

***SCS***  
***INSTASCAN SCANNER***  
***MODEL S556***  
***OPERATIONS MANUAL***



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# Chapter 1

## Introduction

The scanners and Dura-labels developed by SCS are state-of-the-art data gathering and inspection systems that combine sophisticated Interactive Identification technology in a compact form factor. This unique synergy allows our system to integrate seamlessly into — and significantly increase productivity for — a wide range of applications and environments.

These systems consist of Dura-labels that are designed to store information under extremely harsh environments without requiring a battery and scanners capable of reading the Dura-labels.

Communications between the scanner and Dura-label are conducted using a revolutionary two-way technology that provides superior advantages over conventional communication methods. The specific data being communicated, and the amount of interaction you have with the scanner and Dura-label, may be determined by your application.

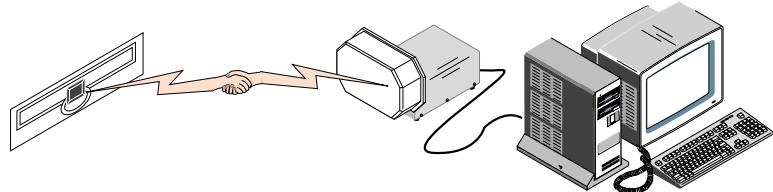
## ***Advantages***

Data-gathering systems such as bar code readers and conventional Radio Frequency Identification products use one-way communication: a sensor reads information from a device, without any interaction between the two devices.

Moreover, bar code systems are subject to line-of-sight limitations. As a result, airborne contaminants such as dust, dirt, oil, and mist, as well as label damage and objects residing outside the line of sight, result in inefficient and erroneous results.



The SCS Interactive Identification System overcomes these restrictions by using state-of-the-art technology. This technology allows the InstaScan and Dura-label to conduct ongoing two-way communications that are not restricted by line-of-sight constraints.



**Figure 1. Interactive Identification Technology**

This unique capability allows:

Collective or selective data to be read from a single Dura-label.

Collective or selective data to be read from multiple Dura-label without requiring sorting or unpacking.

Classes of Dura-label to be filtered according to user-defined criteria.

This technology employs a superior interrogation feature that enables applications to uniquely identify all Dura-label in the scan field, without misidentification or identifying the same Dura-label multiple times.

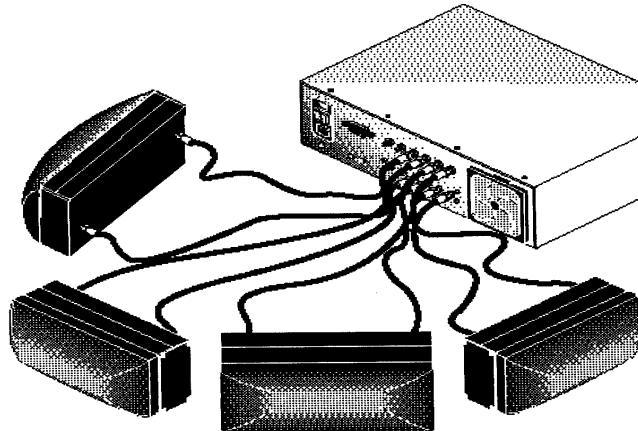
It also uses a robust protocol that maintains a uniform per-Dura-label scan time, regardless of the number of Dura-labels in the scan field. The protocol provides a flexible software application interface that can be customized to the specific needs of particular industries and markets.

These unparalleled capabilities make our system an ideal solution for asset and document management, inventory control, ticketing, and other high-volume applications and environments.

## ***S556 InstaScan Scanner***

The S556 InstaScan Scanner is designed for applications or configurations that require the scanner to be a considerable distance from Dura-labels, or where a high volume of Dura-labels are required to be read simultaneously. Conveyor Belt applications are ideally suited to the scanner.

The scanner provides six pairs of coaxial connectors for supporting up to six external antennas. Each antenna plugs into its own set of connectors on the back panel of the scanner. Figure 2 shows the S556 InstaScan Scanner.



**Figure 2. S556 InstaScan Scanner**

## ***Conventions in This Manual***

This Operations Manual uses the following conventions:

Steps you are to perform are numbered. Any result that occurs after performing a step appears below the step.

Text you are to type appears in a *Courier* typeface.

The carriage return key (designated as ↵ on some keyboards) is referred to as the Enter key.

## ***What Else You Need***

To complete your system, you need an IBM or compatible personal computer with the following system requirements:

486 processor or better

Compatible screen and keyboard

9-pin RS-232 port

MS-DOS version 3.3 or higher

OR

Windows 95

Windows users: 8 MB of RAM (12 MB recommended)  
DOS users: 8 MB of RAM

FCC Part 90 Site License (U.S. Customers)

The applications you use to interface with this system may have additional hardware and software requirements. For more information, consult the manual that came with your applications.

## ***Summary of Chapters***

Besides Chapter 1, this Operations Manual contains the following additional chapters:

*Chapter 2, Installation* – describes how to install the InstaScan and Dura-label.

*Chapter 3, RF Tips* – provides information on radio frequency (RF) communications.

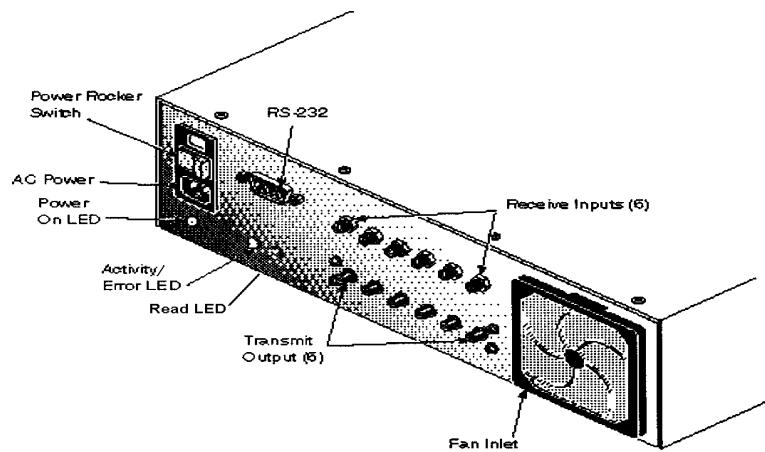
*Chapter 4, Troubleshooting* – describes how to identify, resolve, and avoid problems when using the InstaScan and Dura-label. This chapter also contains Customer Service information and merchandise return instructions.

*Chapter 5, Specifications* – lists InstaScan specifications.

# Chapter 2

## Installation

The InstaScan provides the connectors and LEDs described in the following sections and shown in Figure 3.



**Figure 3. InstaScan Scanner**

## ***Panel Information***

The InstaScan's front panel has three LEDs that indicate power, activity, and transmitter on (see Figure 3). Table 1 describes the meanings of the InstaScan LEDs.

The InstaScan's front panel has an On/Off switch located below the Power ON LED (see Figure 3).

In the ON position, the red Power ON LED should go ON, indicating that the InstaScan is receiving power.

If the OFF position, the InstaScan is not receiving power, even if the connected to the power outlet.

**Table 1. InstaScan Scanner Led Meanings**

<b>LED</b>	<b>Color</b>	<b>Status</b>
Power ON	Red	ON = InstaScan is turned on and receiving power from an AC outlet.
Activity/Error	Yellow	Flicker = InstaScan detects Dura-label information.  Constant Flickering with no Dura-label in the scanning field = Noisy environment or possible interface, resulting in diminished Dura-label reading.
Transmit	Green	ON = InstaScan transmitter is on.

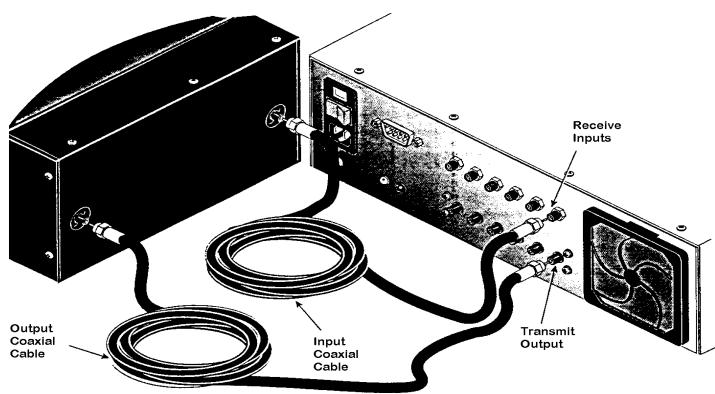
## ***InstaScan Scanner Installation Steps***

1. Connect external antenna(s) – see page 10.
2. Place the antenna for optimum read operation – see page 11.
3. Connect the InstaScan to a computer serial port – see page 12.
4. Power-up the InstaScan – see page 13.
5. Configure the InstaScan – see page 14.
6. Align the InstaScan – see page 16.

## ***Connecting External Antennas***

The front panel provides six pairs of coaxial antenna Receive/Transmit connectors. Each pair of connectors accommodates a single external antenna. Figure 4 shows the external antenna connections to the scanner.

-  *The S556 can be used with fewer than six antennas. Install antennas sequentially, starting with the right-most connector pairs.*



**Figure 4. Antenna Connections**

## ***Placing the Antenna***

Antenna placement is critical to ensuring that information is transmitted to and from Dura-labels accurately. Observe the following guidelines when placing the antenna:

Locate the antenna away from metal objects, microwave ovens, and other devices that may induce radio frequency interference. In addition, make sure there are no metallic surfaces between, or in relative proximity to, the InstaScan and Dura-label. For additional placement considerations, refer to “RF Communications” on page 19.

When reading, the InstaScan should be placed no more than 50 inches from the objects bearing the Dura-labels.

- ☞ *Dura-labels must reside within the scan field for at least 10 milliseconds for information to be retrieved from them.*

## ***Connecting to a PC Serial Port***

The scanner has a 9-pin female RS-232 connector that connects to a serial port or RS-232 connector on an IBM or compatible personal computer. The serial port can operate at 2,400 bps or 19,200 bps.

To make this connection, you need:

An appropriately configured serial cable.

One of the following adapters, if your computer's serial port does not have a 9-pin connector:

- A 15-pin to 9-pin adapter, if your computer has a 15-pin serial port connector.
- A 25-pin to 9-pin adapter, if your computer has a 25-pin serial port connector.

These adapters are available from most computer and electronics stores.

Use the following procedure to connect the InstaScan to your computer's serial port.

1. Attach the male connector on the serial cable to the 9-pin serial connector on the InstaScan front panel (see Figure 3).
2. Connect the other end of the cable to your computer's serial port. Use an adapter, if appropriate, to make this connection.

## ***Connecting to an AC Outlet***

The following procedure describes how to connect the InstaScan to an AC Outlet.

1. Verify that the On/Off switch on the InstaScan front panel is in the OFF position (see Figure 3).
2. Connect the power cord the front panel (see Figure 3).
3. Connect the other end of the power cord to an AC outlet.
4. Set the On/Off switch to the ON position. The Power ON LED lights.

## ***Configuring the InstaScan Scanner***

Use the following procedure to configure the InstaScan for communications and verify that the RS-232 connection is operating properly.

1. Insert the supplied Software Development diskette into an available floppy disk drive.
2. If you are in Microsoft Windows, display an MS-DOS prompt either by exiting to a DOS shell or exiting Windows.
3. At an MS-DOS prompt, switch to the floppy disk drive containing the diskette. If the diskette is in drive A, for example, type the following command at the MS-DOS prompt and press the Enter key:

**A:**

4. Type the following command and press Enter:

**cd \tools**

5. Type the next command and press Enter:

**CHKLINK** if using **COM1** or **CHKLINK /C 2** if using **COM2**

The following message appears on your computer screen:

**SCANNER/PC LINK OK: VSxx:xx VHxx:xx**

Where **VSxx:xx** is the InstaScan software version number and **VHxx:xx** is the hardware version number.

 *If you receive the error message “Problem with scanner/PC link,” refer to page 23 for troubleshooting procedures.*

6. Type the following command and press Enter:

**CHKREAD** if using **COM1** or **CHKREAD /C 2** if using **COM2**

A running series of zeros appear on your computer screen:

**00**      **type <esc> to stop**  
.  
.  
**00**      **Type <esc> to stop**

7. Place the supplied Diagnostic Label in front of the antenna. Do not place your finger over the Label. It should glow red when powered. Remove Diagnostic Label from scanner field.
8. Place an SCS Dura-label into the field. The Activity LED on the InstaScan flickers and the display changes to a running series of zeros and ones:

**01**      **Type <esc> to stop**  
.  
.  
**01**      **Type <esc> to stop**

This indicates that the InstaScan is identifying Dura-labels correctly and is ready for operation.

9. To exit **CHKREAD**, press the Esc key.

## ***Aligning the InstaScan***

After verifying that the InstaScan is operating properly, use the following procedure to align the InstaScan. Aligning the InstaScan ensures optimal performance.

1. At the DOS prompt, type the following command and press Enter:

**CHKREAD or CHKREAD /C 2 if using COM2 Port.**

A running series of zeros appear on your computer screen.

2. Hold an SCS Dura-label within the scanning area, at the point where you intend to scan.
3. Adjust the position and orientation of the antenna mounting until the display on your computer screen changes to:

**01        Type <esc> to stop**

.

.

**01        Type <esc> to stop**

.

.

**01        Type <esc> to stop**

4. To exit **CHKREAD**, press the Esc key.

5. Remove the Software Development diskette from the floppy disk drive.

This completes the InstaScan Scanner installation procedure.

## ***Installing Dura-labels***

Dura-labels have a diminutive form factor that allows them to be installed in areas that cannot accommodate conventional RF tags. In addition, Dura-labels can communicate with the InstaScan without having to be in the line-of-sight. This unique combination provides tremendous flexibility when determining a location for placing Dura-labels.

When considering locations for installing Dura-labels, make sure they are within 50 inches of the InstaScan antenna for at least 10 milliseconds, so data can be read from the Dura-label. Avoid locations where metal or water is present because radio-frequency communication does not penetrate metal and is absorbed by water.

## ***Reading Information from your Dura-labels***

Once you have installed your Dura-labels, and have set-up your InstaScan system, you are ready to begin.

Insert the Software Development Disk into you A: drive. Turn your InstaScan power on. Type:

**cd \tools**

Then type the following command:

**A: READ\_ID /w 2**

This will begin the “READ\_ID” program which will display the information programmed into Memory Word 2 from the Dura-labels that pass through the scanner field. This memory location contains your Dura-labels’ unique serial number or “ID”.

This program will continually read the unique serial numbers from any labels that pass within 50 inches of the InstaScan.

## ***Loading Your Application***

After you install your system according to the instructions in this chapter, you can load your application and begin reading information from the Dura-labels. Your application will determine the amount of interaction you have with the InstaScan Scanner and Dura-labels.

- ☞ *If you will be developing applications designed to interface to your system, refer to the Software Development Disk for programming information.*

# Chapter 3

## RF

## Communications

**I**n general, devices that communicate using radio frequency, such as your system, can be sensitive to signal interference and signal attenuation. This chapter provides tips for optimizing radio-frequency (RF) communications with your InstaScan and Dura-label.

Topics in this chapter include:

Signal interference — see page 20.

Signal attenuation — see page 21.

Optimizing performance — see page 22.

## ***Signal Interference***

Signal interference is RF signals that interfere with the information being exchanged between the Dura-label and the InstaScan. Signal interference can severely diminish the Scanner's ability to read information from the Dura-labels. The Activity LED on the InstaScan flickers constantly if the InstaScan detects signal interference.

The source of the interfering signals may be:

An RF system, such as an RF local-area network (LAN) or another Interactive Identification system, located close to your system.

Security gates, garage doors, or similar devices that emit RF signals.

Appliances such as microwave ovens.

The effects of these noise sources are localized and can be eliminated by relocating the InstaScan or its antenna.

Your system's communication capabilities are significantly reduced when the noise level perceived by the system exceeds the strength of signals received.

## ***Signal Attenuation/Reflections***

Signal attenuation is the loss of signal strength that occurs naturally over distances, but which can also be caused by RF barriers in the signal path.

Examples of such barriers include:

Enclosed locations that have concrete walls, floors, and ceilings.

Metal surfaces surrounding the antenna or Dura-label.

Water or other fluids surrounding the antenna or Dura-label.

Almost every object (furniture, partitions, and people) in the path of a signal causes some degree of attenuation. The effects can be minimized by careful antenna placement.

The reflection from metal or metallic surfaces behind the Dura-label can also affect signal attenuation. In some cases, this may increase the read distance slightly, while inducing intermittent “dead” spots within the read field that permit little or no communication between the InstaScan Scanner and Dura-label.

 *Dura-labels with similar orientations, placed within two inches of each other, will have their read distance diminished by about 40%.*

## ***Optimizing Performance***

While it is not possible to predict how the system will perform in any given environment, observing the following guidelines will help optimize performance in your environments and applications:

Carefully plan the placement of the InstaScan Scanner antenna.

Consider the environment's RF characteristics, including construction materials, office plan (closed or open), and the presence of windows and ducting. The RF field pattern, and the reading distance, may be influenced by nearby metal objects, such as appliances, equipment, metal wall framing, and wire coat hangers.

Ensure that the InstaScan antenna is not pointed directly at fluorescent lighting.

Ensure that objects containing Dura-labels are no more than 50 inches from the antenna and remain in the scan field for at least 10 milliseconds.

To avoid mutual interference when installing more than one Dura-label in the same object, allow a sufficient distance between the Dura-label. The maximum interference occurs when Dura-labels within the same object are within 2 inches of each other and nearly equidistant from the InstaScan Scanner antenna.

Never apply chemicals to the Dura-label. Certain chemicals, such as alcohol, may have little or no effect at room temperature, but may become corrosive at higher temperatures.

# Chapter 4

# Troubleshooting

This chapter provides troubleshooting information you can use in the unlikely event you have a problem with your system. Customer Service information and merchandise return instructions are included in this chapter.

## ***Solving Problems***

The following table identifies InstaScan Scanner and Dura-label problems and provides suggestions for resolving the problem.

**Table 2. Problem Solving**

Problem	Probable Cause	Solution
The Power ON LED does not light when you turn on the scanner	The AC outlet may not be working.	Plug another electrical appliance, such as a lamp, into the outlet and turn it on. If the appliance does not work, plug the scanner into a different outlet.
	The AC outlet may be controlled by a wall switch.	Set the wall switch to provide AC power to the outlet, or use an outlet to be controlled by a switch.

Problem	Probable Cause	Solution
The Activity/Error LED does not light when you configure the scanner	You may have a faulty Dura-label.	Use your diagnostic label to ensure the LED is working.

Problem	Probable Cause	Solution
The Activity/Error LED does not light when you configure the scanner	The scanner may be faulty.  The Antenna cable may be faulty.	Use the CHKLINK and CHKREAD utilities to verify scanner operation (see "Configuring the InstaScan" on page 14).  Contact SCS Customer Service (see page 25).
You receive an error message when configuring the scanner	The scanner may not be turned on.  The scanner's serial port connection to your computer may not be secure.  The Check programs are accessing a different Com Port than the one connected.	Verify that the Power ON LED is lit.  Verify the scanner-to-serial port connection. If you are using a serial port adapter, make sure the adapter connections are secure.  Switch the serial cable to Com Port 1 or use the /C option after CHKREAD or CHKLINK to set the Com Port being used.
Information could not be read from the Dura-label	The Dura-label may be outside of the scanning area.  The Dura-label may have passed too quickly past the scanner.	Make sure the Dura-label is no more than 50 inches from the scanner.  Make sure the Dura-label is in the scanning area for at least 10 milliseconds.

Problem	Probable Cause	Solution
Same as above, but the Activity/Error LED flickers constantly	RF Interference is disrupting scanner-to-Dura-label communications.	See "RF Communications" on page 19 for suggestions on improving communications.

## ***Contacting Customer Service***

If you encounter a problem using your system that you cannot resolve, contact Customer Service:

***Before*** contacting CUSTOMER SERVICE, please have the following information available:

***1. InstaScan Scanner Information:***

- InstaScan Model Number
- Serial Number, located on the bottom of InstaScan
- Any modifications made to the InstaScan or Dura-labels system
- Location where system is installed

***2. Computer Information:***

- Computer Brand and Model number
- Processor speed and available RAM
- COM Port used

**☎ SCS Support (858) 485-9196  
8:00 a.m. – 5:00 p.m. PST  
Email – [techsupport@SCS-Corp.com](mailto:techsupport@SCS-Corp.com)**

## ***Returning Your System***

If SCS Customer Service determines you need to return your system for service, the Service Representative will give you a Return Merchandise Authorization (RMA). Write this number on the outside of the box containing the returned system, and on a slip of paper inside the box, so your return can be processed quickly.

Return only your InstaScan, antenna, cable, and adapter. Do not return accessories, such as the Diagnostic Label or the diskette containing the Scanner configuration program.

Follow these steps to return your InstaScan Scanner and accessories for service:

1. Carefully pack your InstaScan Scanner and accessories in the original static-protected bubble wrap and container. If you no longer have the original container, use a protected box.
2. Use filler material to cover the items in the box.
3. Add a note with the RMA number inside the package.
4. Write the RMA number and the word FRAGILE on the outside of the package in large, legible writing.
5. Address the package to:

SCS Corporation  
10905 Technology Place  
San Diego, CA 92127

ATTN: RMA # \_\_\_\_\_ (indicate your RMA number here)



# Chapter 5

# Specification

# S

## ***SCS Patents***

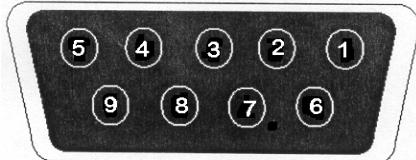
SCS Corporation is currently holding the following patents.  
There are multiple patents outstanding.

- #4,424,579
- #4,442,507
- #4,933,735
- #5,148,256
- #5,296,722
- #5,407,851
- #5,496,763
- #4,796,074
- #5,095,362
- #5,583,819
- #5,686,341

- #5,856,788
- #5,963,144

## ***InstaScan Scanner Specifications***

<b>LEDs:</b>	One Power ON LED, one Transmit On LED, and one Activity LED
<b>Communication Method:</b>	RS-232
<b>Serial transmission rate:</b>	2,400 or 19,200 bps
<b>Connector:</b>	One DB-9F for RS-232 communications
<b>Pin assignments:</b>	Pin 1 – Not used Pin 2 - Transmit Data (Input) Pin 3 - Receive Data (Output) Pin 4 - Internally connected to Pin 6 Pin 5 - Protective Ground Pin 6 - Internally connected to Pin 4 Pin 7 - Internally connected to Pin 8 Pin 8 - Internally connected to Pin 7 Pin 9 - Protective Ground



**Power jack:** Internal Power Module, External Power cable

**RF Output Power:** 5 Watts

**Power Consumption:** 120 watts

**Ambient operating temperature:** 32° to 110° F (0° to 43° C)

**Approved standards:** FCC Part 90

**Maximum serial cable length:** 30 feet (10 meters)

**Dimensions:** 5.5" high x 16" wide x 14.5" length  
(14 cm high x 40.6 cm wide x 36.8 cm length)

**Weight:** 12 lbs. (5.5 kg.)

## **Limited Warranty**

SCS warrants its Dura-label to be free from defects in workmanship and materials, under normal use and service, for a period of ninety (90) days from receipt of products.

SCS warrants its InstaScan Scanner to be free from defects in workmanship and materials, under normal use and service, for a period of ninety (90) days from date of receipt.

If a product does not operate as warranted during its applicable warranty period, SCS shall, at its option, repair the defective product or deliver to Customer an equivalent product to replace the defective item. All products that are replaced shall become the property of SCS. Replacement products may be new or reconditioned. The warranty for replacement or reconditioned product is the same as the equivalent newly purchased product.

SCS reserves the right to refuse to warranty repair any product that has been subjected to any abnormal electrical, mechanical, or environmental abuse.

## **FCC Part 90 Compliance**

The FCC has established rules that permit the Scanner and Label system to be used within acceptable bounds of radio frequency emissions. Your Scanner and Label system complies with Part 90 of the FCC Rules.

Operation of the Scanner and Label system is subject to the following conditions: This device may not cause harmful interference; This device may accept any interference received, including interference that may cause undesired operation.

This device complies with the limits for a Class B digital device, pursuant to Part 90. The Class B limits help ensure that this device provides reasonable protection against harmful interference in residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions in this manual, may cause harmful interference to radio communications.

## **Radio Frequency (RF) exposure requirements for operators of this device**

Operators of this device must have knowledge of their RF exposure conditions in order for the device to comply with FCC-adopted RF exposure limits for persons in the “controlled exposure environment”. The average RF exposure for operators is 5.0 mW/cm<sup>2</sup>, which requires them to maintain an estimated separation distance of 22 cm or 8.5” from the transmitter, while in operation. They should not remain closer than the suggested distance for any continuous 6 minute interval. Holding “Tags” in front of the transmitter for brief moments, at closer than 8.5” is allowed provided the average exposure in any 6 minute interval is less than 5.0 mW/cm<sup>2</sup>. For example, if an operator spends 50% of the time with his/her hands or body closer than 8.5” to the transmitter while spending the other 50% of the time at more than 15” away, the allowed RF exposure limits will be satisfied. Operators should use their own judgment to limit their exposure to the allowed RF exposure limits with control of exposure conditions, separation distance from the transmitter, and duration of exposure. While this device is in operation, nearby persons who have no knowledge of being in the RF fields of this device should be at least 20” away from the transmitter in order for this device to be compliant with the FCC-adopted RF exposure limits.

## **Disclaimer**

Operation of any radio transmitting equipment, including the Scanner, may interfere with the functionality of inadequately protected medical devices. Consult a physician or the manufacturer of the medical device if you have any questions. Other electronic equipment may also be subject to interference.