Mode 3 Trailer

The Disable PACESETTER Plus Mode 3 Trailer command prevents trailer data from being sent with tag reads.

Note: To use PACESETTER Plus commands with a scanner/scale, use the OCIA single cable long commands. Use OCIA long for PACESETTER Plus in scanner-only models. PACESETTER Plus is an optional feature. It is only available in models that have been equipped with PACESETTER Plus at the factory.

Model Differences

With the variety of scanner products that NCR produces, there are some commands that are available with some scanners and not available with others. This section discusses the commands that are available with certain models and includes model specific commands.

7870, 7875, and 7880

With the exception of Start Scanner, all of the commands discussed in this chapter are available to these three slot scanners.

With the exception of Start Scanner, Configuration and Device Configuration Requests, all of the commands discussed in this chapter are available to these three slot scanners.

The 7870 utilizes bi-optic scanning technology by reading tags through two scan windows. This capability increases the amount of successful reads on the first pass.

The 7880 scanner is a new generation vertically or horizontally mounted unit. This model is also available as a scanner/scale. The 7880 is available with optional PACESETTER Plus and PACESETTER Plus III.

The 7875 utilizes bi-optic scanning technology while including significant areas of performance improvement. New features include the addition of top-side read, a larger bottom window, and greatly enhanced presentation scanning to facilitate check-out cashiers by increasing their productivity with minimal risk of occupational injury. PACESETTER Plus is a standard feature on the NCR 7875. PACESETTER Plus III is an optional feature which augments PACESETTER Plus.

7890

The 7890 presentation scanner has the capability to use all scanner-only commands except for the PACESETTER Plus commands. This scanner model does not offer a scale nor PACESETTER Plus like the 7875 and 7880 scanner/scales. Read ROM version number is available in 7890 scanners with versions of firmware 497-0301339 and higher. The 7890 is the only scanner model that uses the Start Scanner command.

The 7890-0200 models also support the Configuration Request and Device Configuration commands.

7890-5800 models support the Program command.

Switch Read

The Switch Read is one other command that is available to OCIA single cable long format communications. Because the 7875, 7880, and 7890 scanners do not have switches, they have no use for this command. The 7824 scanner/scale does have switches for programming and it supports the Switch Read command. For programming information on the Switch Read, consult the *7824 Programming Information, Single Cable Scanner/Scale Interface* (ST-2113-10).

Chapter 7: RS-232 Examples

Constructing RS-232 Messages

This chapter shows you how to construct messages that enable communications between your RS-232 terminal and an NCR scanner. The previous chapters present the information that you need to complete an application program using RS-232. Chapter 3, *RS-232 Message Structures*, shows you how to construct multiple byte messages that are compatible with the RS-232 protocol. Chapter 4, *RS-232 Commands*, presents the function codes that you use in constructing RS-232 messages and controlling communications between your terminal and scanner.

The chapter reviews the same RS-232 information that exists in Chapters 3 and 4. These chapters contain all of the available data on RS-232 with NCR scanners. NCR, however, envisions this book as more than simply a reference document that presents necessary information and forces the user to implement it without direction. Chapter 7, *RS-232 Examples* and Chapter 8, *OCIA Examples* introduce a new method for explaining the use of the two protocols with NCR scanners. This chapter gives you instructions for implementing RS-232 that relate to specific tasks performed within an application program. NCR has selected tasks that are relevant and useful to the types of things that you experience in a programming situation.

Note: All sample messages presented in this chapter are shown without parity.

Assembling No Response Commands

The first commands that this chapter covers are those that do not receive a response from the scanner after they are initiated by the terminal through your application. These commands direct the scanner to perform a function; however, they do not require that it return a response message.

Creating Commands in a Scanner-Only Format

As discussed in Chapter 4, *RS-232 Commands*, scanner-only models utilize their own command set. Scanner-only models have access to no other command sets.

Disabling the scanner with no indication

In your program you have decided that after a certain condition is met, perhaps after a bad read, you would like the scanner to enter a disable mode without a tone sounding or the status indicator flashing. In this case, you select the Disable Scanner with no indication command. Construct the command message in the following format described in Chapter 3, *RS-232 Message Structures*.

13. Select the prefix byte. This discussion uses the default (02).
14. Select and insert function code 32 44 from the Scanner-only list of RS-232 commands in Chapter 4, RS-232 Commands.
15. Insert the terminator byte. This discussion uses an RS-232 control character (0D).
16. Add the BCC byte.

The resulting command message is the following. This is the message your terminal sends to the scanner.

02, 32, 44, 0D, 7B

The scanner sends no response message to the terminal after this command is issued.

Enabling PACESETTER Plus Mode 3 Trailer Data

In your program you decide that you want PACESETTER Plus tag diagnostic data sent with the bar-coded data read by your scanner-only model. To do this you use the Enable PACESETTER Plus Mode 3 Trailer command. This example omits the optional BCC byte. Construct the command message in the following format described in Chapter 3, *RS-232 Message Structures*.

1. Select the prefix byte (02).
2. Select and insert function codes 3D 3E 3E from the PACESETTER Plus command list.
3. Insert the terminator byte (04).

The resulting command message is the following. This is the message your terminal sends to the scanner.

02, 3D, 3E, 3E, 04

The scanner performs the function and sends no response message to indicate that it has completed the operation.

Creating Commands for a Scanner/Scale

Scanner/scales also utilize their own command set. These models do, however, have access to scanner-only commands with the special function address (33).

Constructing a Hard Reset message

In your program, you need to recover from a function that has disabled the scanner. Use the Hard Reset command to power down the scanner and reset it for normal operation. Construct the command message in the following format described in Chapter 3, *RS-232 Message Structures*.

1. Select the prefix byte (02).
2. Insert the correct address of the peripheral device that the command addresses. This command addresses the scanner (30).
3. Select and insert function code 30 from the command list in Chapter 4, *RS-232 Commands*.
4. Insert the terminator byte. This discussion uses an RS-232 control character (03).
5. Add the BCC byte.

The command message resulting from this configuration is the following. This is the message sent from terminal to scanner.

02, 30, 30, 03, 03

The scanner performs the function and sends no response message to indicate that it has completed the operation.

Assembling Response Commands

These commands require that the scanner send a response message to the terminal after the scanner receives its command. The responses usually return data that the application program processes.

Creating Commands in a Scanner-Only Format

Scanner-only models have their own command set. These are the only commands that you can use with scanner-only models.

Sending scanner status to the host terminal

Use the Send Status to host command in your program when the terminal needs to know the current mode of the scanner. Construct the command message in the following format described in Chapter 3, *RS-232 Message Structures*.

1. Select the prefix byte. This discussion uses the default (02).
2. Select and insert function codes 33 36 from the command list in Chapter 4, *RS-232 Commands*.
3. Insert the terminator byte. This discussion uses an RS-232 control character (0D).
4. Add the BCC byte.

The command message resulting from this configuration is the following. This is the message sent from terminal to scanner.

02, 33, 36, 0D, 08

The command requires the scanner to return its status to the host terminal. Since the terminal with a scanner-only configuration was disabled in a previous section, it returns the disabled response code from Chapter 4, *RS-232 Commands*. The response message is the following.

02, 32, 42, 0D, 7D

The codes 32 42 indicate that the scanner has been disabled.

Reading a PACESETTER Tally

The Read PACESETTER Tally command can be implemented at a certain point in your application when you feel it would be useful to read tag diagnostic information into the terminal's memory. Complete the following directions to create the message.

1. Select the prefix byte. This discussion uses the default (02).
2. Select and insert function codes 3D 32 from the PACESETTER Plus command description in Chapter 4, *RS-232 Commands*.
3. Select and insert the code for the type of read you would like. This message selects "Good Reads" (31).
4. Insert the terminator byte. This discussion uses an RS-232 control character (03).
5. Include the BCC byte.

The command message resulting from this configuration is the following. This is the message sent from terminal to scanner.

02, 3D, 32, 31, 03, 3D

If your scanner has read 3247 good labels, the response from the scanner after this command is the following.

02, 3D, 31, 30, 30, 30, 33, 32, 34, 37, 03, 3D

In this response message, 02 is the prefix and 3D is the command code. In addition, the scanner returns the code number for the tally requested which in this case is the 31. The next seven codes are the numeral 3247 in Hex code. The tally can hold seven numbers, so the first three numbers in this case are 30 to represent zeros. 03 is the terminator byte and 3D is the BCC.

Creating Commands for a Scanner/Scale

Scanner/Scales have their own command set. They have access to scanner-only commands with the special function address (33).

Requesting Scanner Status

Use the Send Status to host command in your program when the terminal needs to know the current mode of the scanner. Construct the command message in the following format described in Chapter 3, *RS-232 Message Structures*.

1. Select the prefix byte. This discussion utilizes the default (02).
2. Insert the scanner address (30).
3. Select and insert function code 33 from the RS-232 command description in Chapter 4, *RS-232 Commands*.
4. Insert the terminator byte. This discussion uses the RS-232 control character 0D.
5. Add the BCC byte.

The command message resulting from this configuration is the following. This is the message sent from terminal to scanner.

02, 30, 33, 0D, 0E

The response to this command tells you that Not-On-File is enabled, that the scanner is gateless, and that no scan data is present. These conditions are constant when a status request is called. The command does tell you whether the scanner is disabled or enabled. The sixth byte in the response message carries this information. The following message is sent to the terminal when the scanner is enabled.

02, 30, 33, 30, 31, **31**, 30, 0D, 0E

In the response, the prefix and address precede the command code. These are followed by four bytes of data. The first byte checks Not-On-File, the second shows the scanner as gateless, the third indicates scanner status, and the fourth shows if scan data is present. The terminator byte is 0D and the BCC is 0E.

Getting a Weight from the Scale

In your application, you decide that when a certain condition is met, the scale should send a weight value to the terminal. You may want to call this command (Weigh) when an operator hits a key stroke on the terminal to request a weight. Complete the following directions to create the message.

1. Select the prefix byte. This discussion utilizes the default (02).
2. Insert the scale address (31).
3. Select and insert function code 31 from the RS-232 command description in Chapter 4, *RS-232 Commands*.
4. Insert the terminator byte. This discussion uses the RS-232 control character 0D.
5. Add the BCC byte.

The command message resulting from this configuration is the following. This is the message sent from terminal to scanner.

02, 31, 31, 0D, 0D

If the scale is set to measure an object in pounds and the weight is 4.97 lbs, the response message for this command is the following.

02, 31, 31, 30, 34, 39, 37, 0D, 07

In the response message, the scale address precedes the function code. The four data bytes, for responses in pounds, show tens, ones, tenths, and hundredths in ordered, one-byte increments.

Displaying Data on the Screen

In your application program, you find there are places in its execution where you would like the data that is being processed to be displayed on the scanner's LCD. To do this, you use the Display LCD data command. Complete the following directions to create the message.

1. Select the prefix byte. This discussion utilizes the default (02).
2. Insert the display address (32).
3. Select and insert function code 31 from the RS-232 command description in Chapter 4, *RS-232 Commands*.
4. Include the data that you want displayed.
5. Insert the terminator byte. This discussion uses the RS-232 control character 0D.
6. Add the BCC byte.

If the LCD display is set to show prices and the data to be transmitted is the price $1.65, the resulting command message is the following. This is the message sent from terminal to scanner.

02, 32, 31, 31, 2E, 36, 35, 0D, 12

Notice that the fifth byte is a 2E, the hex representation of (".") the decimal point. This character is not one of the 7 display characters. The scanner sends an acknowledgment in response to this command. The format for the response message is the following.

02, 32, 30, 0D, 0F

In the response message, the prefix (02) and display address (32) precede the response code. The terminator byte is 0D and the BCC is 0F.

Processing Tag Messages

As discussed in Chapter 3, *RS-232 Message Structures*, tag messages have their own structure. In order to process tag messages, you must be aware of the formats in which they are transmitted. The following tag message is an example of a UPC-A message transmitting a bar code label numbered 1234567890 in a scanner/scale model.

02, 30, 38, 41, **30**, 31, 32, 33, 34, 35, 36, 37, 38, 39, 30, **35**, 03, 4E

Note: This message contains no PACESETTER Plus data. In addition, the boldface numbers indicate number system and check digit characters.

In the message, the prefix byte precedes the UPC-A label identifier and the tag data. The terminator byte and BCC byte follow these components.

Chapter 8: OCIA Examples

Constructing OCIA Messages

Note: NCR RealScan SuperASIC (SA) units do NOT support any form of OCIA.

This chapter shows you how to create messages in NCR versions of OCIA long format. The two versions of long format that the chapter covers are regular long format and single cable long format.

The chapter reviews the same OCIA information that exists in Chapter 5, *OCIA with NCR Scanners* and Chapter 6, *OCIA Commands*. These chapters contain the available data on using NCR OCIA long formats. Since this section shows you how to perform specific tasks within your application, it reexamines some of the topics covered by these chapters. This chapter gives you instructions and guidance in implementing OCIA that relate to relevant and useful tasks in a programming situation.

Note: All of the sample messages in this chapter include parity because the OCIA protocol uses fixed parity.

Assembling No Response Commands

The first commands that this chapter covers are those that do not receive a response from the scanner after they are initiated by the terminal through your application. These commands direct the scanner to perform a function; however, they do not require that it return a response message. Commands in single cable long format, however, do receive acknowledgments.

Creating Commands in OCIA Long Format

As discussed in Chapter 6: *OCIA Commands*, OCIA long format utilizes its own command set. OCIA long has access to no other command sets.

Sending a Not-On-File to the scanner

In your program you decide that after a certain condition is met, you would like the terminal to send a Not-On-File command to the terminal. This command is useful for disabling the scanner with indication when the terminal receives tag data that it does not recognize. The command prevents the scanner operator from scanning additional tags. Construct the command message in the following format described in Chapter 5: *OCIA with NCR Scanners*.

- Select and insert the function code 3F for the Not-On-File command.

The resulting command message is the following. This is the message that your terminal sends to the scanner.

3F

The scanner sends no response message to the terminal after this command message has been issued.

Creating Commands in OCIA Single Cable Long Format

OCIA single cable long format also utilizes its own command set. This OCIA format does, however, have access to OCIA long commands with the special function address (B3).

Disabling the scanner with no indication

In your program you have decided that after a certain condition is met, perhaps after a bad read, you would like the scanner to enter a disable mode without a tone sounding or the status indicator flashing. In this case, you select the Disable Scanner with no indication command. Construct the command message in the following format described in Chapter 5: *OCIA with NCR Scanners*.

1 Insert the prefix byte 80.

2 Insert the address byte for the scanner (30).

3 Select and insert function code 32 for Disable Scanner with no indication.

4 Add the BCC byte.

The resulting command message with parity is the following. This is the message your terminal sends to the scanner.

80, B0, 32, 02

The scanner sends an acknowledgment to the terminal after this command message has been issued.

Assembling Response Commands

These commands require that the scanner send a response message to the terminal after it receives its command. The responses usually return data that the application program processes.

Creating Commands in OCIA Long Format

OCIA long format has its own command set. These are the only commands that you can use with OCIA long.

Sending scanner status to the host terminal

Use the Send Status to host command when you find that the terminal needs to know the current mode of the scanner. Construct the command message in the following format described in Chapter 5: *OCIA Commands*.

- Select and insert function code 36 for Send Status to host.

The resulting command message is the following. This is the message your terminal sends to the scanner.

36

The command requires the scanner to return its status to the host terminal. The terminal disabled the scanner in a previous section and as a result, the scanner returns the following response code that indicates it is disabled.

2B

Creating Commands in OCIA Single Cable Long Format

OCIA single cable long format has its own command set. The format has access to OCIA long commands with the special function address (B3).

Sending scale status to the host terminal

In your application, you find that at a certain point you need to check the status of the scale. The operator may find that the scale is not sending a weight value and with a key stroke could determine the operating mode of the scale. Construct the command message in the following format described in Chapter 5: *OCIA with NCR Scanners*.

1. Insert the prefix byte 80.
2. Insert the address byte for the scale (31).
3. Select and insert function code 33 for Send Status to host.
4. Add the BCC byte.

The resulting command message is the following. This is the message your terminal sends to the scanner.

80, 31, B3, 02

With the weight calculated in pounds and the scale enabled, the response message is the following.

31, B3, B0, B0, 31, 32, 81

The response message includes the BCC. In addition, the address precedes the function code which is followed by response data. The first two bytes of data show that weight is presented in pounds and that the scale is enabled. The third byte indicates that a zero weight display occurs after 5 seconds and the fourth byte shows that timers are always disabled. These last two bytes are constant within the response message.

A

Appendix A: Commands and Message Structures

Scanner-Only Commands

The following table contains the scanner-only commands in all of the formats presented in this book. Address bytes are included where appropriate and are highlighted by boldface type. Commands are discussed in Chapter 4: *RS-232 Commands*, and Chapter 6: *OCIA Commands*.

Command Description	Function Codes			
	RS-232 scanner-only	RS-232 scanner/scale	OCIA long format	OCIA single cable long
Soft Reset, No indication	32 30	**33** 32 30	20	**B3** 32 B0
Hard Reset	32 31	**33** 32 31	21	**B3** 32 31
Disable Scanner, Red light flashes	32 42	**33** 32 42	2B	**B3** 32 3B
Disable Scanner with no indication	32 44	**33** 32 44	2D	**B3** 32 3D
Enable Tone	32 46	**33** 32 46	2F	**B3** B2 BF
Enable Scanner (only early 7870s do not support this command)	32 33	**33** 32 33	23	**B3** 32 B3
Configuration Request (7890-0200)	30 41	NA	30 41	NA
Device Configuration	30 42	NA	30 42	NA

Command Description	Function Codes			
	RS-232 scanner-only	RS-232 scanner/scale	OCIA long format	OCIA single cable long
Request (7890-0200).				
Beep Good Tone	33 34	**33** 33 34	34	**B3** B3 34
Send Status to host	33 36	**33** 33 36	36	**B3** B3 B6
Start Scanner (7890 Only)	33 38	**33** 33 38	38	**B3** B3 38
Program	33 45	NA	33 45	NA
Disable Tone	33 39	**33** 33 39	39	**B3** B3 B9
Read ROM version number	33 31 30 32 30 30	**33** 33 31 30 32 30 30	1F B0 32 B0 B0	**B3** 1F B0 32 B0 B0
Low Frequency non-programmable beep	33 44	**33** 33 34	NA	NA

The commands listed in the table do not include all of the required components of message structure, nor do they include optional items. OCIA commands are shown with parity and the ROM version number data is shown in italics with the command.

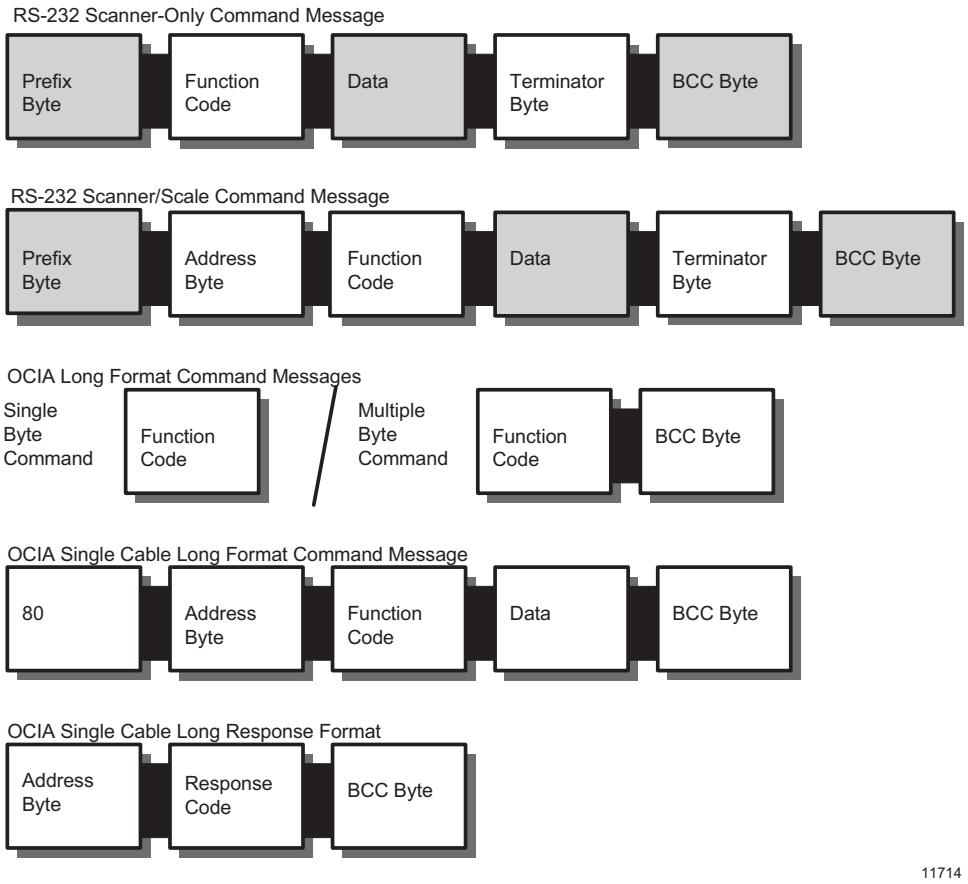
Message Structures

Message structures for all RS-232 and OCIA long formats can be found in Chapter 3: *RS-232 Message Structures*, and Chapter 5: *OCIA with NCR Scanners*. The following figure gives you the command structures for all protocol formats discussed in this book. Use these structures to control the operation of your scanner.

Note: The response message structure for OCIA single cable long format is also provided. This is the standard response for only OCIA single cable long communications.

More detailed information about the message structure of Configuration Request and Device Configuration Request is given in the section following Figure A-1. These are new commands for the 7890-0200 scanner only.

Figure A-1 Message Structures



Response Formats for Configuration Request and Device Configuration Commands

Configuration Request and Device Configuration Request are commands which apply to all SuperASIC Scanners for RS-232 format. Only the 7892 Release 1 scanner could use both RS-232 and OCIA formats.

For both the Configuration and Device Configuration commands, there is a version number of the response so that the software can tell how to parse the data. All data is in ASCII characters and separated by commas. Some of the bytes use bit settings, but a valid ASCII character of 20-7F is always used.

Configuration Response Format

The response from the device for this command contains basic information about the unit.

The example below illustrates the format for the configuration response to the Configuration Request command.

Table A-1 Example of Configuration Response Format

Code	Comment
'0A'	STATUS REQUEST RESPONSE
'10,'	BLOCK VERSION NUMBER
'7890,'	CLASS #
'0200,,'	MODEL NUMBER, RESERVED FIELD
'50-xxxxxxxx,'	RESERVED FOR SERIAL NUMBER
'497-xxxxxxx,'	FIRMWARE PART NUMBER
'xxx,'	FIRMWARE VERSION NUMBER, RESERVED FIELD

Device Response Format

The following table illustrates the configuration for the Device Response Format contains. Please note that @ or 40H is used to insure the byte will not be a control byte. Bit 7 is reserved for parity.

Following the table, the Device Request Configuration Format will be further explained in four sections which correspond directly to sections of the configuration in Table A-1. These sections contain details such as bit values for each segment of the configuration format.

Table A-2 Example of Device Response Format

Code	Description
'0B'	DEVICE RESPONSE
'11,'	BLOCK VERSION NUMBER
'@@,'	OFFSET OF BASIC CONFIGURATION BYTES, RESERVED
'47H, 43H, 47H, 41H, 2CH'	SYMBOLOGIES SUPPORTED AND ENABLED
'@@,'	CURRENT STATE - DISABLED OR ENABLED AND LASER ON OR OFF
'@@,'	RESERVED FOR PACESETTER SUPPORT/STATUS
'@, @, @, @@,'	GOOD TONE VOL, FREQ, DURATION, VOICE
'@@,'	RESERVED FOR SCALE CONFIGURATION STATUS
'@@,'	RESERVED FOR DISPLAY CONFIGURATION STATUS
'@,'	DEFAULT SETTING
',,,'	RESERVED, FOUR FIELDS

First and Second Byte Bit Assignments

The first two bytes for the Device Response Format can be further broken down into bit assignments as shown in shown in Tables A-3 and A-4.

Table A-3 Bit Assignments of First Byte

Bit	Description
0	DISPLAY CONFIGURATION BIT 0
1	DISPLAY CONFIGURATION BIT 1
2	DISPLAY CONFIGURATION BIT 2 (000 => NO DISPLAY)
3	0 => PROTOCOL BIT 0
4	0 => PROTOCOL BIT 1 (00 => SCANNER ONLY)
5	0 => NOT ASSIGNED
6	1 ALWAYS SET TO INSURE NOT CONTROL BYTE
7	RESERVED FOR POSSIBLE PARITY BIT

Table A-4 Bit Assignments of Second Byte

Bit	Description
0	0 =>NO STEPPER (7800 AND 7890 ONLY)
1	NOT ASSIGNED
2	NOT ASSIGNED
3	NOT ASSIGNED
4	NOT ASSIGNED
5	NOT ASSIGNED
6	1 ALWAYS SET TO INSURE NOT CONTROL BYTE
7	RESERVED FOR POSSIBLE PARITY BIT

Symbologies Supported and Enabled Bytes

The next portion of the device configuration response format is the symbologies field. There are two sets of two bytes associated with this field. The first set indicates which symbologies can be supported (Table A-5) while the second set delineates which symbologies have been enabled (Table A-6).

The bit assignments of the first set of bytes (first and second bytes) are shown in the following table.

Table A-5 First Set of Bytes for the Symbology Field

First Byte Bits	Description
0	CODE 128
1	CODE 39
2	INTERLEAVED 2 OF 5
3	RESERVED
4	RESERVED
5	RESERVED
6	ALWAYS SET
7	RESERVED FOR PARITY

Second Byte Bits	Description
0	UPC/EAN
1	ADDON/PERIODICALS
2	RESERVED
3	RESERVED
4	RESERVED

Second Byte Bits	Description
5	RESERVED
6	ALWAYS SET
7	RESERVED FOR PARITY

The second set of bytes (the third and fourth bytes) delineates which symbologies have been enabled, as seen in the following table.

Table A-6 Second Set of Bytes for the Symbology Field

Byte	Description
THIRD	(CORRESPONDS TO FIRST BYTE) ENABLED (1), DISABLED (0)
FOURTH	(CORRESPONDS TO SECOND BYTE) ENABLED (1) OR DISABLED (0)

Fields Following Symbology

The section of the basic configuration following the symbologies supported and enabled field includes the current state, pacesetter support, good tone volume, good tone frequency, and good tone duration fields.

Table A-7 Bit Values for Remaining Fields

FIELD	BYTE OR BIT	DESCRIPTION
Current State (2 Bytes)	First Byte	State Of Scanner 70H Normal 6eh Test Cycle Disabled
	Second Byte Bit 0 Bit 1 Bits 2-5 Bits 6	Laser and Motor Status (0=> OFF) Laser Status (0=> OFF) Motor Status Reserved Always On
PACESETTER Support/ Status Bytes	Two Bytes	Not Defined
Good Tone Volume	0 (Bit) 1 2 3 4 5 6 7	Reserved Reserved Reserved Reserved Reserved 0=> Not Applicable To 7890 Always Set Reserved for Parity
Good Tone Frequency	0 (Bit) 1 2 3 4 5 6 7	Freq Setting Bit 0 Freq Setting Bit 1 Freq Setting Bit 2 Reserved Reserved Good Tone Enabled 1=>Enabled Always Set Reserved for Parity

FIELD	BYTE OR BIT	DESCRIPTION
Good Tone Duration	0 (Bit) 1 2 3 4 5 6 7	Good Tone Duration Bit 0 Good Tone Duration Bit 1 Good Tone Duration Bit 2 Good Tone Duration Bit 3 Reserved Reserved Always Set Reserved for Parity
Default Value		Value will be either 0 or 6, but additional values will be added as requirements change. The value is 'OR'D' into the lower 4 bits. Bit 6 will remain on to ensure at least one bit is present to avoid confusion with control bytes.

Fields Not Defined or Available for Later Expansion

Table A-8 Fields Not Defined or Available

Field	BYTES	DESCRIPTION
VOICE	TWO BYTES	NOT DEFINED
SCALE CONFIGURATION STATUS	TWO BYTES	NOT DEFINED
DISPLAY CONFIGURATION STATUS	TWO BYTES	NOT DEFINED

Note: PACESETTER SUPPORT/STATUS BYTES are also not supported, but are shown in Table A-7 to maintain order of the configuration format.

B

Appendix B: PACESETTER Plus Commands

PACESETTER Plus commands are scanner-only commands that are available to scanner/scale models through use of the special function address (33 or B3 with parity. The following table presents the PACESETTER Plus commands that you can call in your application program. OCIA commands contain the entire message for each command.

Command Description	Function Codes	
	RS-232	OCIA
Read PACESETTER Tally (3X = 31 to 35 - Code for type of read)	3D 32 3X	00 33 3D 32 3X BCC
Reset PACESETTER Tallies	3D 3C	00 03 0D 0C BCC
Enable PACESETTER Plus Mode 3 Trailer Tallies	3D 3E 3E	00 33 3D 3E 3E BCC
Disable PACESETTER Plus Mode 3 Trailer Tallies	3D 3F 3F	00 33 3D 3F 3F BCC

In the table, OCIA commands are shown without parity. OCIA long format does not use parity, while OCIA single cable long PACESETTER commands must include parity. Chapter 6, *OCIA Commands* presents all PACESETTER commands with and without parity.

The 3X portion of the function code byte in the **Read PACESETTER Tally** command stands for the type of tally that you want sent. The following table shows the available PACESETTER tallies.

Tallies	Codes
Good Reads	31
No reads due to lack of a full label	32
Good reads with very highly overprinted bars	33
Good reads with very highly underprinted bars	34
Good reads with missing margins	35

PACESETTER Plus Data in Tag Messages

Each protocol has a format for PACESETTER Plus data in its tag messages. The following table contains the format for PACESETTER Plus data.

RS-232	OCIA Long	OCIA Single Cable Long
43 3Y 3Z	0C 0Y 0Z	0C XY XZ
Y Z = decoding code		

For OCIA Single Cable Long, X is 8 or 0. The code that maintains odd parity is the one that is sent in the message.

Decoding Codes (Y and Z)

The decoding codes for Y and Z are specified in the following table. The table shows you how to interpret the PACESETTER Plus data sent with tag messages.

Decoding Codes		Description
Y	Z	
1		Decoding was difficult; missing print lines corrected by Pacesetter 3.
2		Fragmented or folded label or inconsistent printing.
3		Decoding was difficult due to fragmented, folded or inconsistently printed label.
	1	Label appears to be highly underprinted.
	2	Label appears to be highly overprinted.
	4	Label appears to have missing bars or margins.
	5	Label appears to be highly underprinted and to have missing bars or margins.

Decoding Codes		Description
Y	Z	
	6	Label appears to be highly overprinted and to have missing bars or margins.
0	0	Label was decoded without major problems.
9	9	If a particular label intermittently shows this code, the label should be analyzed more closely for out of specification conditions, even though the label may show a "code 00" when it does scan (printing may be inconsistent).

The following tag message is an example of a UPC-A message with PACESETTER Plus data transmitting a bar code label numbered 1234567890 in a scanner/scale model.

02, 30, 38, 41, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 30, 35, **43**, **31**, **31**, 03, 0D

The same tag message in OCIA long format is the following.

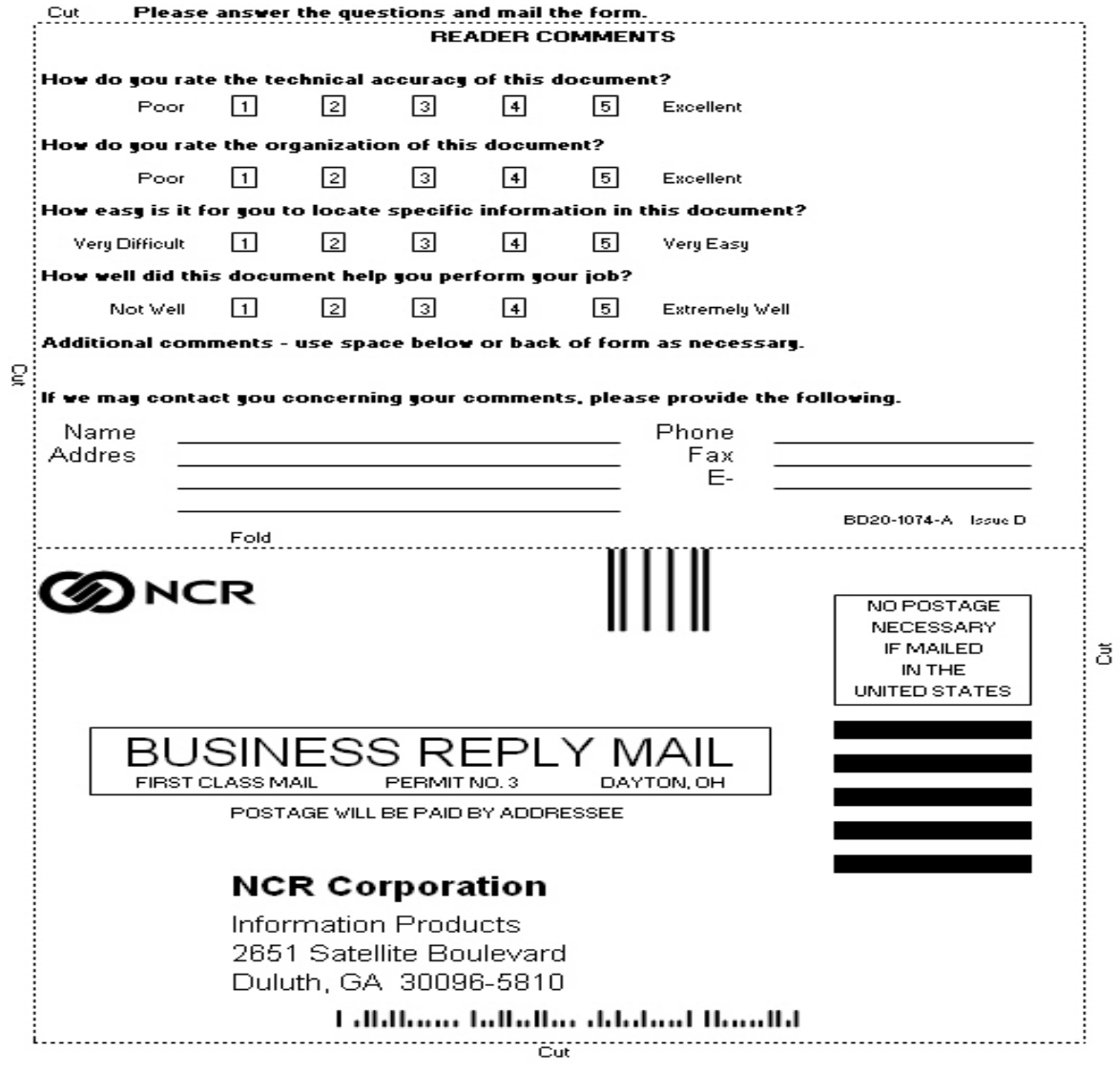
41, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 30, 35, **OC**, **01**, **01**, 49

In OCIA single cable long format, the tag message is the following.

B0, 38, BA, B0, 31, 32, B3, 34, B5, B6, 37, 38, 39, B0, B5, **8C**, **01**, **01**, BA

The PACESETTER Plus data in this message indicates that decoding was difficult and that the label appears to be highly underprinted.

Appendix C: User Feedback



Cut **Please answer the questions and mail the form.**

READER COMMENTS

How do you rate the technical accuracy of this document?

Poor [1] [2] [3] [4] [5] Excellent

How do you rate the organization of this document?

Poor [1] [2] [3] [4] [5] Excellent

How easy is it for you to locate specific information in this document?

Very Difficult [1] [2] [3] [4] [5] Very Easy

How well did this document help you perform your job?

Not Well [1] [2] [3] [4] [5] Extremely Well

Additional comments - use space below or back of form as necessary.

If we may contact you concerning your comments, please provide the following.

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