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497-0430074	A
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PROCUREMENT SPECIFICATION

GENERIC PART NO.		PART DESCRIPTION	
Not Applicable		7730 RBA (Remote Button Activator), -1.5dBm EIRP (North America)	
SIZE		SPEED, FREQ.	PACKAGE TYPE
Not Applicable		2.443 GHz	
CAT. CODE	HARM. CODE	COMM. CODE	COMM. NAME
	8525.10.90.90		
CONTROL PLANT		PREPARED BY	DATE
CODE	LOCATION		
50	Atlanta	Albert Claessen	03/07/2003

SUPPLIER'S APPROVAL

SUPPLIER'S PART NO.: TBD

SIGNED: _____

TITLE: _____

COMPANY: Avid Technologies, Inc

DATE: _____

REQUESTED RETURN DATE: _____

REVISION		APPROVAL	DATE
A	50DR12637	Albert Claessen	03/07/2003

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PROCUREMENT SPECIFICATION

GENERIC PART NO.		PART DESCRIPTION	
Not Applicable		7730 RBA (Remote Button Activator), 10 dBm EIRP (EU)	
SIZE		SPEED, FREQ.	PACKAGE TYPE
Not Applicable		2.443 GHz	
CAT. CODE	HARM. CODE	COMM. CODE	COMM. NAME
	8525.10.90.90		
CONTROL PLANT		PREPARED BY	DATE
CODE	LOCATION		
50	Atlanta	David E. Berl	August 7, 2002

SUPPLIER'S APPROVAL

SUPPLIER'S PART NO.: TBD

SIGNED: _____

TITLE: _____

COMPANY: Avid Technologies, Inc

DATE: _____

REQUESTED RETURN DATE: _____

REVISION		APPROVAL	DATE
A	50PDR12017	Albert Claessen	
B	50DR12637	Albert Claessen	03/07/2003

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1. Scope

The requirements for the 7730 Remote Button Activator, herein referred to as the RBA, are specified in this procurement specification.

The RBA shall function as a remote display sequence activator for NCR Electronic Shelf Labels (ESL).

The RBA is intended for use in the countries listed in Appendix B.

The RBA shall meet the following objectives:

- Small and Light
- Robust design
- 10 buttons
- Long battery life with replaceable battery
- Key chain or belt attachment

2. Associated Documents

2.1 NCR Reference Documents

497- 0424649	DecisioNet/RealPrice RBA Product Requirements
230-0415412	NCR-7730 DecisioNet Functional Specification (3.0 Air Interface and Protocol)
497-0412176	Regulator Compliance Guidelines
89/336/EEC	EMC Directive
UL60950	
EN/IEC06950	
	NCR Corporate Packaging Standard B-2, Section B2
	NCR Packaging Standard 10-001

2.2 Priority of Documents

In the event of conflict between documents, the priority shall be as follows:

- Procurement Specification
- Business Agreement between NCR and Manufacturing Supplier
- Other applicable documents and drawings
- Purchase Order

3. Requirements

3.1 Functional Requirements

3.1.1. General

1. The RBA shall consist of a ten button Radio Frequency (RF) transmitter device designed to send commands to RealPrice electronic shelf labels (ESL).
2. The RBA shall communicate with ESLs using the **High Signal Input Communication Mode** as specified in 230-0415412.

3.1.2. Operation

3.1.2.1 Single-Shot Mode

1. Each key press lasting between 0.5 and 1.873 seconds shall result in a “single-shot” mode operation as described below:
 - (a) Program the 4th Sequence Register with 128 bits of information. Only one display register shall be programmed with FFh; all others shall be programmed with 00h. The display register programmed with FFh is dependent on which button(s) is pressed per the following table:

Button	Display Register
1	16
2	15
3	14
4	13
5	12
6	11
7	10
8	9
9	8
Alt followed by 1	1
Alt followed by 2	2
Alt followed by 3	3
Alt followed by 4	4
Alt followed by 5	5
Alt followed by 6	6
Alt followed by 7	7

- (b) Select the 4th Sequence Register for display.
- (c) Send the Switch Activation command.

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- (d) The sequence (a, b, c) defined above shall be chained and sent as a single transmit burst.
- (e) The Alt key function shall remain in effect for no more than 5 seconds (the operator has 5 seconds to select a button after pressing the Alt key.) The Alt function is terminated at the end Alt + # command sequence.

2. Simultaneous activation of two or more buttons shall not result in commands, other than those listed above, being sent to the ESL.

3.1.2.2 Repetitive Mode

- 1. Each numbered key press lasting longer than 1.873 seconds shall result in a repetitive mode operation as described below:
 - (a) Program the 4th Sequence Register with 128 bits of information. Only 1 display register shall be programmed with FFh; all others shall be programmed with 00h. The display register programmed with FFh is dependent on which button is pressed per the following table:

Button	Display Register
1	16
2	15
3	14
4	13
5	12
6	11
7	10
8	9
9	8
Alt 1	1
Alt 2	2
Alt 3	3
Alt 4	4
Alt 5	5
Alt 6	6
Alt 7	7

- (b) Select the 4th Sequence Register for display
- (c) Send the Switch Activation command.
- (d) When a numbered button is held down for more than 1.873 second, the entire sequence (a, b, c) shall be sent repetitively every 1.873 seconds. To conserve battery life, the maximum transmit time shall be limited to 8 repetitions.
- (e) The sequence (a, b, c) defined above shall be sent as a single concatenated transmit burst..

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- (f) The Alt key function shall remain in effect for no more than 5 seconds (the operator has 5 seconds to select a button after pressing the Alt key.) The Alt function is terminated at the end Alt + # command sequence.

2. Simultaneous activation of two or more buttons shall not result in commands, other than those listed above, being sent to the ESL.

3.1.2.3 Security Code Programming

The RBA shall have a programming mode whereby the operator shall be able to input, via the keypad, a three-digit store ID code. Valid store ID codes are 000 to 203 and 205 to 255. ID 255 is the factory programmed default for ESLs and RBA. ID 204 is reserved for broadcast messages and can not be programmed.

The code shall be stored in non-volatile memory. Battery removal shall not require the reprogramming of the store ID code.

The following procedure shall be followed to re-program the codes:

- Press and hold buttons 5 and 6 simultaneously (> 5 seconds) until the RBA indicates that programming mode is entered with three short flashes of the LED.
- Enter the three digits for to program the store ID. The Alt button enters a "0".
- After the third digit is entered the RBA will indicate the programming was successful with three short flashes of the LED or that programming failed with one long pulse.

The store ID code shall be sent with every command sequence as defined in 230-0415412.

3.1.3. Transmitter

3.1.3.1 Operating Distance

The operating distance is measured from the front (LED side) of the RBA housing to the surface of the ESL display with the RBA perpendicular to the ESL surface and the bottom of the ESL and RBA both aligned horizontally.

The RBA shall be able to activate a display change on an ESL with a nominal sensitivity rating of -10 dBm at a minimum distance of 2 inches.

The RBA shall not be able to activate a display change on an ESL with a nominal sensitivity rating of -10 dBm at a distance of over 12 inches.

3.1.3.2 Transmit Frequency

The transmit frequency shall be 2.443 GHz +/- 2% (center of ISM band), including initial tolerance and drift of the RF Transceiver. The RF transmitter shall be designed to operate in the ISM band at 2.400 GHz to 2.4835 GHz. The transmitter circuit shall not require any adjustments during production nor shall any adjustments be required in store environments.

3.1.3.3 Transmit Power

The transmitter power shall be 10 dBm EIRP maximum.

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3.1.3.4 RF Modulation

The RF modulation shall be On-Off-Keying (OOK) amplitude modulation with a minimum 20dB modulation depth.

3.1.3.5 Transmit Data Rate

The transmit data rate shall be 16.384 Kbits/sec.

3.1.3.6 Transmit Data Duration

Each key press shall initiate a command sequence per 3.1.2 that includes communication protocol data as specified in 230-0415412.

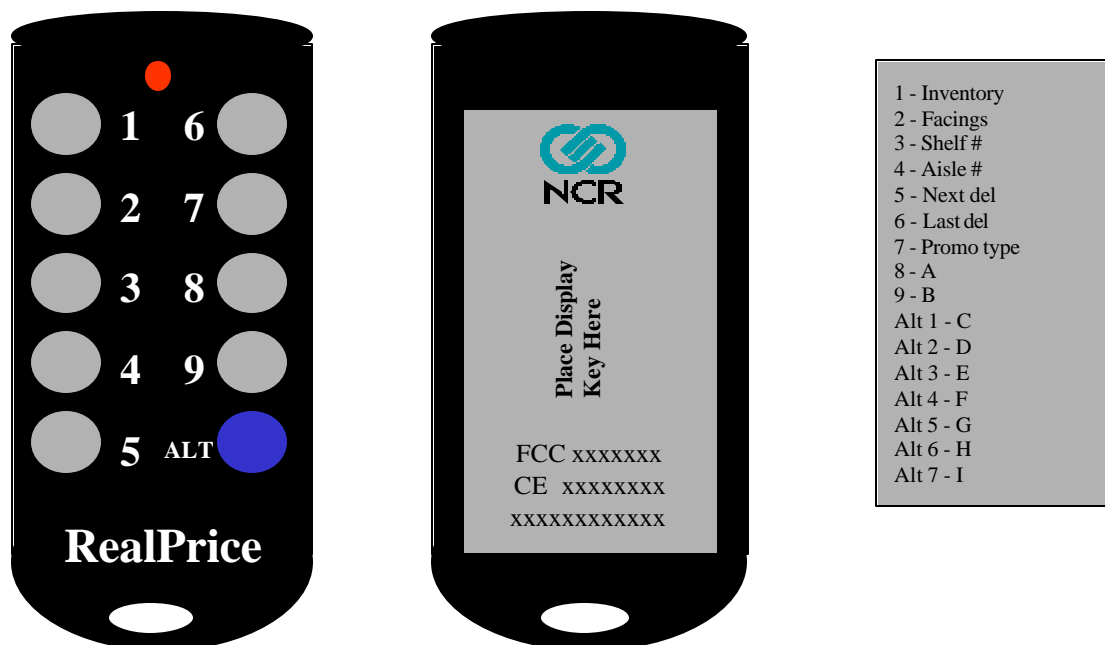
3.1.3.7 Message Format

The message format for the RBA transmission shall be as specified in 230-0415412.

3.1.4. Antenna

The antenna shall be completely contained within the enclosure.

3.1.5. Enclosure (see figures below)



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1. Preferably, a standard off-the-shelf 10-button enclosure will be used for the RBA. This enclosure shall be designed specifically for RF transmitter applications. The enclosure shall have the approximate dimensions shown below:
 - (a) Length: 3.5 inches
 - (b) Width: 1.5 inches
 - (c) Depth: 0.625 inch max.
2. The back of the enclosure shall include a recessed area for two labels. One label shall be used to display permanent information such as part number, FCC certification, etc. per 6.1.1. The other label shall be for a customer applied/replaceable keypad legend.
3. The enclosure shall accommodate a standard user replaceable coin cell battery.
4. The enclosure shall be black.
5. The enclosure shall not have exposed metal parts.
6. The enclosure shall have a provision for securely attaching a key ring.
7. No special tools shall be required to replace the battery.

3.1.6. Keypad

- The keypad shall be a ten-button, rubber membrane keypad with carbon puck contacts.
- The contact patterns shall be plated or protected to provide corrosion resistance and longer life.
- Each of the ten buttons shall provide tactile feedback to the operator.
- Key designations shall be legible for the life of the keypad.
- The keypad shall be skin oil, cleaning agent, and hand lotion resistant.
- Each of the ten buttons shall have an actuation force of 155 +/- 20 grams.
- Each of the ten buttons shall have a contact force of 80 +/- 20 grams.

3.1.7. Battery

3.1.7.1 Battery Model

The RBA shall be powered by CR2032, 20mm diameter, 3 Volt, 220 mAh, lithium coin cells.

3.1.7.2 Battery Life

The operating life of the battery shall provide for a minimum of 1.3 million single-shot mode (section 3.1.2.1) operations.

3.1.7.3 Battery replacement

The Batteries shall be replaceable. Opening the RBA cabinet to replace the batteries is an acceptable solution.

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3.2 Environment Test Requirements

3.2.1 Temperature & Humidity

3.2.1.1 Operating

Operating temperature and humidity testing per NCR standard procedures is not applicable. This is hand-held device that can not operate stand-alone and is intended for use in a conditioned environment.

3.2.1.2 Non-Operating

3.2.1.2.1 Storage

	Min.	Max.	Note
Period of Storage Range	-	3 months	
Temperature Range (Dry Bulb)	10 °C	+50 °C	
Temperature Change	-	15 °C/Hr.	
Relative Humidity Range	10 %	90 %	No condensation
Barometric Pressure	70x10 ³ Pa	105x10 ³ Pa	A maximum of 2,000 meter altitude

3.2.1.2.2 Shipping

	Min.	Max.	Note
Period of Storage Range	-	3 months	
Temperature Range (Dry Bulb)	-40 °C	+60 °C	
Temperature Change	-	15 °C/Hr.	
Relative Humidity Range	5 %	95 %	No condensation
Barometric Pressure	70x10 ³ Pa	105x10 ³ Pa	A maximum of 2,000 meter altitude

3.2.2 Shock and Vibration

3.2.2.1 Operating

Operating temperature and humidity testing per NCR standard procedures is not applicable. This is hand-held device that can not operate stand-alone and is intended for use in a conditioned environment.

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3.2.2.2 Non-Operating

3.2.2.2.1 Vibration

The unpacked equipment is to be subjected to a frequency sweep from 3-150-3 Hz with a constant 1.0 g sinusoidal input (0 to peak) in both the + and - directions along the three mutually perpendicular axis of the equipment. A dwell time of 15 minutes is to be applied at any frequency on any axis where vigorous or resonant excitation of the equipment or any parts thereof occurs.

Acceleration	1.0 G
Frequency	3 - 150 - 3 Hz
Sweep time	15 minutes/each axis
Axis	3 axis (X,Y,Z)

Success Criteria: The RBA shall be functional. However, cosmetic failures, such as minor scratches to the enclosure, can be accepted.

3.2.2.2.2 Shock

The unpacked equipment is to be subjected to three shock pulses in both the + and - direction along the three mutually perpendicular axis of the equipment (total 18 shocks). The velocity change must equal 4.25 meters per second (167 inches per second). The characteristics of this shock pulse is a triangular waveform at a 85 g peak occurring in a 10 millisecond timeframe. This shock simulates an approximate 0.92 meters (36 inch) free fall drop onto a tiled concrete floor.

Success Criteria: The RBA shall be functional. However, cosmetic failures, such as minor scratches to the enclosure, can be accepted.

3.2.2.2.3 Shock Test with Shipping Material (trays, carton Box, etc.)

Test per NCR Packaging Standard 10-001. Success Criteria: The RBA shall be functional.

3.2.2.2.4 ESD Durability (Electro Static Discharge)

Air discharge	+/- 8 kV, +/- 10 kV, +/- 15 kV
Horizontal coupling	+/- 4 kV, 100 cycles; +/- 6KV, 100 cycles; +/- 10KV, 100 cycles
Vertical coupling	+/- 4 kV, 100 cycles; +/- 6KV, 100 cycles; +/- 10KV, 100 cycles

Success Criteria: The RBA shall have no physical and/or functional damage.

3.2.2.3 Contamination

The RBA shall survive modest dust and dirt exposure with no performance degradation.

4. Diagnostics requirements

No diagnostics have been defined.

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5. Legal and Regulatory Requirements

5.1.1. Safety Requirements

The RBA shall comply with UL60950 and EN/IE C60950.

5.1.2. Disposal Requirements

The RBA shall conform to environmental regulatory requirements, such as disposal of the product and/or Lithium battery.

5.2 Electromagnetic Compatibility

The RBA shall comply with NCR corporate standards per 497-0412176 and European EMC Directive 89/336/EEC.

5.3 RF Certification

The RBA shall comply with RF certification standards listed in appendix A for the countries listed in appendix B.

5.4 Human Exposure Limits

The RBA shall comply with the Specific Absorption Rate (SAR) requirements per US FCC OET65 Edition 97-01.

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6. Marking and Packaging

6.1 Unit Marking

6.1.1. Label and Marking on RBA

A product label shall be adhered to each individual RBA unit. The product label shall be placed on the recessed area on the back of the enclosure. Material for the label is 0.05mm thick WHITE polyester film (Modern Plastics Inc. Ltd. "Sun-plate CP-50" or equivalent). The product label shall be legibly and indelibly marked with the following information:

1. NCR company logo
2. NCR Corporation
3. country of origin
4. class
5. NCR part number
6. lot code or production date
7. FCC/CE certification
8. "crossed out waste basket symbol"
9. patent pending statement (PAT. P)

6.2 Packaging

The carton box shall be labeled according to NCR specifications detailed in NCR Corporate Packaging Standard B-2 section 2.

6.2.1. Packaging for RBA

Five (5) RBA kits shall be packed in a carton box. There shall be five (5) RBA units per kit. The manufacturing origin shall be identified on the surface of the carton box. The packaging shall provide adequate protection to prevent shipping damage to the RBA.

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7. Quality Assurance Provisions

A supplier who undertakes supplying assemblies to this specification shall be responsible for maintaining the quality of the assemblies equal to or better than the quality of the originally supplied samples. At the option of NCR, samples may be pulled from any lot and tested to determine compliance with this specification. In the event compliance is not satisfactory, units and/or lots may be returned to the supplier for replacement. The supplier shall pay shipping charges both ways on rejected materials.

7.1 Product Quality

When a purchase order (PO) is accepted to supply material against this specification, the supplier assumes a responsibility for the shipment of defect-free products produced under a prevention oriented quality system. NCR expects to receive products at the AQL specified in paragraph 9.5. To help prevent defective product from reaching the customer, NCR is to be made immediately aware of any knowledge the supplier has on past and current problems with the product. In the event that problems with the product do occur, NCR uses a Closed Loop Corrective Action (CLCA) process to isolate and correct the problems. In general, this process involves a communication to the supplier to indicate and detail the problem, who will in turn, provide both a short and long term solution to correct the problem in a timely fashion. Rejections may occur and shipments may be held pending the receipt and approval of a complete failure analysis and a corrective action report from the vendor to the NCR Corporation

7.2 Quality Documentation

A detailed description of the manufacturer's quality program shall be made available to NCR Supplier Chain Management (SCM). The program content will be confirmed during a facility and process audit at the manufacturing site if required by SCM.

7.3 Warranty Period

Refer to the business agreement document between NCR and Manufacturing Supplier.

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8. Product Acceptance

It is the intent of NCR to source materials from suppliers who provide defect-free shipments which require no routine incoming inspection. Shipments are to be received and accepted through Dock-To-Stock or Dock-to-Line programs.

8.1 Dock-to-Stock

Dock-to-Stock implementation does not negate the right to reinstate incoming inspection or reject and return non-conforming material. Reinstatement will have a negative effect on the NCR Business Plan; immediate supplier corrective action is mandatory.

All lots of items supplied to this specification shall be homogeneous in materials and construction. No lot-to-lot changes in design or materials involved in the manufacture of product delivered to NCR will be allowed without written prior approval from NCR.

8.2 Process Change

NCR is to be made aware of all potential materials, design, assembly, and manufacturing site changes that may cause the product delivered to NCR to not meet specifications. All design and materials changes must be approved in writing prior to the receipt of production quantities. NCR is to be made aware of any potential manufacturing site changes; written approval of the change by NCR is not required. NCR reserves the right to audit and qualify the new location in the event of a manufacturing site change.

8.3 Quality Performance Records

Quality performance records consisting of inspection and test results shall be maintained by the supplier in a place and manner which prevents loss or deterioration. They are to be made available to NCR for audit and analysis. In addition, NCR will provide track supplier quality performance based on the products they are currently providing to the NCR Corporation. The goal of the report is to the supplier work towards continual quality improvements by meeting goals set between NCR and the supplier.

8.4 Statistical Process Control (SPC)

The supplier shall be committed to process control and a philosophy of continuous quality improvement. SPC is a means to achieve each. It is expected that process capability will be demonstrated through SPC and that it will be used as required to control quality characteristics.

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8.5 Product AQL (Acceptable Quality Level)

Due to anticipated low volume, AQL is not applicable at this time. AQL will be reevaluated if volume levels increase significantly.

8.5.1. MTBF

The RBA shall meet an MTBF goal of 500,000 hours whereby the workload is 1000 actuations per day per Bellcore TR-332.

8.5.2. Definition of Failure

An RBA is considered to be a failed RBA if the RBA experiences one or more problems listed below. A failed RBA will be excluded from MTBF measurement if the failure is caused by misuse or abuse during normal operation.

- ESL's do not respond to RBA commands when RBA is located within specified range of ESL (Battery OK)
- Push Switch does not work
- Enclosure is cracked and/or broken
- Excessive power consumption

8.6 Quality Goal

The supplier is requested to make continuous quality improvements to the RBA until the quality targets below are achieved.

Out-of-box Quality Goal		Reliability Goal
Factory Out of Box	50 DPM	0.5 million hours MTBF
Shipping & Handling	50 DPM	
All Others	50 DPM	
Total	150 DPM	

DPM = devices per million

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9. Engineering Change Provisions

9.1 General

Any changes affecting manufactured or purchased parts, firmware programming, purchased equipment performance, maintenance, interchangeability, spare parts, or other pre-established routines and procedures of the physical assembly involving the product delivered to NCR must receive NCR's written approval prior to incorporation.

9.2 Request From Supplier

A request for approval will be submitted to NCR accompanied by evaluation samples where applicable. NCR will respond within 60 days; however, no changes are to be made on products delivered to NCR without NCR approval.

9.3 Approval

The NCR representative will analyze the change requested and give written approval or disapproval.

9.4 NCR Changes

Changes originating from NCR will be communicated to the supplier through NCR's representative. If NCR suggests changes to the supplier with respect to modifications of any product, unit, or part thereof, the supplier shall study each suggested change and, within a reasonable time, not to exceed 60 days, report to NCR as to the feasibility, price, modifications to the change, and the estimated time or serial number of the product on which such change can be implemented. Such change shall not be made by the supplier until official approval has been granted by NCR.

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10. Design Qualification Test Requirements

The manufacturing supplier is responsible for the electrical and mechanical design and shall pursue ultimate design-for-manufacturing. The manufacturing supplier should take responsibility for conducting its Design Qualification Test and should report its results to NCR for approval prior to RBA mass production.

NCR's preference for the Design Qualification Test items that should be done by the manufacturing supplier is as follows. Items below are subject to negotiation between the manufacturing supplier and NCR when the manufacturing supplier does not have the capability to perform the test(s).

Par.	Description
3.1.2	Operation
3.1.3	Transmitter
3.1.7.2	Battery Life
3.1.8	Environmental Test Requirements – Temperature & Humidity
3.1.9	Environmental Test Requirements – Shipping

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Appendix A: Regulatory Requirements

Product Description

- Hand-held device that activates specific displays of the NCR 7730 series ESLs
- Operating frequency is within 2.4 and 2.4835GHz and operates on a single frequency.
- Output power is 10mW EIRP (Equivalent Isotropically Radiated Power).
- Antenna is located within 20cm of the user.

Compliance with Radio and Telecommunication Terminal Equipment (R&TTE) Directive

- EN 55022 Class A Electromagnetic Interference (EMI) compliance
- EN 300 328 Radio Standard
- EN 301 489-17 Electromagnetic Compatibility (EMC) Standard
- EN 60950 Safety Standard
- Assembly of TCF and submittal to Notified Body*
- Issuance of Statement of Opinion by Notified Body*
- Notification to 19 EU/EFTA countries.
- Currently no published RF exposure standards exist and compliance is not required. This will change soon.

*Not required however it is highly suggested to ease the Notification Process. Some countries, particularly Belgium, have stepped up enforcement of the R&TTE Directive. The lack of Notified Body involvement can cause problems.

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Appendix B: List of Countries for RBA Deployment

EUROPE

	Country
1.	Austria
2.	Belgium
3.	Denmark
4.	Finland
5.	France
6.	Germany
7.	Greece
8.	Ireland
9.	Italy
10.	Luxembourg
11.	Netherlands
12.	Portugal
13.	Spain
14.	Sweden
15.	England (UK)

Radio Frequency Interference Statements

Federal Communications Commission (FCC)

Information to User

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

NCR is not responsible for any radio or television interference caused by unauthorized modification of this equipment or the substitution or attachment of connecting cables and equipment other than those specified by NCR. The correction of interference caused by such unauthorized modification, substitution or attachment will be the responsibility of the user. The user is cautioned that changes or modifications not expressly approved by NCR may void the user's authority to operate the equipment.

FCC Label Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation

Canadian Department of Communications

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

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

Canadian Label Statement

This Class A digital apparatus complies with Canadian ICES-003
Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada

International Radio Frequency Interference Statement

Warning: This is a Class A product. In a domestic environment this product may cause radio interference, in which case the user may be required to take adequate measures.

LITHIUM BATTERY WARNING

CAUTION: Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the Manufacturer. Discard used batteries according to the manufacturer's Instructions"

"ATTENTION: Il y a danger d'explosion s'il y a remplacement incorrect de la batterie. Remplacer uniquement avec une batterie du même type ou d'un type recommandé par le constructeur. Mettre au rebut les batteries usagées conformément aux instructions du fabricant".

Battery Disposal (Switzerland)

Refer to Annex 4.10 of SR814.013 for battery disposal



DECLARATION OF CONFORMITY

We, NCR Corporation, Retail Solutions Division – Atlanta

2651 Satellite Blvd., Duluth, Georgia 30096-5810

declare under our sole responsibility that the product

Class 7730 - K070 Remote Button Activator

to which this declaration relates is in conformity with the following standard(s) or other normative document(s) following the provisions of the noted Directives.

EU Directive	Harmonized Standard (s)
89/336/EEC (EMC) Amended by 91/263/EEC 92/31/EEC, 93/68/EEC 93/97/EEC 1995/5/EC (R&TTE)	ETSI EN 300 440 ETSI EN 301 489 EN 55022 EN 61000-4-2 EN 61000-4-3

Chapter 11: Remote Button Activator (RBA)

Overview

The Remote Button Activator (RBA) offers an easy method to check the contents of an ESL's registers. In a store environment, the RBA can be used to access promotional messaging, stocking information, planogram data, or other store-specific information stored in the ESL's registers.

The RBA device is similar to an automotive car door lock system or garage door opener system in both size and method of operation.

2. Using the Remote Button Activator (RBA)

Place the RBA near an ESL. Press the buttons on the RBA in the sequences listed below and the contents of the selected ESL register displays.

Button	Display Register	Button	Display Register
1	16	A-1	1
2	15	A-2	2
3	14	A-3	3
4	13	A-4	4
5	12	A-5	5
6	11	A-6	6
7	10	A-7	7
8	9	A-8	no action
9	8	A-9	no action

Alternate functions can also be activated by first pressing the A key and then button 1 through 9.

When the A key is pressed, the LED turns on a little less brightly than normal to indicate alternate mode. Within 5 seconds a number must be entered or the RBA turns off the LED and defaults back to normal mode.

There are two ways to use the RBA to view the contents of an ESL's registers:

1. Press and release the RBA button.

This shows the contents of the selected ESL register on the ESL LCD. After a few seconds, the ESL LCD redisplay the contents of the original register.

2. Press and hold down the RBA button.

This shows the contents of the selected ESL register on the ESL LCD. The LED light on the RBA blinks eight (8) times while the button is pressed. After approximately 15 seconds, the ESL LCD redisplay the contents of the original register and the LED stops blinking.

Note: Each RBA is configured for use in a specific store and does not work on a RealPrice System in another store.

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1. Scope

The requirements for the 7730 Remote Button Activator, herein referred to as the RBA, are specified in this procurement specification.

The RBA shall function as a remote display sequence activator for NCR Electronic Shelf Labels (ESL).

The RBA is intended for use in the countries listed in Appendix B.

The RBA shall meet the following objectives:

- Small and Light
- Robust design
- 10 buttons
- Long battery life with replaceable battery
- Key chain or belt attachment

2. Associated Documents

2.1 NCR Reference Documents

497- 0424649	DecisioNet/RealPrice RBA Product Requirements
230-0415412	NCR-7730 DecisioNet Functional Specification (3.0 Air Interface and Protocol)
497-0412176	Regulator Compliance Guidelines
89/336/EEC	EMC Directive
UL60950	
EN/IEC06950	
	NCR Corporate Packaging Standard B-2, Section B2
	NCR Packaging Standard 10-001

2.2 Priority of Documents

In the event of conflict between documents, the priority shall be as follows:

- Procurement Specification
- Business Agreement between NCR and Manufacturing Supplier
- Other applicable documents and drawings
- Purchase Order

3. Requirements

3.1 Functional Requirements

3.1.1. General

1. The RBA shall consist of a ten button Radio Frequency (RF) transmitter device designed to send commands to RealPrice electronic shelf labels (ESL).
2. The RBA shall communicate with ESLs using the **High Signal Input Communication Mode** as specified in 230-0415412.

3.1.2. Operation

3.1.2.1 Single-Shot Mode

1. Each key press lasting between 0.5 and 1.873 seconds shall result in a “single-shot” mode operation as described below:
 - (a) Program the 4th Sequence Register with 128 bits of information. Only one display register shall be programmed with FFh; all others shall be programmed with 00h. The display register programmed with FFh is dependent on which button(s) is pressed per the following table:

Button	Display Register
1	16
2	15
3	14
4	13
5	12
6	11
7	10
8	9
9	8
Alt followed by 1	1
Alt followed by 2	2
Alt followed by 3	3
Alt followed by 4	4
Alt followed by 5	5
Alt followed by 6	6
Alt followed by 7	7

- (b) Select the 4th Sequence Register for display.
- (c) Send the Switch Activation command.

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- (d) The sequence (a, b, c) defined above shall be chained and sent as a single transmit burst.
- (e) The Alt key function shall remain in effect for no more than 5 seconds (the operator has 5 seconds to select a button after pressing the Alt key.) The Alt function is terminated at the end Alt + # command sequence.

2. Simultaneous activation of two or more buttons shall not result in commands, other than those listed above, being sent to the ESL.

3.1.2.2 Repetitive Mode

- 1. Each numbered key press lasting longer than 1.873 seconds shall result in a repetitive mode operation as described below:
 - (a) Program the 4th Sequence Register with 128 bits of information. Only 1 display register shall be programmed with FFh; all others shall be programmed with 00h. The display register programmed with FFh is dependent on which button is pressed per the following table:

Button	Display Register
1	16
2	15
3	14
4	13
5	12
6	11
7	10
8	9
9	8
Alt 1	1
Alt 2	2
Alt 3	3
Alt 4	4
Alt 5	5
Alt 6	6
Alt 7	7

- (b) Select the 4th Sequence Register for display
- (c) Send the Switch Activation command.
- (d) When a numbered button is held down for more than 1.873 second, the entire sequence (a, b, c) shall be sent repetitively every 1.873 seconds. To conserve battery life, the maximum transmit time shall be limited to 8 repetitions.
- (e) The sequence (a, b, c) defined above shall be sent as a single concatenated transmit burst..

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- (f) The Alt key function shall remain in effect for no more than 5 seconds (the operator has 5 seconds to select a button after pressing the Alt key.) The Alt function is terminated at the end Alt + # command sequence.

2. Simultaneous activation of two or more buttons shall not result in commands, other than those listed above, being sent to the ESL.

3.1.2.3 Security Code Programming

The RBA shall have a programming mode whereby the operator shall be able to input, via the keypad, a three-digit store ID code. Valid store ID codes are 000 to 203 and 205 to 255. ID 255 is the factory programmed default for ESLs and RBA. ID 204 is reserved for broadcast messages and can not be programmed.

The code shall be stored in non-volatile memory. Battery removal shall not require the reprogramming of the store ID code.

The following procedure shall be followed to re-program the codes:

- Press and hold buttons 5 and 6 simultaneously (> 5 seconds) until the RBA indicates that programming mode is entered with three short flashes of the LED.
- Enter the three digits for to program the store ID. The Alt button enters a "0".
- After the third digit is entered the RBA will indicate the programming was successful with three short flashes of the LED or that programming failed with one long pulse.

The store ID code shall be sent with every command sequence as defined in 230-0415412.

3.1.3. Transmitter

3.1.3.1 Operating Distance

The operating distance is measured from the front (LED side) of the RBA housing to the surface of the ESL display with the RBA perpendicular to the ESL surface and the bottom of the ESL and RBA both aligned horizontally.

The RBA shall be able to activate a display change on an ESL with a nominal sensitivity rating of -10 dBm at a minimum distance of 2 inches.

The RBA shall not be able to activate a display change on an ESL with a nominal sensitivity rating of -10 dBm at a distance of over 12 inches.

3.1.3.2 Transmit Frequency

The transmit frequency shall be 2.443 GHz +/- 2% (center of ISM band), including initial tolerance and drift of the RF Transceiver. The RF transmitter shall be designed to operate in the ISM band at 2.400 GHz to 2.4835 GHz. The transmitter circuit shall not require any adjustments during production nor shall any adjustments be required in store environments.

3.1.3.3 Transmit Power

The transmitter power shall be -1.5 dBm EIRP maximum.

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3.1.3.4 RF Modulation

The RF modulation shall be On-Off-Keying (OOK) amplitude modulation with a minimum 20dB modulation depth.

3.1.3.5 Transmit Data Rate

The transmit data rate shall be 16.384 Kbits/sec.

3.1.3.6 Transmit Data Duration

Each key press shall initiate a command sequence per 3.1.2 that includes communication protocol data as specified in 230-0415412.

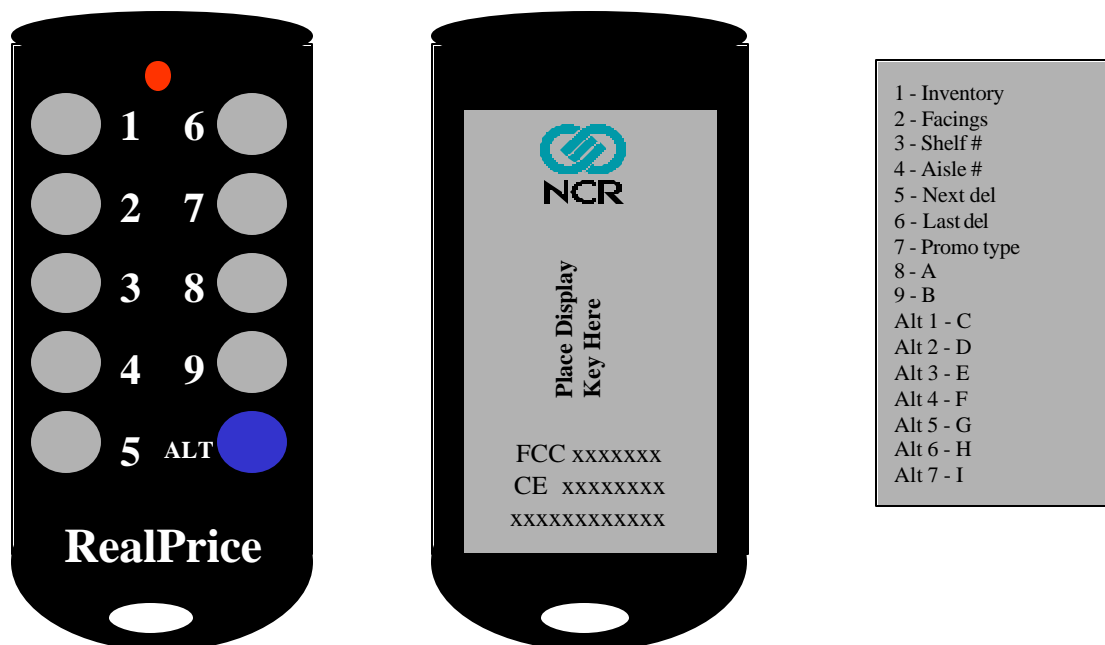
3.1.3.7 Message Format

The message format for the RBA transmission shall be as specified in 230-0415412.

3.1.4. Antenna

The antenna shall be completely contained within the enclosure.

3.1.5. Enclosure (see figures below)



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1. Preferably, a standard off-the-shelf 10-button enclosure will be used for the RBA. This enclosure shall be designed specifically for RF transmitter applications. The enclosure shall have the approximate dimensions shown below:
 - (a) Length: 3.5 inches
 - (b) Width: 1.5 inches
 - (c) Depth: 0.625 inch max.
2. The back of the enclosure shall include a recessed area for two labels. One label shall be used to display permanent information such as part number, FCC certification, etc. per 6.1.1. The other label shall be for a customer applied/replaceable keypad legend.
3. The enclosure shall accommodate a standard user replaceable coin cell battery.
4. The enclosure shall be black.
5. The enclosure shall not have exposed metal parts.
6. The enclosure shall have a provision for securely attaching a key ring.
7. No special tools shall be required to replace the battery.

3.1.6. Keypad

- The keypad shall be a ten-button, rubber membrane keypad with carbon puck contacts.
- The contact patterns shall be plated or protected to provide corrosion resistance and longer life.
- Each of the ten buttons shall provide tactile feedback to the operator.
- Key designations shall be legible for the life of the keypad.
- The keypad shall be skin oil, cleaning agent, and hand lotion resistant.
- Each of the ten buttons shall have an actuation force of 155 +/- 20 grams.
- Each of the ten buttons shall have a contact force of 80 +/- 20 grams.

3.1.7. Battery

3.1.7.1 Battery Model

The RBA shall be powered by CR2032, 20mm diameter, 3 Volt, 220 mAh, lithium coin cells.

3.1.7.2 Battery Life

The operating life of the battery shall provide for a minimum of 1.3 million single-shot mode (section 3.1.2.1) operations.

3.1.7.3 Battery replacement

The Batteries shall be replaceable. Opening the RBA cabinet to replace the batteries is an acceptable solution.

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3.2 Environment Test Requirements

3.2.1 Temperature & Humidity

3.2.1.1 Operating

Operating temperature and humidity testing per NCR standard procedures is not applicable. This is hand-held device that can not operate stand-alone and is intended for use in a conditioned environment.

3.2.1.2 Non-Operating

3.2.1.2.1 Storage

	Min.	Max.	Note
Period of Storage Range	-	3 months	
Temperature Range (Dry Bulb)	10 °C	+50 °C	
Temperature Change	-	15 °C/Hr.	
Relative Humidity Range	10 %	90 %	No condensation
Barometric Pressure	70x10 ³ Pa	105x10 ³ Pa	A maximum of 2,000 meter altitude

3.2.1.2.2 Shipping

	Min.	Max.	Note
Period of Storage Range	-	3 months	
Temperature Range (Dry Bulb)	-40 °C	+60 °C	
Temperature Change	-	15 °C/Hr.	
Relative Humidity Range	5 %	95 %	No condensation
Barometric Pressure	70x10 ³ Pa	105x10 ³ Pa	A maximum of 2,000 meter altitude

3.2.2 Shock and Vibration

3.2.2.1 Operating

Operating temperature and humidity testing per NCR standard procedures is not applicable. This is hand-held device that can not operate stand-alone and is intended for use in a conditioned environment.

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3.2.2.2 Non-Operating

3.2.2.2.1 Vibration

The unpacked equipment is to be subjected to a frequency sweep from 3-150-3 Hz with a constant 1.0 g sinusoidal input (0 to peak) in both the + and - directions along the three mutually perpendicular axis of the equipment. A dwell time of 15 minutes is to be applied at any frequency on any axis where vigorous or resonant excitation of the equipment or any parts thereof occurs.

Acceleration	1.0 G
Frequency	3 - 150 - 3 Hz
Sweep time	15 minutes/each axis
Axis	3 axis (X,Y,Z)

Success Criteria: The RBA shall be functional. However, cosmetic failures, such as minor scratches to the enclosure, can be accepted.

3.2.2.2.2 Shock

The unpacked equipment is to be subjected to three shock pulses in both the + and - direction along the three mutually perpendicular axis of the equipment (total 18 shocks). The velocity change must equal 4.25 meters per second (167 inches per second). The characteristics of this shock pulse is a triangular waveform at a 85 g peak occurring in a 10 millisecond timeframe. This shock simulates an approximate 0.92 meters (36 inch) free fall drop onto a tiled concrete floor.

Success Criteria: The RBA shall be functional. However, cosmetic failures, such as minor scratches to the enclosure, can be accepted.

3.2.2.2.3 Shock Test with Shipping Material (trays, carton Box, etc.)

Test per NCR Packaging Standard 10-001. Success Criteria: The RBA shall be functional.

3.2.2.2.4 ESD Durability (Electro Static Discharge)

Air discharge	+/- 8 kV, +/- 10 kV, +/- 15 kV
Horizontal coupling	+/- 4 kV, 100 cycles; +/- 6KV, 100 cycles; +/- 10KV, 100 cycles
Vertical coupling	+/- 4 kV, 100 cycles; +/- 6KV, 100 cycles; +/- 10KV, 100 cycles

Success Criteria: The RBA shall have no physical and/or functional damage.

3.2.2.3 Contamination

The RBA shall survive modest dust and dirt exposure with no performance degradation.

4. Diagnostics requirements

No diagnostics have been defined.

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5. Legal and Regulatory Requirements

5.1.1. Safety Requirements

The RBA shall comply with UL60950 and EN/IEC60950.

5.1.2. Disposal Requirements

The RBA shall conform to environmental regulatory requirements, such as disposal of the product and/or Lithium battery.

5.2 Electromagnetic Compatibility

The RBA shall comply with NCR corporate standards per 497-0412176 and European EMC Directive 89/336/EEC.

5.3 RF Certification

The RBA shall comply with RF certification standards listed in appendix A for the countries listed in appendix B.

5.4 Human Exposure Limits

The RBA shall comply with the Specific Absorption Rate (SAR) requirements per US FCC OET65 Edition 97-01.

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6. Marking and Packaging

6.1 Unit Marking

6.1.1. Label and Marking on RBA

A product label shall be adhered to each individual RBA unit. The product label shall be placed on the recessed area on the back of the enclosure. Material for the label is 0.05mm thick WHITE polyester film (Modern Plastics Inc. Ltd. "Sun-plate CP-50" or equivalent). The product label shall be legibly and indelibly marked with the following information:

1. NCR company logo
2. NCR Corporation
3. country of origin
4. class
5. NCR part number
6. lot code or production date
7. FCC/CE certification
8. "crossed out waste basket symbol"
9. patent pending statement (PAT. P)

6.2 Packaging

The carton box shall be labeled according to NCR specifications detailed in NCR Corporate Packaging Standard B-2 section 2.

6.2.1. Packaging for RBA

Five (5) RBA kits shall be packed in a carton box. There shall be five (5) RBA units per kit. The manufacturing origin shall be identified on the surface of the carton box. The packaging shall provide adequate protection to prevent shipping damage to the RBA.

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7. Quality Assurance Provisions

A supplier who undertakes supplying assemblies to this specification shall be responsible for maintaining the quality of the assemblies equal to or better than the quality of the originally supplied samples. At the option of NCR, samples may be pulled from any lot and tested to determine compliance with this specification. In the event compliance is not satisfactory, units and/or lots may be returned to the supplier for replacement. The supplier shall pay shipping charges both ways on rejected materials.

7.1 Product Quality

When a purchase order (PO) is accepted to supply material against this specification, the supplier assumes a responsibility for the shipment of defect-free products produced under a prevention oriented quality system. NCR expects to receive products at the AQL specified in paragraph 9.5. To help prevent defective product from reaching the customer, NCR is to be made immediately aware of any knowledge the supplier has on past and current problems with the product. In the event that problems with the product do occur, NCR uses a Closed Loop Corrective Action (CLCA) process to isolate and correct the problems. In general, this process involves a communication to the supplier to indicate and detail the problem, who will in turn, provide both a short and long term solution to correct the problem in a timely fashion. Rejections may occur and shipments may be held pending the receipt and approval of a complete failure analysis and a corrective action report from the vendor to the NCR Corporation

7.2 Quality Documentation

A detailed description of the manufacturer's quality program shall be made available to NCR Supplier Chain Management (SCM). The program content will be confirmed during a facility and process audit at the manufacturing site if required by SCM.

7.3 Warranty Period

Refer to the business agreement document between NCR and Manufacturing Supplier.

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8. Product Acceptance

It is the intent of NCR to source materials from suppliers who provide defect-free shipments which require no routine incoming inspection. Shipments are to be received and accepted through Dock-To-Stock or Dock-to-Line programs.

8.1 Dock-to-Stock

Dock-to-Stock implementation does not negate the right to reinstate incoming inspection or reject and return non-conforming material. Reinstatement will have a negative effect on the NCR Business Plan; immediate supplier corrective action is mandatory.

All lots of items supplied to this specification shall be homogeneous in materials and construction. No lot-to-lot changes in design or materials involved in the manufacture of product delivered to NCR will be allowed without written prior approval from NCR.

8.2 Process Change

NCR is to be made aware of all potential materials, design, assembly, and manufacturing site changes that may cause the product delivered to NCR to not meet specifications. All design and materials changes must be approved in writing prior to the receipt of production quantities. NCR is to be made aware of any potential manufacturing site changes; written approval of the change by NCR is not required. NCR reserves the right to audit and qualify the new location in the event of a manufacturing site change.

8.3 Quality Performance Records

Quality performance records consisting of inspection and test results shall be maintained by the supplier in a place and manner which prevents loss or deterioration. They are to be made available to NCR for audit and analysis. In addition, NCR will provide track supplier quality performance based on the products they are currently providing to the NCR Corporation. The goal of the report is to the supplier work towards continual quality improvements by meeting goals set between NCR and the supplier.

8.4 Statistical Process Control (SPC)

The supplier shall be committed to process control and a philosophy of continuous quality improvement. SPC is a means to achieve each. It is expected that process capability will be demonstrated through SPC and that it will be used as required to control quality characteristics.

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8.5 Product AQL (Acceptable Quality Level)

Due to anticipated low volume, AQL is not applicable at this time. AQL will be reevaluated if volume levels increase significantly.

8.5.1. MTBF

The RBA shall meet an MTBF goal of 500,000 hours whereby the workload is 1000 actuations per day per Bellcore TR-332.

8.5.2. Definition of Failure

An RBA is considered to be a failed RBA if the RBA experiences one or more problems listed below. A failed RBA will be excluded from MTBF measurement if the failure is caused by misuse or abuse during normal operation.

- ESL's do not respond to RBA commands when RBA is located within specified range of ESL (Battery OK)
- Push Switch does not work
- Enclosure is cracked and/or broken
- Excessive power consumption

8.6 Quality Goal

The supplier is requested to make continuous quality improvements to the RBA until the quality targets below are achieved.

Out-of-box Quality Goal		Reliability Goal
Factory Out of Box	50 DPM	0.5 million hours MTBF
Shipping & Handling	50 DPM	
All Others	50 DPM	
Total	150 DPM	

DPM = devices per million

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9. Engineering Change Provisions

9.1 General

Any changes affecting manufactured or purchased parts, firmware programming, purchased equipment performance, maintenance, interchangeability, spare parts, or other pre-established routines and procedures of the physical assembly involving the product delivered to NCR must receive NCR's written approval prior to incorporation.

9.2 Request From Supplier

A request for approval will be submitted to NCR accompanied by evaluation samples where applicable. NCR will respond within 60 days; however, no changes are to be made on products delivered to NCR without NCR approval.

9.3 Approval

The NCR representative will analyze the change requested and give written approval or disapproval.

9.4 NCR Changes

Changes originating from NCR will be communicated to the supplier through NCR's representative. If NCR suggests changes to the supplier with respect to modifications of any product, unit, or part thereof, the supplier shall study each suggested change and, within a reasonable time, not to exceed 60 days, report to NCR as to the feasibility, price, modifications to the change, and the estimated time or serial number of the product on which such change can be implemented. Such change shall not be made by the supplier until official approval has been granted by NCR.

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10. Design Qualification Test Requirements

The manufacturing supplier is responsible for the electrical and mechanical design and shall pursue ultimate design-for-manufacturing. The manufacturing supplier should take responsibility for conducting its Design Qualification Test and should report its results to NCR for approval prior to RBA mass production.

NCR's preference for the Design Qualification Test items that should be done by the manufacturing supplier is as follows. Items below are subject to negotiation between the manufacturing supplier and NCR when the manufacturing supplier does not have the capability to perform the test(s).

Par.	Description
3.1.2	Operation
3.1.3	Transmitter
3.1.7.2	Battery Life
3.1.8	Environmental Test Requirements – Temperature & Humidity
3.1.9	Environmental Test Requirements – Shipping

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Appendix A: Regulatory Requirements

Product Description

- Hand-held device that activates specific displays of the NCR 7730 series ESLs
- Operating frequency is within 2.4 and 2.4835GHz and operates on a single frequency.
- Output power is 10mW EIRP (Equivalent Isotropically Radiated Power).
- Antenna is located within 20cm of the user.

USA

- FCC (Federal Communication Commission) Part 15 Subpart B, Class A – Unintentional Radiators
- FCC Part 15.250 - Intentional Radiators.
- Filing with Technical Competent Body (TCB) instead of FCC is possible for devices less than 15mW EIRP.
- RF) Exposure – Maximum Permissible Power (MPE) Calculations should suffice, however FCC reserves the right to request Specific Absorption Rate (SAR) evaluation.

Canada

- ICES-003 EMI*
- RSS 139 Licensed Indoor/Outdoor use**
or
- RSS 210 Unlicensed Indoor use**
- Filing with Industry Canada required
- SAR evaluation per RSS 102. All handheld devices where the antenna is 20cm or closer to the user are required to undergo SAR evaluation (Section 2.1 of RSS 102).

* Satisfied by FCC Part 15 Subpart B

**Satisfied by FCC Part 15 Subpart C

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Appendix B: List of Countries for RBA Deployment

NORTH AMERICA

	Country
1.	Canada
2.	United States