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**Electronic Cash Registers (ECR) and
Point-of-Sale Systems (POS) Interfaced with Scales
Part 2 - Examination**

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This is the second part of a two-part article on Electronic Cash Registers (ECR) and Point-of-Sale Systems (POS) Interfaced with Scales and is intended to provide weights and measures officials with guidelines and test procedures that can be used to examine electronic cash registers (ECR) and point-of-sale systems (POS) interfaced with scales. If you have read Part 1, you are aware of the reasons that POS systems interfaced with scales are regulated by weights and measures.

WMD has reviewed the examination procedure outline (EPO) for ECRs developed by the California Division of Measurement Standards, applicable National Type Evaluation Program (NTEP) test procedures in 2006 edition of the National Conference on Weights and Measures (NCWM) Publication 14, and applicable requirements in NIST Handbook 44 in order to develop these additional examination guidelines that can be used in conjunction with NIST Handbook 112 EPO for Retail Computing Scales.

Inspection: Upon entering the establishment, the inspector will notify a manager or supervisor, just as he would when inspecting any other weighing or measuring device. However, the inspector should ask that the system under test be placed in a "training mode, "VOID mode," or some other mode of operation where cash drawers will not open and totals affecting the store's inventory of money and products will not be accumulated. Many inspectors will request that the store managers provide assistance in the operation of the POS system (and remove cash drawer, if necessary), citing Handbook 44 General Code paragraph G-UR.4.4. Assistance in Testing Operations.

As discussed in Part 1 of this article, the definition of "point-of-sale systems" does not apply to some ECRs designed to accept only the total price of a weighing transaction from a computing scale. This scenario essentially makes the ECR a price accumulator and printer. NTEP established evaluation criteria in the early 1980s listing the conditions where an ECR interfaced with a computing scale is not considered a "point-of-sale system," provided the ECR does not metrologically impact the accuracy of the weighing and pricing transaction. The current conditions are listed in the 2006 edition of NCWM Publication 14 as follows:

- The computing scale displays the weight, unit price, and total price on both the customer and operator side of the scale.
- The computing scale has a functioning tare capability.
- The computing scale is positioned so the customer can accurately read the indications and observe the weighing operation.
- The computing scale is equipped with motion detection that complies with Handbook 44 paragraph S.2.5.1. Digital Indicating Elements.

- The computing scale is not equipped with price look-up or scanner capability. Unit prices must be entered manually at the computing scale to give the customer adequate time to view the information and make an informed decision on the acceptance of the transaction.
- The computing scale shall not have an operational sales accumulation feature or shall have that feature disabled since the ECR accumulates sales of all items.
- The ECR cannot have any input to the computing scale in determining the total of a weighed transaction.

These seven items are evaluated by NTEP in order for the "ECR interface" feature to be listed on the NTEP CC for the computing scale and the "computing scale interface" feature to be listed on the NTEP CC for the ECR.

1. General considerations: For jurisdictions requiring NTEP Certificates of Conformance (CCs), the inspector should review the ECR and POS scale CCs and determine that the manufacturer has designated them for the service selected by the user and verify that the features and options, locations of identification and sealing mechanism, and special operations or limitations are consistent with the information contained in the CC.

2. Markings: Verify that the required markings are provided for the POS system and separable components. These include General Code identification requirements, operational controls, identification of indications, accuracy class, capacity, value of the scale division, and maximum number of divisions for separable indicating and load-receiving elements. The NTEP CCs for the POS system and POS scale will provide information on the content and location of the required markings. The official should be aware that POS scales may not always provide the primary weight indications in the system. In order for the POS system to comply with the requirements for a primary weight indication in General Code paragraph G-S.5.1. General, the primary weight display will be provided by the ECR or other parts of the POS system. As discussed above, information on the location of the required markings will be contained in the CC. Additionally, separable devices that have no metrological impact on the accuracy of the transaction, such as cash drawers, card readers, and scanners, are not required to be marked by Handbook 44.

Many POS systems are type evaluated as "not-built-for-purpose, software-based devices." Unless the POS software identification information is continuously displayed on the screen or physically marked on the device, it may be difficult to determine the manufacturer and model designation of the software used in the system. General Code paragraph G-S.1.1. Location of Marking Information for Not-Built-For-Purpose, Software-Based Devices allows these devices to have:

- All required identification information or just the CC number* physically marked or continuously displayed on the device, or
- All required identification information or just the CC number* easily recalled from memory through easily accessible "view only" system identification where the

information can be accessed through a clearly marked key, a computer type menu item, or listed in the help menu. This would be equivalent to verifying the software identification of other types of software programs in the "about" screen in the "help" menu on computers.

- * **Note:** If the CC number alone is provided, the CC must include instructions for accessing the remaining identification information listed in the "Identification" paragraph of the applicable CC.

3. Indicating and recording elements. All requirements in General Code paragraph G-S.5. Indicating and Recording Elements are applicable to a POS system if the device provides the primary weight indications. Additional paragraphs to carefully consider are: General Code paragraph G UR.3.3. Position of Equipment and Scales Code paragraphs S.1.1. Zero Indication, S.1.1.1. Digital Indicating Elements, and UR.4.1. Balance Condition.

Weight indication and zero-balance information must be visible at all times from a normal customer's and operator's position. When ECRs are interfaced to POS scales, the customer must be provided with a "live" continuous zero balance or weight information visible at all times from a normal customer position. This can be accomplished in one of the following ways:

- The ECR may have an integral weight indicator that is part of the terminal. However, the "live" continuous weight indication must be entirely separate from the price transaction portion of the customer display.
- The ECR may have a remote customer's weight indicator mounted on or adjacent to the terminal or the POS scale.
- The POS scale may have a built-in customer's weight indicator or have a remote customer's weight indicator mounted on or adjacent to the terminal or weighing element.

4. Checking the zero-balance condition. The zero-balance condition of the POS scale must be available to both the customer and the operator. As mentioned earlier, POS scales may not always provide the "live" continuous primary weight indications in the system. In these cases the only primary "live" continuous weight indication is located at the ECR display of the POS system. In many supermarkets, the ECR display may go into a "screen saver" or display a scrolling message if the POS system has not been in use for a period of time. This can be an indication that the scale is in a zero-balance condition if the cashier is not required to enter a log-in number, code, or take other action to turn off the "screen saver" mode and check the zero-balance condition of the scale.

If the screen saver or scrolling messages are intended to represent the zero condition of the scale, the primary weight indication of the POS system shall be identified with zero annunciators, or words such as "scale ready," "zero," or markings or indications that state that the "screen saver" or "scrolling message" means the scale is in a zero-balance condition. To verify this feature is operating correctly, add an object to the scale while it is in the "screen saver" mode. The scale shall display either an error condition or a

weight value. If the scale displays a weight rather than an error condition, remove the weight from the scale and verify that the weight indication returns to zero.

Pretest Determinations: See Handbook 112, EPO No.1 for Retail Computing Scales for additional determinations applicable to the POS system.

Test and Test Notes: The following should be considered and verified during the examination of POS systems in addition to the test notes and tests listed in Handbook 112, EPO No.1 for Retail Computing Scales.

1. Increasing-load, decreasing-load, shift, discrimination and zero-load balance change tests. - These tests are applicable to the POS scale and are the same tests that would be applied to electronic price computing scales in NIST Handbook 112, EPO No.1. During these tests, you may want to enter a unit price at various test loads to verify motion detection capability, price calculations, or document the test results.

2. Motion detection. - Depending upon the manufacturer, the POS system will usually print the weight indication when the "scale," "weight," or department key is pressed or PLU number is entered. Scales Code paragraph S.2.5.1. requires that the scale complies with motion detection requirements and all POS scales have been type evaluated with that capability. Tests for motion detection requirements are still required on the POS system since it should only capture stable weights sent from the POS scale.

3. Test for over-capacity indication. - Both the POS system and its associated POS scale shall not indicate or record values exceeding 105 % nominal capacity according to Scales Code paragraph S.1.7. Capacity Indication, Weight Ranges, and Unit Weights. Place a test load on the POS scale exceeding 105 % of the nominal capacity of the scale (for example, 105 % is 31.50 lb on a 30-lb capacity scale) and attempt to enter a PLU number of an item sold by weight. There should be no indication of weight on the primary weight display or the customer receipt, and the ECR should provide a visible or audible error condition.

4. Price look-up. - Verify accuracy and correctness of transactions based on product look-up and scanner entries. You may want to look at a current newspaper advertisement for that information, or prior to starting POS system testing, take a walk through the produce and bulk food sections of the store noting the price on various items. Then using the product code listing (usually adjacent to the ECR), enter or have the cashier enter the PLU's for those chosen scale items into the register with a 1 lb weight on the scale.

The inspector should also select items that are sold by multiple pound or multiple items per unit price (e.g., 3 lb for \$1.00 or 7 items for \$1.00). This is commonly known as split-pricing. You will recall that the price items sold by weight shall be rounded to the nearest 1-cent money value. An example of verifying the correct rounding will be included in the subsequent test for mathematical calculations. Non-weighted split-priced items may be calculated based on normal marketing practices unless otherwise posted. Using the example of 3 items for \$1.00, the price of non-weight split-priced items may be

recorded as \$0.34, \$0.34, and \$0.33 unless otherwise posted. For example, if the customer purchases only a single item, he may be charged the regular price for that item. Other pricing structures, such as "buy 2 at the regular price and get the 3rd one free," may be acceptable if the information is posted and correctly calculated.

5. Tare capability. - Verify operation and accuracy of these systems. The tare mechanism must have sufficient capacity to equal the heaviest tare container used. Tare capability may be achieved in one of the following methods according to Scales Code paragraph S.2.3, Tare: pre-programmed "global tare," or tare programmed as part of the product information in a PLU, or a manually entered keyboard tare. A single tare value (sometimes called a "global tare") may be programmed into the register if a single tare value is adequate for all tare material (bag, twist ties, labels, etc.). Provision to override tare is acceptable if the standard tare is not to be used for a particular transaction. For example, the tare value for coffee sold from bulk may be heavier than the global tare and there may be different tare values for different sized containers at salad bars. Tare values programmed into the PLU codes can override the global tare.

- **Tare programmed with the price look-up information.** - Check items from bulk items in the store that are in a bag or tray that would require a tare to be taken (such as produce, bulk coffee, bulk candy, bulk health food items, soup and salad bar - if sold by weight). Verify that the correct tare is applied by observing the net weight value on the printed receipt and the displayed gross weight. Remember to include any ties, labels or other tare materials used with the bag or container.

EXAMPLE: Entering the PLU for fresh mushrooms, place a 1 lb test weight on the scale and print a receipt. If the tare for a plastic bag and tie is 0.01 lb, you should see a printed net of 0.99 lb. If the PLU is for freshly ground coffee, you may see a different net weight, of say 0.94 lb, since coffee is typically weighed in a heavier paper bag. In all cases, check the tare against the

- **Keyboard tare.** - This tare normally functions when the operator enters a number prior to pressing the scale key.

EXAMPLE: With 1.00 lb placed on the scale, the operator enters "2" before activating the "scale" key and the ECR prints 0.98 lb net weight on the customer receipt. Thus the "2" corresponds to a tare of 0.02 lb.

6. Mathematical agreement. - Handbook 44 paragraph G-S.5.5. Money Values, Mathematical agreements requires that any money-value shall be in mathematical agreement with its associated quantity representation to the nearest one cent of the money value. The correct computation of money values for both manually entered and price look-up unit prices can be verified by using the following table:

normal operation of the POS system. The receipt typically will have a minimum of three columns for the net weight, unit price, and total price. The columns shall be sufficiently separated from each other to facilitate understanding by the customer. The net weight information also needs to be identified with the appropriate weight units (e.g., lb or kg). The required information may also be on separate, but consecutive lines so that the receipt can be easily read from left to right and top to bottom. NTEP reviews the POS customer receipts during type evaluation, but changes are frequently made to the format and content of the customer receipt by the store and the official must verify that the minimum information is available to the customer and in a format that is understood by the customer during initial and subsequent examinations.

9. Subsequent Examinations. During subsequent examinations of POS systems, the inspector needs to perform the performance tests outlined in steps 1 thru 3, and verify correct tare values are still being used since tare materials may have changed from the previous inspection and the features evaluated during the initial examination must continue to comply with Handbook 44.

The above examination guidelines will form the basis for a complete EPO or an addendum to the EPO retail price computing scales, which will be further developed and included in NIST Handbook 112. Please contact Steve Cook at owm@nist.gov with comments and suggestions for the final EPO. Electronic copies of these guidelines will be posted on the WMD Internet homepage (www.nist.gov/owm) and can be accessed by selecting the link to the "Weights and Measures Quarterly Newsletter Archive" in the column titled "W&M Resources" or by using the following URL: <http://ts.nist.gov/ts/htdocs/230/235/newsletterarchive.htm>.