# MID:COM E:COUNT

# Operators Reference Guide

## Reference Guide for Operating the

## MID:COM E:Count Electronic Register

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# Section 1 – TECHNICAL SPECIFICATIONS

**Electrical Requirements**
  Operating Voltage:   10-30 VDC unregulated
  Operating Current:   Standby 275 mA
  Up to 3 solenoids activated: 1 A additional each

**Operating Environment**
  Outdoors exposed to elements
  Temperature Range: -40°C to +60°C (-40°F to 140°F)
  Humidity: 100% Condensing

**Enclosure**
  Aluminum permanent mold casting with epoxy powder coat
  Rating: IP-68 and NEMA-4
  Silicone gasket for keyboard and cover seals
  Calibration and Program Screws seal with BUNA 'O' Ring

**Environmental Testing**
  Temperature Range: -40°C to +60°C (-40°F to 140°F)
  Moisture Ingression: Fully submerged for 24 hours
  Vibration: 3 Gs, 30 Hz, 2 axes, 72 hours
  Shock: 4 foot drop to concrete, 3 axes, 5 times each

**Interconnect**
  Up to 5 multi-pin circular plastic connectors
  Sealed to IP-68 standards
  Compensator Probe uses a 1/4" NPT compression fitting with
  thread sealant

**Metrological Sealing**
  Drilled head screws for:
    Calibration Switch
    Program Switch
    Enclosure Cover
    Connectors Seal Plate
    All Mounting Accessories

**Mounting**
  Industry standard 'Veeder-Root' bolt circle with 1/4-20 threads
  Adapters available to mount all currently available meters

## **Inputs/Outputs**

### Pulse Input
Internal: 100 pulse-per-revolution (ppr) dual channel quadrature encoder for rotational input from positive displacement meters
External: Single or dual channel input from meters with electrical output, 3 to 30 V signal

### Pulse Output
Calibrated pulse output for remote counting or monitoring devices.
Raw encoder pulse output for connection to small volume piston provers.

### Powered Control Outputs
Three (3) High-side 12 V drivers for use with solenoid valves and other ancillary devices.

### Analog Input
One (1) 4 to 20 mA current loop for applications including tank gauging.

### Communications
Four (4) RS-232 compliant serial ports for use with printers, external computing devices, etc.

## **Calibration**
Prescale Factor (MRATIO) Range: 1 to 255
Calibration Factor Range: 0.0001 to 1.9999
Compensation Accuracy: Four (4) decimal places from lookup table

## **Registration Capacity (Units)**
Delivery:    -99999.9
Totalizer: 9999999.9

## Section 2 - LAYOUT

Figure 1.  E:Count LCD and Keyboard Layout
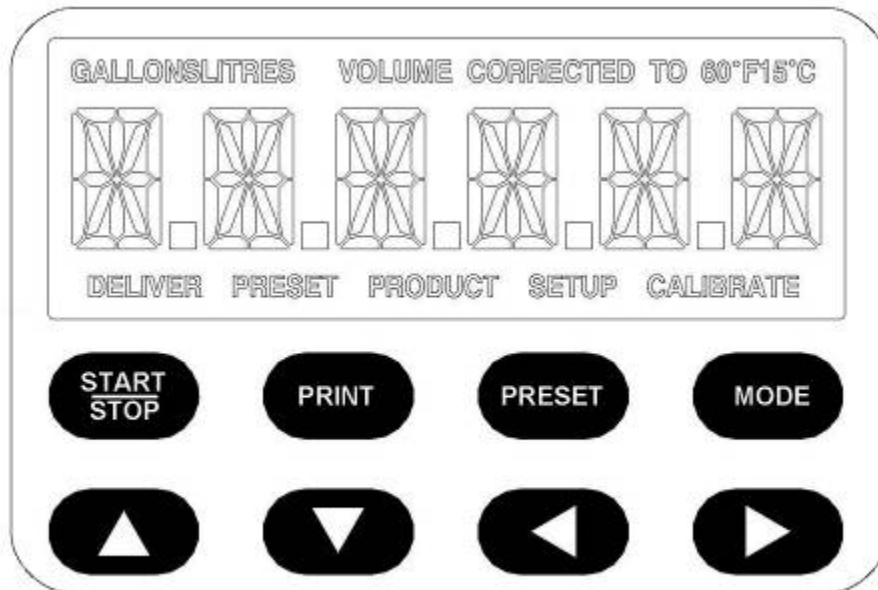


| | |
|---|---|
| GALLONSLITRES | 'GALLONS' or 'LITRES' indicates the current Volume Mode (US or Metric). |
| VOLUME CORRECTED TO 60F15C | Displayed whenever the Temperature Compensation is active. '60F' in Gallons Mode, 15C' in Liters mode. |
| DELIVER | Indicates Delivery Mode is active and will display until the Fuel Delivery Ticket prints. |
| PRESET | Indicates the Preset Volume is being changed. |
| PRODUCT | Indicates the Product Code is being changed. |
| SETUP | Displayed in the Delivery Menu and the Calibration Menu. |
| CALIBRATE | Indicates the Calibration Screw has been backed out - will display until the Calibration Screw is tightened. |

The E:Count uses special technique called **PRESS & HOLD** for keyboard entry.  This technique eases keyboard operation, especially when wearing gloves, in the absence of any audible or tactile feedback. Simply press a button and wait for the desired action.

Examples:
- For menus press & hold the mode key until the selection appears.
  - PRESS & HOLD **<START/STOP>** to enter that selection.
  - PRESS & HOLD **<START/STOP>** to exit the selection.
- To enter number PRESS & HOLD the **<RIGHT>** or **<LEFT>** arrow keys to select the digit to be changed. To change the number PRESS & HOLD the **<UP>** or **<DOWN>** arrow.
- To start a delivery PRESS & HOLD **<START/STOP>**.
- To enter a preset PRESS & HOLD **<PRESET>**.

Pressing and releasing a button may give results but it is only coincidental that the button was held long enough.

# Section 3 - WIRING DIAGRAM

Figure 2.  E:Count Wiring Diagram
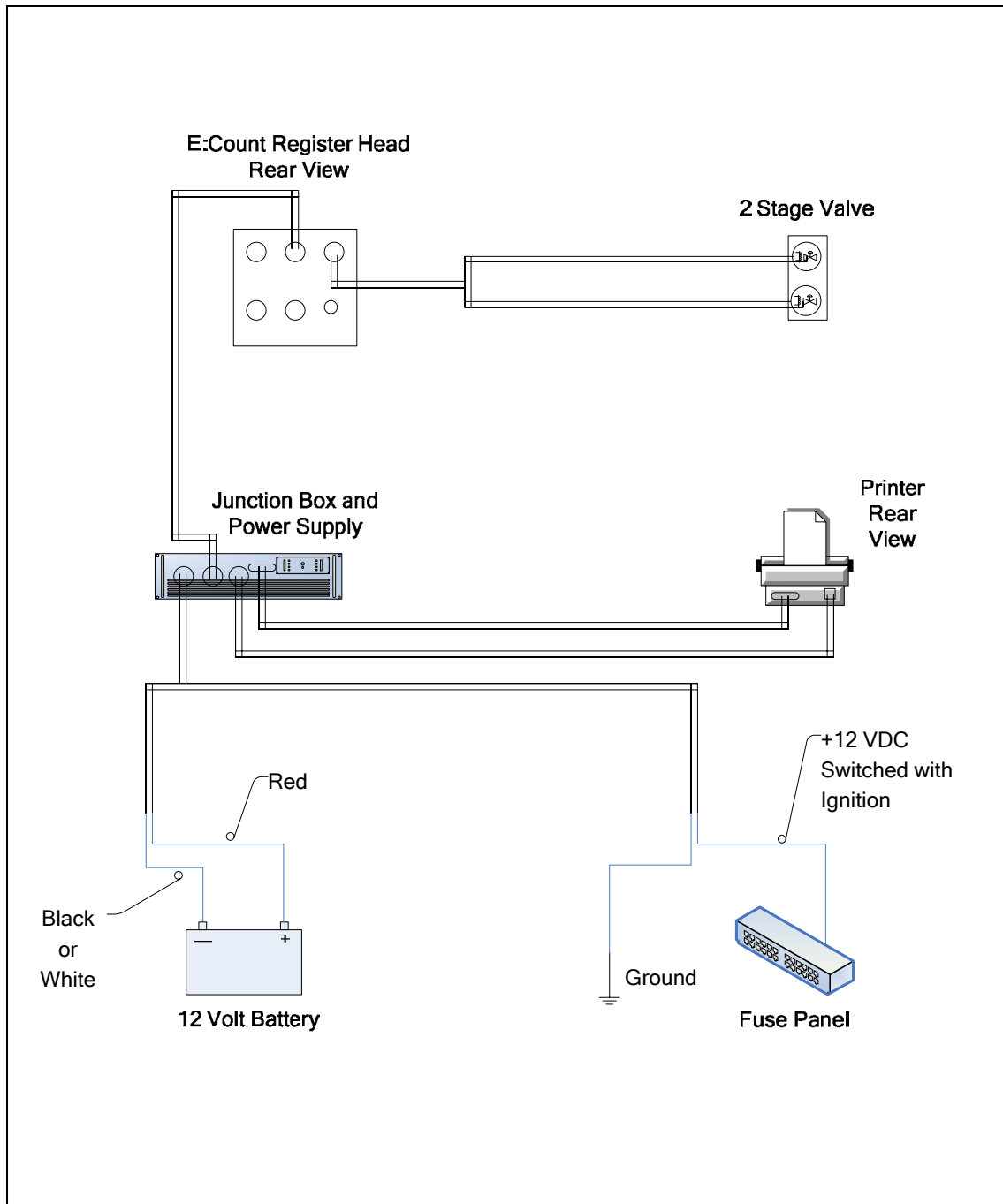
# Section 4 - OPERATION

## Figure 3.  E:Count Operation



Figure 3.  E:Count Operation

The flowchart shows the following elements:

**Power-On** → **Self-Test** → **Delivery Mode**

From Delivery Mode:
- PRESET to set Preset Quantity → **Preset Mode** → Arrow Keys Modify Preset Quantity → START/STOP to Save Preset → Delivery Mode
- START/STOP to Begin Delivery → **Delivery Active** → Deliver Product → PRINT to End Delivery and PRINT Ticket → Delivery Mode
- MODE to Enter Delivery Menu → Press Mode to Select Next Delivery Menu Category (PRCODE, SHIFT, DRIVER, TOTAL, DISVOL, CALTKT, SETUP, EXIT) with Arrow Keys Modify Values (SS) → START/STOP on EXIT → Delivery Mode
  - START/STOP on SETUP → **Setup Mode** → Enter Security Code → Press Mode to Select Next Setup Category (NEWCOD, STAGE1, STAGE2, TIME, DATE, SALE, TRUCK, EXIT) with Arrow Keys Modify Values (SS) → START/STOP on EXIT → Delivery Mode
- Back Out CALIBRATION Bolt → **Calibration Mode** → Calibrate Register Valves Open → MODE → Press Mode to Select Next Calibration Menu Category (DISVOL, CALFAC, TEMP F, TEMP C, TABLE, MRATIO, CMPTBL, SERIAL, PRINTER, COPIES, TIMER, PRCODE, EXIT) with Arrow Keys Modify Values (SS) → Tighten CALIBRATION Bolt / START/STOP on EXIT → Delivery Mode
- Back Out PROGRAM Bolt → **Program Mode** → Upload New Program → Tighten PROGRAM Bolt → Delivery Mode

**Delivery Mode**

## E:Count Overview and Theory of Operation

### Meter Calibration and Temperature Compensation

The MID:COM E:Count model MCR-05 is a general purpose electronic meter register for use with mechanical positive displacement meter with rotational output as well as other types of meters with electronic pulse outputs. In the case of a rotational output, the E:Count has an internal 100 pulse per revolution (ppr) quadrature encoder which converts the meter rotation to a pulse train. Meter calibration and optional temperature compensation techniques are all digital in nature and are explained below.

### Meter Calibration (Un-compensated)

Meter calibration is a two step process. First a prescale factor called MRATIO must be determined and entered. This number is an integer value from 1 to 255 and only needs to be entered when the E:Count is initially installed.

This factor serves three purposes:
1. It allows the resulting calibration factor to remain just above or below unity which preserves the "1 part in 10,000" calibration resolution. For example, if there were 10 times too many pulses per unit volume the calibration factor would be near 0.1. This would result in the least significant digit of the calibration factor representing 1 part in 1000.
2. It allows for the elimination of mechanical adjusters and gear reductions which can add torque to the meter as well as wear out and slip.
3. It allow for a convenient way to change units of measure, such as gallons, liters, kilograms, etc.

This factor can be determined by trial and error or by contacting MID:COM with the following information:
1. Meter manufacturer.
2. Meter size.
3. Units of measure.

The second step in calibration, and only step after initial installation, is to determine the calibration factor with a prover or master meter. For initial installation a factor of 1.0000 should be used as a point of reference. Subsequently use the present factor.

**E:Count Overview (continued)**

With a factor near unity, the meter error as expressed by PROVER VOLUME/REGISTER VOLUME results in a percentage in which the error can be added or subtracted to the current calibration factor as needed.

Another way to view the factor is that the digits to the right of the decimal represent the following:
- First digit - tens of units/hundred units
- Second digit - units/hundred units
- Third digit - tenths of units/hundred units
- Fourth digit - hundredths of units/hundred units.

The calibration factor represents the value of each pulse as it is received by the E:Count. These are added to each other and the resultant sum is compared to the volume currently displayed.  If the new rounded value is greater than the current displayed value the displayed value is adjusted accordingly.

Temperature Compensation

Temperature compensation is done by table lookup only. The E:Count is loaded with the appropriate API or ASTM table for the following products:
- PROPANE
- DIESEL/HEATING OIL
- GASOLINE
- LUBE OIL
- METHANOL
- ANHYDROUS AMMONIA
- JET-A FUEL

The tables are interpolated and extrapolated as necessary to have 1024 entries ranging from -40 to +62.4 degrees Celsius in 0.1 degree steps.  As each pulse is received the temperature is sampled and the corresponding table entry for that temperature is multiplied by the calibration factor. The result is added, rounded and displayed as described above, but as a separate value.

## E:Count Overview (continued)

Thus, there is always a running count of uncompensated AND compensated volumes. After the delivery these values can be toggled on the display to facilitate computations without the need to run BOTH compensated and uncompensated tests.

Both the current temperature and its associated table value can be displayed. If adjustment is necessary for the net volume, the temperature is adjusted up or down to obtain the table value necessary for the next test to be accurate.

It can occur that when an accurate test is obtained, the displayed temperature is not the same as the test thermometer temperature. There can always be small discrepancies since the temperature can vary during the delivery and the displayed temperature is what the product is at after the delivery.

However, if the difference is large the following needs to be considered:
1. The displayed temperature will always correspond to the correct table value.
2. The resulting calculations using that value will also always be correct.
3. The table in the E:Count may not be the same as the one being used for the test.
4. The product being tested is not exactly the same as what the table is intended for.

The fourth item is the most common source of error especially in the case of propane. In the summer months is quite common for refiners to blend in other products with higher or lower coefficients of expansion thus skewing the test.

There is no inherent problem with adjusting the temperature to make the test come out correctly, however if the product changes later on, the system may go out of tolerance. This situation has come up so often that it is necessary to emphasize that the compensator may be working as designed and consideration should be given to other factors affecting the test.

**E:Count Overview (continued)**

Product Codes

    The E:Count is able to handle 99 different produce codes.
Each product code defines:
1. Product identifier (i.e. PROPANE) which is printed on
   the delivery ticket.
2. Calibration factor for the product.
3. Compensator status (on/off) for the product.
4. Assigned compensator table for the product.
5. Preset valve second stage dwell.

The product code must be selected in Delivery Mode before a
delivery is started and also before entering calibration
mode. The product code cannot be changed while in Calibration
Mode. All settings made in any mode are stored associated
with the current product code.

**<u>Minimum Initial E:Count Configuration Settings</u>**

Steps for the end-user to setup an E:Count "out of the box"

1.  Delivery Menu
    a. Driver
    b. Product Code

2.  Setup Mode
    a. Time
    b. Date
    c. Next Sale Number
    d. Truck Number
    e. Stage 1 Shutoff
    f. Stage 2 Dwell

3.  Calibration Menu
    a. Printer (and Copies if using Thermal printer)
    b. Product Code
    c. Temperature Compensation Setting
    d. Meter Ratio
    e. Table Number
    f. Calibration Factor (with Prover)
    g. Serial Number

## Section 5 - MODES

### Delivery Mode

To enter Calibration Mode back out the <**CALIBRATION SCREW>.**
*CALIBRT MODE* will be shown and the E:Count will enter
Calibration Mode.

To enter Program Mode back out the <**PROGRAM SCREW>** and the
E:Count will automatically enter Program Mode.

To Set the **Preset Volume** press <**PRESET>.** *PRESET* will be shown
and allow the Preset Volume to be modified.

To **Begin a Delivery** press <**START/STOP>** and *DELIVR PRINT* will be
shown. The Delivery Ticket Header will print, the E:Count will
reset to **00000.0,** and the Security Valve will open allowing
product to be dispensed.

To enter the Delivery Menu press **<MODE>** and *PRCODE* will be
shown.

Figure 4. E:Count Delivery Process
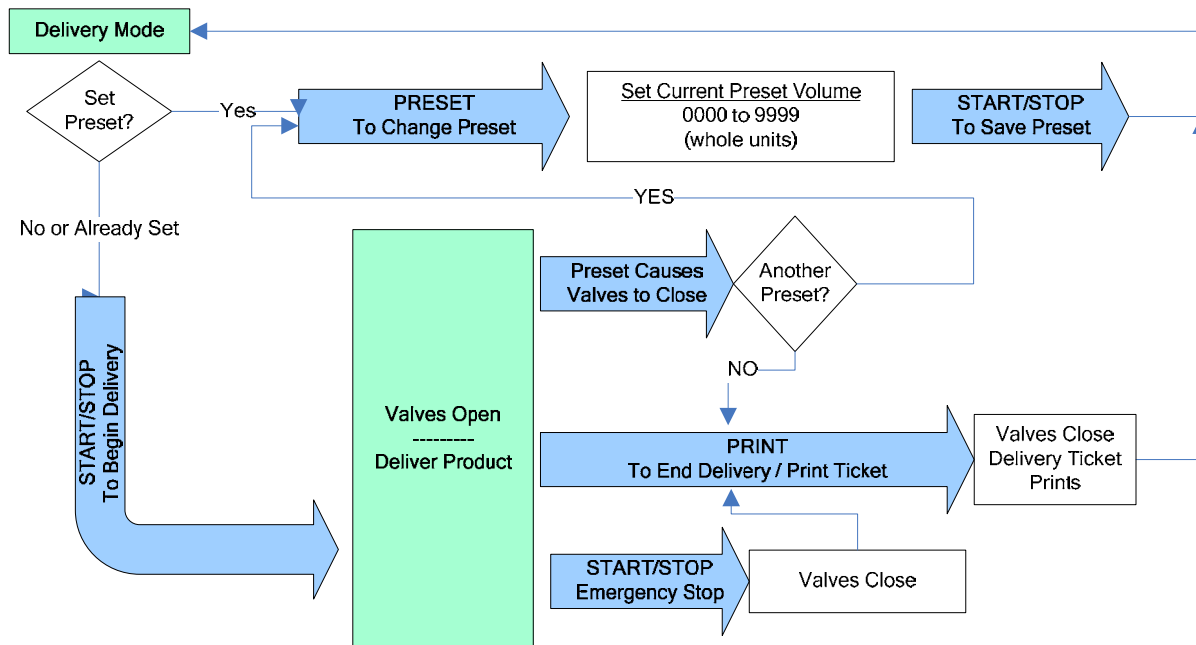
## Delivery Mode (continued)

1. Press **<PRESET>** to enable the **Preset** and set the **Preset Volume**.
   a. Press the **<ARROW>** keys to modify the current **Preset Volume**.
   b. Press the **<START/STOP>** key to save the **Preset Volume** and enable the **Preset** for the next delivery.

2. Press **<START/STOP>** to **Begin a Delivery** and **Open the Security Valve**.
   a. If a ticket is in the printer *DELIVR PRINT* will be displayed, the **Fuel Delivery Ticket Header** will print, and *VALVES OPEN* will be displayed.
   b. The **Security Valve** will open and the display elements will reset (all on followed by all off).
   c. If no ticket is in the printer *INSERT TICKET* will be displayed – **the E:Count will not begin a delivery until a ticket is inserted into the printer.**

3. **Deliver Product.**

4. Press **<PRESET>** to enable another **Preset** and set a **Preset Volume for the next Delivery Segment.**
   a. Press the **<ARROW>** keys to modify the **Preset Volume for the next Delivery Segment** .
   b. Press the **<START/STOP>** key to save the **Preset Volume** and enable the next **Preset Volume for the next Delivery Segment.**

5. Press **<PRINT>** to finalize and end the delivery.
   a. *VALVES CLOSED* will be shown and the **Fuel Delivery Ticket** will print.
   b. The **Delivered Volume** will remain on the display.

 Note: **<START/STOP>** functions as an **<EMERGENCY STOP>** button while product is flowing.  After an **<EMERGENY STOP> t**he **Security Valve** will be closed and the **Fuel Delivery Report** will not print until **<START/STOP>** is pressed **again** to end the delivery.

## Delivery Menu

Delivery Menu Categories
*PRCODE*
*SHIFT*
*DRIVER*
*TOTAL*
*DISVOL*
*CALTKT*
*SETUP*
*EXIT*

When entering the Delivery Menu the E:Count will display the current Delivery Menu Category.

To display the next Delivery Menu Category press **<MODE>**.

To view or modify the Delivery Menu Category press **<START/STOP>**.

To exit the Delivery Menu and return to Delivery Mode press and hold **<MODE>** to display *EXIT*, and then press **<START/STOP>**.

**To enter Setup Mode:**
1. Press and hold **<MODE>** until *SETUP* is displayed in the Delivery Menu
2. Press **<START/STOP>**
   a. The E:Count will display *ENTER CODE*.
3. Enter the **Security Code** and press **<START/STOP>**.
   a. If the **Security Code** is correct *OK* will be displayed and the E:Count will enter Setup Mode.
   b. If the **Security Code** entered is NOT correct *NOGOOD* will be displayed and the E:Count will return to Delivery Mode.

**Note**: The factory default **Security Code** is 000000.

**Delivery Menu (continued)**

Figure 5.  E:Count Delivery Menu
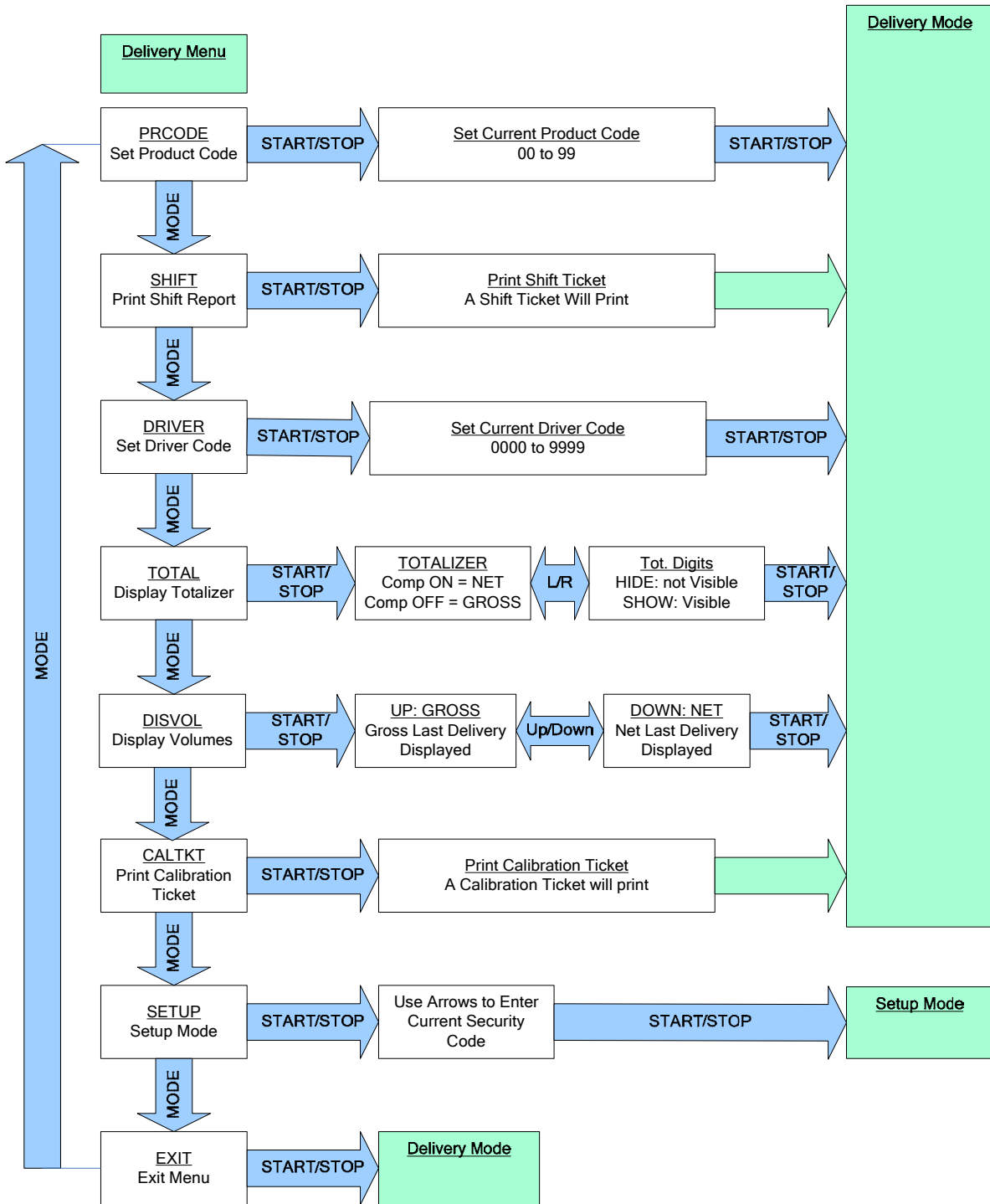
**<u>Delivery Menu (continued)</u>**

<u>Delivery Menu Categories</u>

*PRCODE* – Product Code
Press **<START/STOP>** to set the current **Product Code**.
The **Product Code** is a 2-digit number from 00 to 99.
Use the **<ARROW>** keys to change the **Product Code**.
Press **<START/STOP>** to save the **Product Code** and return to
<u>Delivery Mode</u>.

**Note on Product Code:**
Changing the **Product Code** affects all calibration data.
The **Calibration Factor, Temperature Compensation Setting**
(enabled or disabled), and the **Stage 2 Dwell** are all
stored separately for each **Product Code**.  <u>Changing the</u>
**Product Code** <u>will load the saved value for each of these</u>
<u>variables</u>.

*SHIFT* – Shift Report
Press **<START/STOP>** to print the current **Shift Report**.
The E:Count will display PRINT while printing the **Shift
Report**.
The E:Count will return to <u>Delivery Mode</u> automatically when
**Shift Report** printing is complete.

*DRIVER* – Driver Code
Press **<START/STOP>** to set the current **Driver** code.
The **Driver** code is a 4-digit number from 0000 to 9999.
Use the **<ARROW>** keys to change the **Driver** code.
Press **<START/STOP>** to save the **Driver** code and return to
<u>Delivery Mode</u>.

*TOTAL* – Totalizer
Press **<START/STOP>** to display the Current Totalizer.
The **Net Totalizer** will be displayed if Temperature
Compensation is enabled – OR - the **Gross Totalizer** will be
displayed if temperature compensation is disabled.
The **Totalizer** display requires two screens to show all of
the **Totalizer** data; initially only the right-most 5 digits
and the tenths will be displayed.

To view the left **Totalizer** digits press the **<LEFT ARROW>**.
To view the right **Totalizer** digits press the **<RIGHT ARROW>**.
Press **<START/STOP>** to exit the **Totalizer** and return to
<u>Delivery Mode</u>.

**Delivery Menu (continued)**

*DISVOL* – Volumes
  Press **<START/STOP>** to display the **Gross Volume** or the **Net
  Volume** of the previous delivery.
  Press **<UP>** to display the **Gross Volume**.
  Press **<DOWN>** to display the **Net Volume**.
  Press **<START/STOP>** to return to <u>Delivery Mode</u>.

*CALTKT* – Calibration Report
  Press **<START/STOP>** to print the current **Calibration Report**.
  See the **Sample Tickets** at the end of this reference for a
  sample **Calibration Report**.
  The E:Count will display PRINT while printing the
  **Calibration Report**.
  The E:Count will return to <u>Delivery Mode</u> automatically when
  **Calibration Report** printing is complete.

*SETUP* **–** Enter <u>Setup Mode</u>
  Press **<START/STOP>** to enter <u>Setup Mode</u>.
  *ENTER CODE* and then *000000* will be displayed and the
  **Security Code** must be entered to continue.
  Use the *<ARROW>* buttons to display the **Security Code**.
  Press **<START/STOP>** to enter the **Security Code** and continue
  in <u>Setup Mode</u>.
  If the **Security Code** entered is correct the E:Count will
  display *OK* and begin <u>Setup Mode</u>.
  If the Security Code entered is incorrect the E:Count will
  display *NOGOOD* and return to <u>Delivery Mode</u>.

*EXIT* – Exit Delivery Menu
  Press **<START/STOP>** to exit the <u>Delivery Menu</u> and return to
  <u>Delivery Mode</u>.

**Setup Mode**

Setup Categories:
- *NEWCOD*
- *STAGE1*
- *STAGE2*
- *TIME*
- *DATE*
- *SALE*
- *TRUCK*
- *EXIT*

When entering Setup Mode the E:Count will require the operator to enter the **Security Code** to continue.  After a valid Security Code is entered the E:Count will display the first Setup Category.
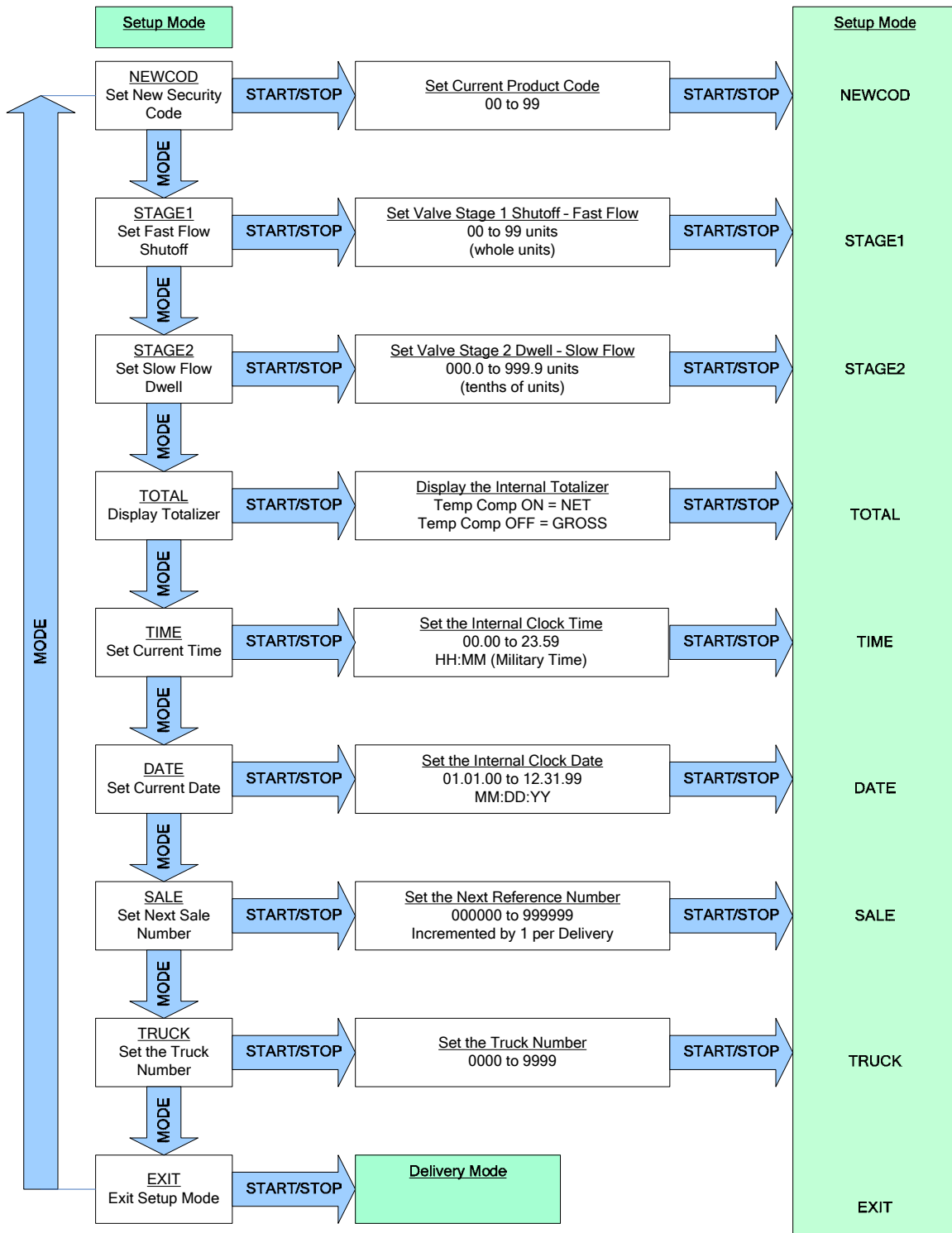
To display the next Setup Category press **<MODE>**.

To view or modify the Setup Category press **<START/STOP>**.

To exit Setup Mode and return to Delivery Mode press and hold **<MODE>** until the E:Count displays *EXIT* and then press **<START/STOP>**.

**Setup Mode (continued)**

Figure 6.   E:Count Setup Mode

| Setup Mode | | | Setup Mode |
|---|---|---|---|
| NEWCOD<br>Set New Security Code | START/STOP → | Set Current Product Code<br>00 to 99 | START/STOP → | NEWCOD |
| ↓ MODE | | | |
| STAGE1<br>Set Fast Flow Shutoff | START/STOP → | Set Valve Stage 1 Shutoff - Fast Flow<br>00 to 99 units<br>(whole units) | START/STOP → | STAGE1 |
| ↓ MODE | | | |
| STAGE2<br>Set Slow Flow Dwell | START/STOP → | Set Valve Stage 2 Dwell - Slow Flow<br>000.0 to 999.9 units<br>(tenths of units) | START/STOP → | STAGE2 |
| ↓ MODE | | | |
| TOTAL<br>Display Totalizer | START/STOP → | Display the Internal Totalizer<br>Temp Comp ON = NET<br>Temp Comp OFF = GROSS | START/STOP → | TOTAL |
| ↓ MODE | | | |
| TIME<br>Set Current Time | START/STOP → | Set the Internal Clock Time<br>00.00 to 23.59<br>HH:MM (Military Time) | START/STOP → | TIME |
| ↓ MODE | | | |
| DATE<br>Set Current Date | START/STOP → | Set the Internal Clock Date<br>01.01.00 to 12.31.99<br>MM:DD:YY | START/STOP → | DATE |
| ↓ MODE | | | |
| SALE<br>Set Next Sale Number | START/STOP → | Set the Next Reference Number<br>000000 to 999999<br>Incremented by 1 per Delivery | START/STOP → | SALE |
| ↓ MODE | | | |
| TRUCK<br>Set the Truck Number | START/STOP → | Set the Truck Number<br>0000 to 9999 | START/STOP → | TRUCK |
| ↓ MODE | | | |
| EXIT<br>Exit Setup Mode | START/STOP → | Delivery Mode | | EXIT |

Setup Categories

*NEWCOD* – Set Security Code
  Press **<START/STOP>** to set the **Security Code.**
  The **Security Code** is 6 digits from 000000 to 999999.
  Use the **<ARROW>** keys to change the **Security Code.**
  Press **<START/STOP>** to save the **Security Code** and return to
  Setup Mode.

*STAGE1* – Stage 1 (Fast Flow) Shutoff Volume
  Press **<START/STOP>** to set the **Stage 1 Shutoff** Volume.
  The **Stage 1 Shutoff** Volume is a whole number from 00 to 99.
  Use the **<ARROW>** keys to change the **Stage 1 Shutoff.**
  Press **<START/STOP>** to save the **Stage 1 Shutoff** and return
  to Setup Mode.

*STAGE2* – Stage 2 (Slow Flow) Dwell Volume
  Press **<START/STOP>** to set the **Stage 2 Dwell** Volume.
  The **Stage 2 Dwell** Volume is tenths of units from 000.0 to
  999.9.
  Use the **<ARROW>** keys to change the **Stage 2 Dwell.**
  Press **<START/STOP>** to save the **Stage 2 Dwell** and return to
  Setup Mode.

*TIME* – System Time
  Press **<START/STOP>** to set the current **System Time.**
  The **Time** will be displayed in 24 hour format HH.MM.
  Use the **<ARROW>** keys to set the **System Time.**
  Press **<START/STOP>** to save the **System Time** and return to
  Setup Mode.

*DATE* – System Date
  Press **<START/STOP>** to set the current **System Date.**
  The **Date** will be displayed in the format MM.DD.YY.
  Use the **<ARROW>** keys to set the **System Date.**
  Press **<START/STOP>** to save the **System Date** and return to
  Setup Mode.

*SALE* – Next Sequential Sale Number
  Press **<START/STOP>** to set the **Next Sequential Sale Number.**
  The **Next Sequential Sale Number** will be displayed.
  Use the **<ARROW>** keys to set the **Next Sequential Sale
  Number.**
  Press **<START/STOP>** to save the **Next Sequential Sale Number**
  and return to Setup Mode.

**Setup Mode (continued)**

    *TRUCK*  – Truck Number
      Press **&lt;START/STOP&gt;** to set the **Truck Number**.
      The **Truck Number** will be displayed.
      Use the **&lt;ARROW&gt;** keys to set the **Truck Number**.
      Press **&lt;START/STOP&gt;** to save the **Truck Number** and return to
      Setup Mode.

    *EXIT*   – Exit Setup Mode
      Press **&lt;START/STOP&gt;** to exit Setup Mode and return to
      Delivery Mode.

## Calibration Mode

To enter Calibration Mode in Delivery Mode back out the
<**CALIBRATION SCREW**> – the E:Count will display *CALIBRT MODE* and
enter Calibration Mode.

If the **Compensator** is turned **ON**, the VOLUME CORRECTED TO legend
will display and the **Net Volume** will be displayed. If the
**Compensator** is turned **OFF**, the VOLUME CORRECTED TO legend will
**NOT** display and the **Gross Volume** will be displayed.

If *SETUP* is visible <**MODE**> may be pressed to access the
Calibration Menu.

**Security Valve Note**: The security valve will be open while the
E:Count is in Calibration Mode allowing the operator to
directly control product flow.

**Delivery Ticket Note**: No delivery tickets will print while the
E:Count is in Calibration Mode.  At the completion of
Calibration Mode (after the tightening of the <**CALIBRATION
SCREW**>) the E:Count will print a **CALIBRATION REPORT**.

To exit Calibration Mode tighten the <**CALIBRATION SCREW**>.
*PRINT* will be displayed, the E:Count will print a CALIBRATION
REPORT, and return to Delivery Mode.

**Printer Copies Note**: Only the **THERMAL** printer allows the
selection of the number of copies, all other printer types
print only 1 copy per delivery.

**Note on Calibration Data**:
  Set the **Product Code** before changing any calibration data.
  The **Calibration Factor, Compensation Setting** (enabled or
  disabled), and the **Stage 2 Dwell** are all stored separately
  for each **Product Code**.  Changing the **Product Code** will load
  the saved value for each of these variables.

## Calibration Mode (continued)

Figure 7.  E:Count Calibration Process
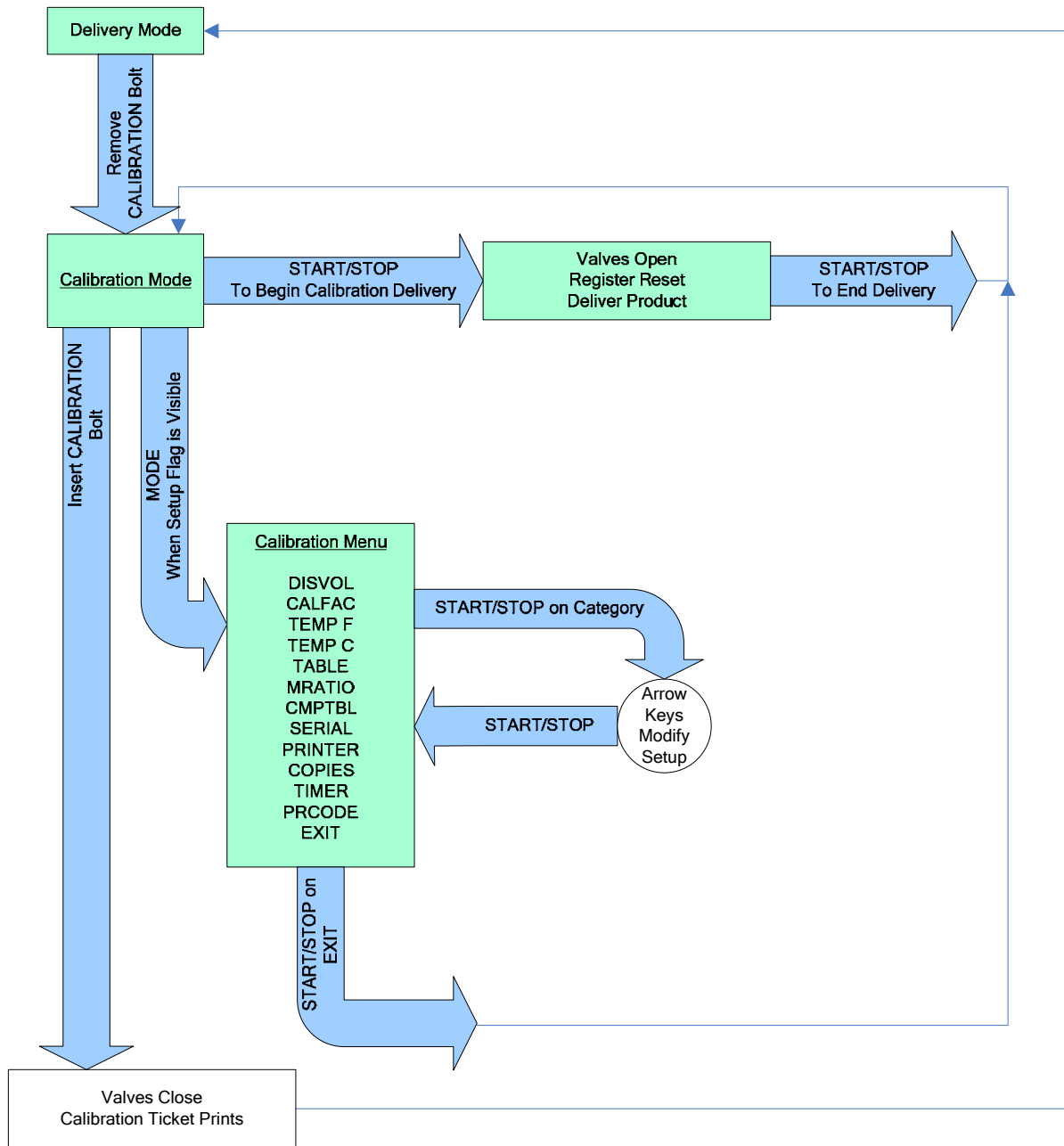
**Calibration Menu**

Calibration Menu Categories:
*DISVOL*
*CALFAC*
*TEMP F*
*TEMP C*
*TABLE*
*MRATIO*
*CMPTBL*
*SERIAL*
*PRINTR*
*COPIES*
*TIMER*
*PRCODE*
*EXIT*


When entering the Calibration Menu the E:Count will display the current Calibration Menu Category.
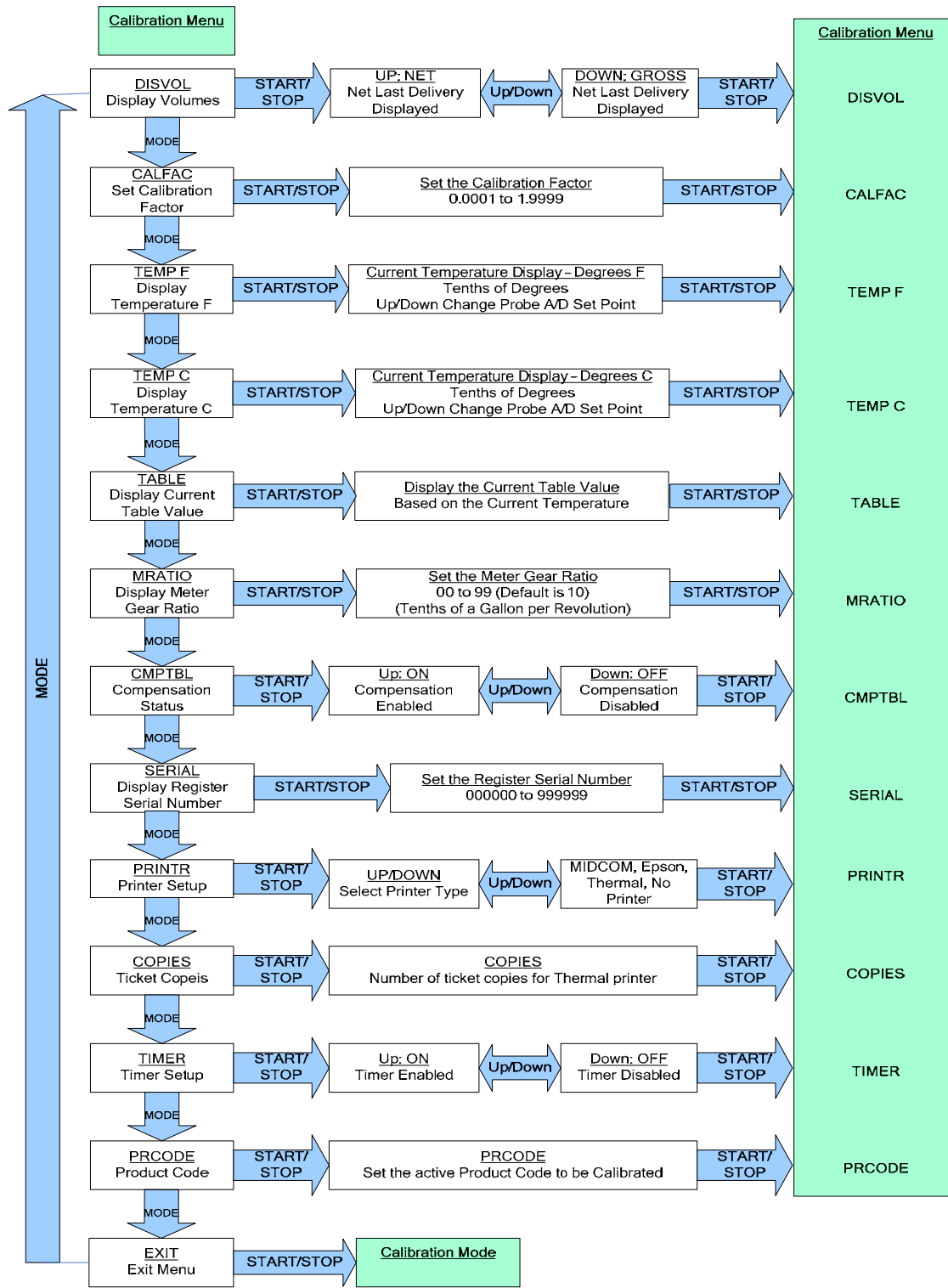
To display the next Calibration Menu Category press **<MODE>.**

To view or modify the visible Calibration Menu Category press **<START/STOP>.**

To exit the Calibration Menu and return to Calibration Mode press and hold **<MODE>** until the E:Count displays *EXIT* and then press **<START/STOP>.**

## Calibration Menu (continued)

Figure 8.  E:Count Calibration Menu

**Calibration Menu (continued)**

Calibration Menu Categories

*PRCODE* – Product Code
  Press **<START/STOP>** to set the current **Product Code**.
  The **Product Code** is a 2-digit number from 00 to 99.
  Use the **<ARROW>** keys to change the **Product Code**.
  Press **<START/STOP>** to save the **Product Code** and return to
  the Calibration Menu.

  **Note on Product Code**:
    Changing the **Product Code** affects all calibration data.
    The **Calibration Factor, Temperature Compensation Setting**
    (enabled or disabled), and the **Stage 2 Dwell** are all
    stored separately for each **Product Code**.  Changing the
    **Product Code** will load the saved value for each of these
    variables.

*DISVOL* – Volumes
  Press **<START/STOP>** to display the **Gross Volume** or the **Net
  Volume** of the previous delivery.
  The **Gross Volume** of the previous delivery will be displayed
  first.
  Press **<UP>** to display the **Gross Volume**.
  Press **<DOWN>** to display the **Net Volume**.
  Press **<START/STOP>** to return to the Calibration Menu.

*CALFAC* – Calibration Factor
  Press **<START/STOP>** to set the **Calibration Factor**.
  The **Calibration Factor** is a number from 0.0000 to 1.9999.
  Use the **<ARROW>** keys to change the **Calibration Factor**.
  Press **<START/STOP>** to save the **Calibration Factor** and
  return to the Calibration Menu.

  Note:                   {  Prover Volume  }
           New Factor = {----------------- } * Old Factor
                         { Register Volume  }

*TEMP F* – Temperature in Degrees Fahrenheit
  Press **<START/STOP>** to display the **Current Temperature**.
  The current Temperature in Degrees Fahrenheit will be
  displayed (if the temperature probe is installed).
  Press **<UP>** or **<DOWN>** to change the probe temperature.
  Press **<START/STOP>** to save the temperature and return to
  the Calibration Menu.

## Calibration Menu (continued)

*TEMP C* – Temperature in Degrees Celsius
 Press **<START/STOP>** to display the **Current Temperature.**
 The current **Temperature in Degrees Celsius** will be
 displayed (if the temperature probe is installed).
 Press **<UP>** or **<DOWN>** to change the probe temperature.
 Press **<START/STOP>** to save the temperature and return to
 the Calibration Menu.

*TABLE* – Table Value at Current Temperature
 Press **<START/STOP>** to display the current value in the
 compensation table based on the current temperature.
 Press **<START/STOP>** to return to the Calibration Menu.

*MRATIO* – Meter Ratio
 Press **<START/STOP>** to enter the **Meter Ratio.**
 Use the *<ARROW>* buttons to set the **Meter Ratio.**
 Press **<START/STOP>** to save the **Meter Ratio** and return to
 the Calibration Menu.

 Note: Contact the MID:COM factory or your distributor for
 more information about meter ratios and suggested values.

*CMPTBL* – Temperature Compensation Status
 Press **<START/STOP>** to display the **Temperature Compensation
 Status.**
 Press the <UP ARROW> to set **Temperature Compensation ON.**
 Press the <DOWN ARROW> to set **Temperature Compensation OFF.**
 Press **<START/STOP>** to save the **Temperature Compensation
 Status** and return to the Calibration Menu.

*SERIAL* – E:Count Serial Number
 Press **<START/STOP>** to set the **E:Count Serial Number.**
 The current **E:Count Serial Number** will be displayed.
 This is intended to allow a circuit board in the E:Count to
 be replaced and set the **E:Count Serial Number** to match the
 Faceplate of the E:Count.
 Use the *<ARROW>* buttons to set the **E:Count Serial Number.**
 Press **<START/STOP>** to save the **E:Count Serial Number** and
 return to the Calibration Menu.

**Calibration Menu (continued)**

*PRINTR* – Printer Setup
  Press **<START/STOP>** to display the **Printer Type**.
  Press the <DOWN ARROW> to cycle through the **Printer Types:**
    MIDCOM
    EPSON
    THERMAL
    NO PRINTER
  Press **<START/STOP>** to save the **Printer Type** and return to
  the Calibration Menu.

*COPIES –* Thermal Printer Ticket Copies
  Press **<START/STOP>** to display the **Number of Thermal Copies.**
  Press the <UP ARROW> to increase the number **Copies.**
  Press the <DOWN ARROW> to decrease the number of **Copies.**
  Press **<START/STOP>** to save the **Number of Thermal Copies** and
  return to the Calibration Menu.

*TIMER* – Timer Setup
  Press **<START/STOP>** to display the **Timer Status.**
  Press the <UP ARROW> to set the **Timer ON.**
  Press the <DOWN ARROW> to set **Timer OFF.**
  Press **<START/STOP>** to save the **Timer Status** and return to
  the Calibration Menu.

*EXIT* – Exit Calibration Menu
  Press **<START/STOP>** to exit the Calibration Menu and return
  to Calibration Mode.

## Program Mode

To enter Program Mode in Delivery Mode back out the <**PROGRAM SCREW>** – the E:Count display will not change however the E:Count will be in Program Mode.

Proceed as directed by MID:COM personnel to complete E:Count programming.

To exit Program Mode (after programming is complete) tighten the **<PROGRAM SCREW>** - the E:Count will reset and will be in Delivery Mode.

Figure 9.  E:Count Program Mode
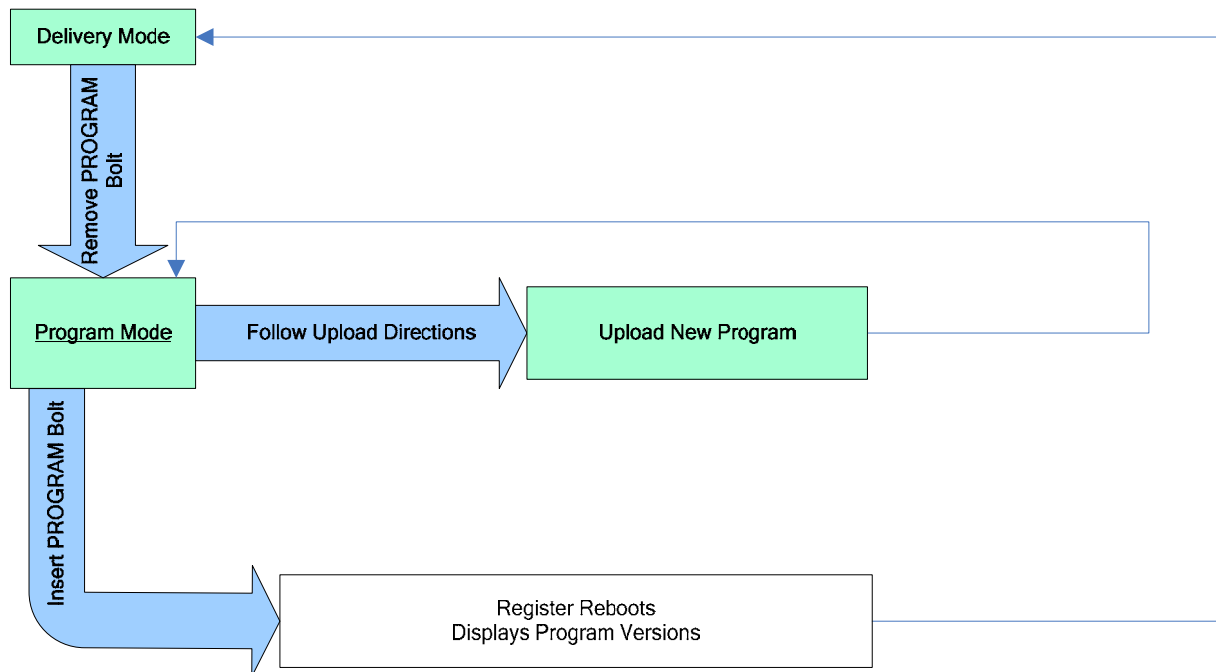
**Power-Up**

On Power-up the E:Count will:
1. Perform a set of diagnostic tests
2. Display the User Software Version:           U        ##
3. Display the Metrological Software Version:  M        ##
4. Reset all display elements
5. Enter Delivery Mode and display the previous quantity.

Figure 10.  E:Count Fuel Delivery Tickets



```
         INSERT FACE UP                        INSERT FACE UP

  MIDWEST COMPUTER REGISTER CORP - HAMPTON, IOWA 50441    MIDWEST COMPUTER REGISTER CORP - HAMPTON, IOWA 50441


  MID:COM E:Count                         MID:COM E:Count

   FUEL DELIVERY TICKET                      FUEL DELIVERY TICKET

  TRUCK# 0001  DRIVER# 0001                TRUCK# 0001  DRIVER# 0001
  DATE 03/15/06 STIME 12:59                DATE 03/15/06 STIME 12:57
  DATE 03/15/06 FTIME 13:00                DATE 03/15/06 FTIME 12:59

  SALE# 000005                             SALE# 000004

  GALLONS START      0.0                   GALLONS START      0.0
  GALLONS FINISH   00042.1                 GALLONS FINISH   00047.1

  PRODUCT # 01                             PRODUCT # 01
  PRODUCT PROPANE                          PRODUCT PROPANE

  VOLUME COMPENSATED TO 60F                VOLUME COMPENSATED TO 60F
  COMP. TABLE # 01                         COMP. TABLE # 01

  TOTALIZER      0000129.2                 TOTALIZER      000008T.1
  METER # 000000                           METER # 000000



  FORM MID COM SPECIAL                     FORM MID COM SPECIAL
```

Figure 11.  E:Count Shift Report and Calibration Report



MID:COM E:Count

SHIFT REPORT

TRUCK# 0001   DRIVER# 0001
DATE 03/14/06 STIME 15:32
DATE 03/15/06 FTIME 13:01

TOTALIZER        0000129.2
METER  # 000000
PROD 01 NET      0000129.2
PROD 01 GROSS    0000131.5

END SHIFT REPORT

MID:COM E:Count

CALIBRATION REPORT

TRUCK# 0001   DRIVER# 0001
DATE 03/15/06 STIME 12:59
TOTALIZER        0000129.2

USER SOFTWARE VER. VE103A
METROLOGICAL   VER. M0010A
METER  # 000000

ADJUSTMENT EVENT # 000002
CONFIGURE  EVENT # 000002

PRODUCT # 01
PRODUCT PROPANE
METER RATIO    10
CALIBRATION FACTOR 1.0000
COMPENSATOR STATUS    ON
COMP. TABLE # 01
VOLUME COMPENSATED TO 60F

------------------------------
INSPECTOR

## Section 7 – Appendices

### Appendix A – E:Count to Mid:Com 8000 Interface

#### Theory of Operation

The MID:COM 8000 is the ultimate, rugged, easy to use cab mounted computer, printer, and data transfer system.  Using the SD Data Card the driver has access to 50,000 complete customer records.  An easy-to-follow menu guides the driver through the delivery process.  The most popular software providers offer a MID:COM SD Card interface that provides automatic posting from the SD Card to your accounts receivable accounting package.

The MID:COM 8000 Cab-Mounted Computer has a seamless interface with the MID:COM E:Count Electronic Register. The combination of these systems allows fuel distributors to utilize the most cost-effective, flexible, efficient, secure, and reliable vehicle-based electronic registration system on the market today.

#### Return on Investment

Electronic Temperature Compensation:
* Reduces shrinkage by 1%
* Increases driver efficiency by 10% to 15%
* Reduces meter maintenance by 50%
* Eliminates handwritten tickets and ticket notation errors
* Reduces ticket posting time and eliminates posting errors
* Eliminates postage costs

#### Valve Options

**When the MID:COM E:Count Electronic Register is connected to a MID:COM 8000 Electronic Computer either the E:Count or the 8000 can control the security valves.**

**The Calibration must be performed on the MID:COM E:Count regardless of the Valve Control Setting.**

<u>MID:COM 8000 controls the valves:</u>
1. The Preset Gallons and Preset Dollars fields from the SD Card fields allow the 8000 to control the Preset.
2. The 8000 will automatically shut the valves when the necessary quantity (based on dollars or gallons) has been reached.
3. The driver may enter the Preset Gallons or Preset Dollars on the 8000 directly.
4. Once the Preset has been reached there is no way to continue the current delivery or enter a new preset – a new delivery (meaning a new ticket) must be started.
5. Operation – the Operator may:
    a. Set the Preset Amount on the 8000 using the 'Preset' option or the 'Preset' amount from the SD-Card.
    b. Begin and End the delivery process on the 8000 using the **<DOWN>** and **<START/STOP>** buttons respectively
    c. End the delivery and print the delivery ticket by pressing **<PRINT>** on the E:Count in 'Remote Print' applications.

<u>MID:COM E:Count controls the valves:</u>
1. The driver manually enters the Preset Quantity on the E:Count.
2. The E:Count will automatically shut the valves when the Preset Quantity has been reached.
3. If necessary the driver has the ability to restart the delivery after the Preset has been reached and continue the current delivery.
4. If necessary the driver has the ability to enter a new Preset Quantity and continue the delivery to the new Preset Quantity.  In addition the driver may repeat this process as many times as necessary.
5. Operation – the Operator may:
    a. Set the Preset Amount on the E:Count using the **<PRESET>** button.
    b. Begin and End the delivery process on the E:Count using the **<START/STOP>** and **<PRINT>** buttons respectively
    c. End the delivery and print the delivery ticket by pressing **any button** on the 8000.
    d. Compute and add a discount by pressing **<DISC>** on the 8000.

**E:Count Menu Changes**

    1. Delivery Menu
        a. Valve Controlled by E:Count
            i. <u>No Ticket in the 8000</u>
                1. TOTAL
                NOTE: The Totalizer is the only option available when the E:Count is controlling the Valves and there is no ticket in the printer.
           ii. <u>Ticket in the 8000</u>
                1. PRCODE
                2. DISVOL
                3. SETUP
                4. EXIT

        b. Valve controlled by 8000
            i. No menu available – all E:Count buttons disabled

    2. Setup Menu
        a. Valve Controlled by E:Count (NOTE: The Setup Menu is available in the Delivery Menu only when a ticket is in the 8000)
            i. NEWCOD
           ii. STAGE1
         iii. STAGE2
          iv. TIME
           v. DATE
          vi. EXIT

        b. Valve controlled by 8000
            i. No menu available – all E:Count buttons disabled

**E:Count Menu Changes (continued)**

    3. Calibration Menu
        a. Valve Controlled by E:Count **or** 8000
            i.   PRCODE
           ii.   DISVOL
          iii.   CALFAC
           iv.   TEMP F
            v.   TEMP C
           vi.   TABLE
          vii.   MRATIO
         viii.   CMPTBL
           ix.   SERIAL
            x.   TIMER
          **xi.   V CTRL**
               1. **Available only with the E:Count 8000 Interface**
               2. Select the "Valve Control" setting
                   a. E:Count: The E:Count controls the security valves as explained above.
                   b. 8000: The 8000 controls the security valves as explained above.
          xii. EXIT

Figure 12.  E:Count Operation – E:Count Controlling Valves
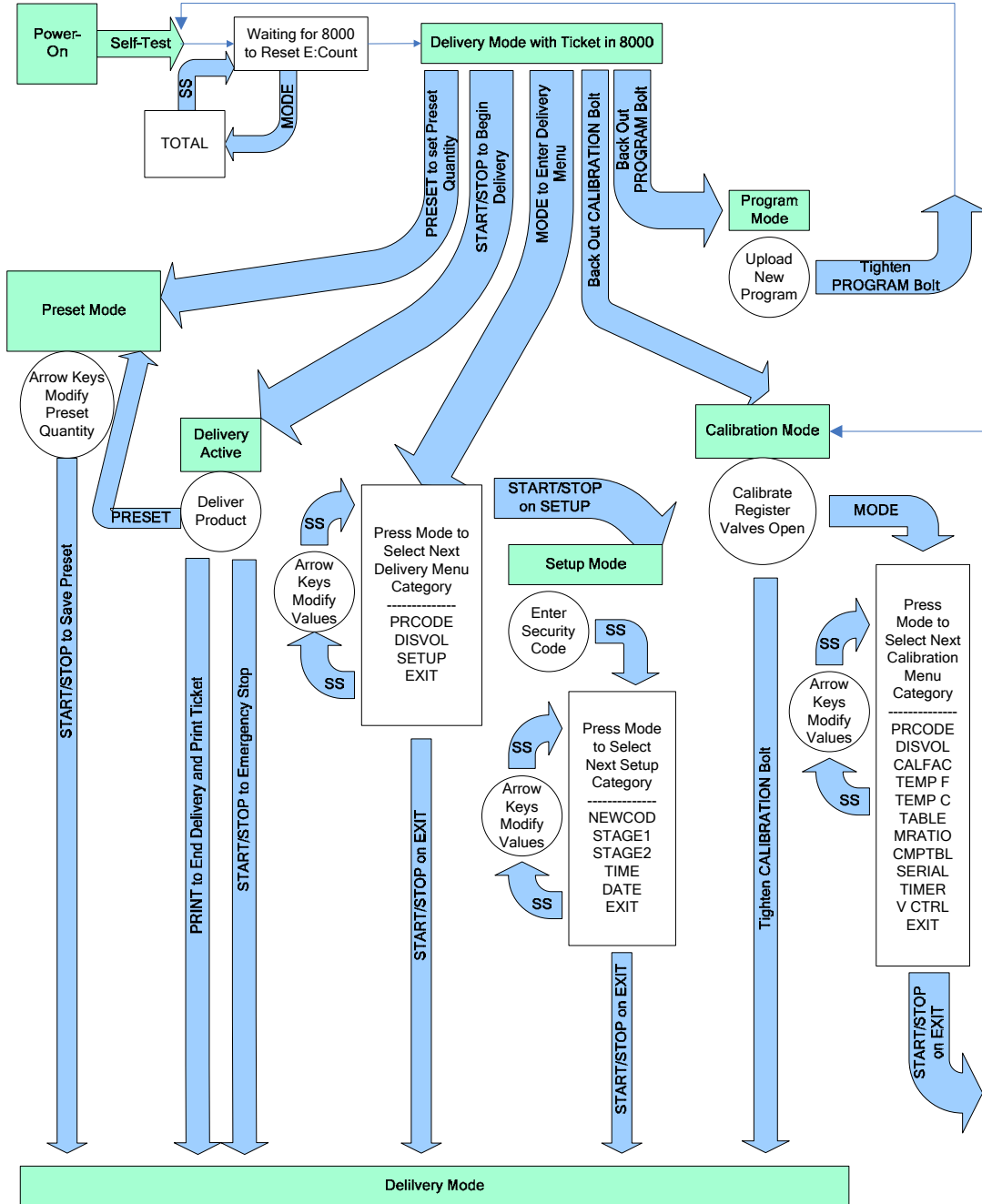
Figure 13.  E:Count Operation – 8000 Controlling Valves

# INDEX

## VERSION HISTORY

| Version | Date | Author | Description |
|---------|----------|--------|-------------|
| 1.01 | 09-27-05 | BJS | Document created |
| 1.02 | 02-28-06 | BJS | Updated menus |
| 1.03 | 03-06-06 | BJS | Updated menus |
| 1.04 | 03-15-06 | BJS | Updated descriptions, added images |
| 1.05 | 03-16-06 | BJS | Added E:Count to 8000 Interface |
| 1.06 | 03-20-06 | BJS | Updated Images |
| | | | |
| | | | |
| | | | |