CB-1

Automated Concrete Batch Controller

Installation/Operation Manual

RICE LAKE WEIGHING SYSTEMS
Industrial Solutions on a Global Scale®

ISO 9001 REGISTERED

45045
REV 1.11

Contents

About This Manual

This manual provides reference information to install and configure the CB-1 Concrete Batch Controller.

Note: All information regarding the CB-1 manual references the redi-mix application. If you have the concrete block plant feature enabled, refer to Chapter 10 for additional information regarding that feature.

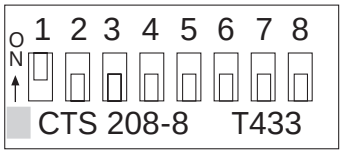
All touchscreen and front panel buttons appear in **bold text**. All words from the touchscreen appear in SMALL CAPS.

1.0 Introduction

Congratulations on purchasing the most advanced and configurable embedded concrete batch controller in its market today! The CB-1 is powerful yet simple to use. However, we ask you please read this manual completely before getting started.

2.0 DIP Switch Settings

The DIP switch bank on the CPU board includes 8 DIP switches (see graphic below). All are normally in the OFF position. You need only to be concerned with switches 1, 2 and 3.



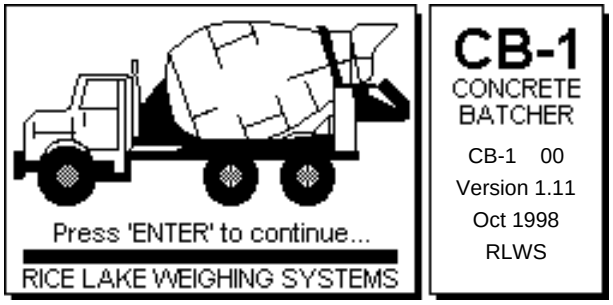
DIP Switch Numbering

2.1 DIP Switch 1—Initialize Variables

Caution **Powering up the controller with DIP switch 1 ON will initialize all system variables to their default settings. All data (mix designs, ingredient names, passcodes, etc.) will be lost and have to be reentered.**

Under normal circumstances this feature should only be used once on initial power up. The system is shipped from the factory with DIP switch 1 in the ON position. Upon start up with switch 1 ON, the touchscreen displays: "Please wait for initialization..." in the message window of the start-up screen.

After the CB-1 initializes all variables, the screen prompts: "Move Switch 1 to OFF position." Move DIP switch 1 back to the OFF position. The screen then displays the current revision information.



From this point forward, all information entered via keypad or touchscreen, including learned values, are stored in battery backed memory. In the event of a battery failure, data would be lost if the system looses external power. Therefore, we recommend downloading the system configuration to a PC using the optional PC software once the system is configured and tuned to your satisfaction. At a minimum, the system configuration should be printed and stored in a safe place. See Reports menu, selection #3, "Print Configuration."

2.2 DIP Switch 2—Reset Passcodes

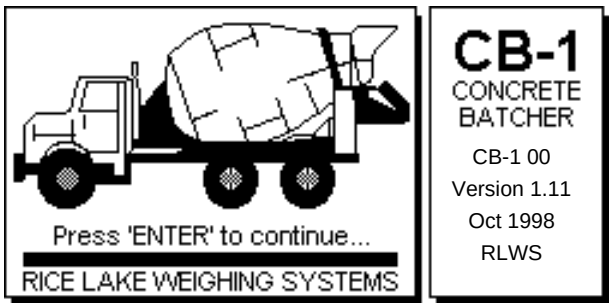
Powering up the controller with DIP switch 2 ON will initialize the passcodes to their default settings. The default setting for the supervisor and operator passcodes are 0 (zero). This DIP switch might be used in the event a passcode was forgotten. The CB-1 doesn't ask the user to verify a passcode if it set to zero. Setting (or leaving) a passcode to zero, effectively disables passcode protection. Therefore, we strongly recommend changing the supervisor and operator passcodes to a non-zero number.

2.3 DIP Switch 3— International System of Units (metric)

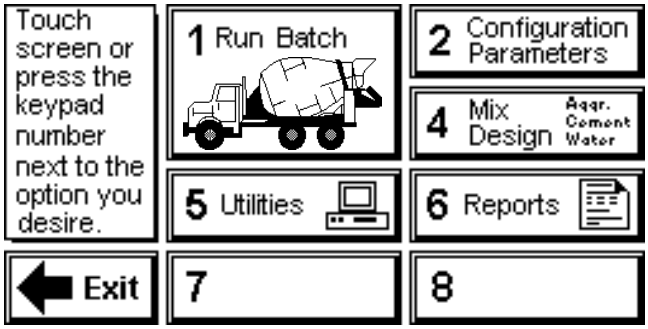
Powering up the controller with DIP switch 3 ON will set the primary units to kilograms, liters, and cubic meters instead of pounds, gallons, and cubic yards. This DIP switch should probably be used everywhere outside of the U.S. It is not necessary to set DIP switch 3 to ON for an occasional metric use since the units may be specified per mix design. This manual and examples within are assuming U.S. Units (DIP switch 3 OFF). If your primary units are metric, and you have moved DIP switch 3 to the ON position, you can expect to see all prompts that refer to weight or volume, to refer to kilograms, liters, and cubic meters.

3.0 Main Menu

Once the DIP switches have been checked (after power up) the CB-1 displays a "Start-up" screen (below) that displays version information and a redi-mix concrete truck, or concrete blocks for the block version software.



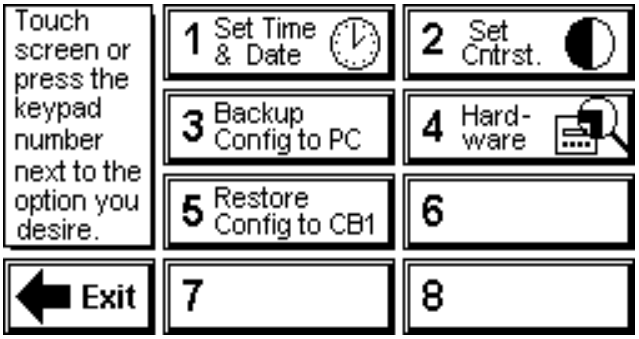
The barrel of the truck should appear to be turning. This indicates that the processor and user-interface are running and communicating. Press ENTER on the front panel keypad or touch the screen to continue on to the Main menu (shown below).



Touch the screen or press the desired number key on the front panel keypad (1-7) to enter a Main menu selection.

4.0 Utilities

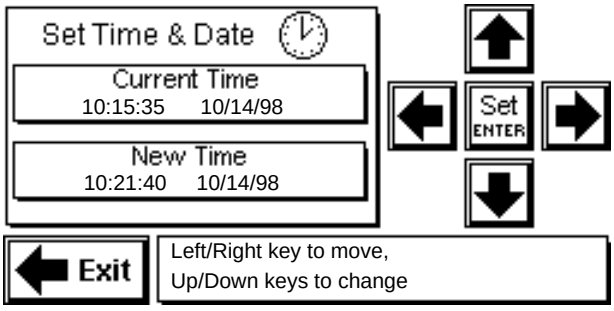
The utilities menu (shown below), is a place for useful functions not directly relating to batching concrete.



4.1 Set Time & Date

The CB-1 should have the current time and date already in place. You can edit the time and date by using the SET TIME & DATE mode.

Press **Set Time & Date** or the 4 key on the front panel to access the SET TIME & DATE screen.



Use the following procedure to edit the NEW TIME value and display the current time (24-hour format) and date.

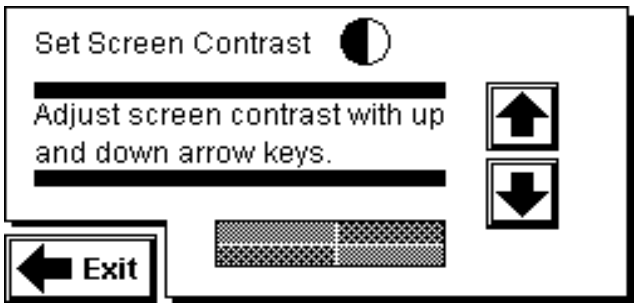
1. Press the left/right arrows to move the cursor to select the digit in the NEW TIME box.
2. Press the up/down arrows to change the value of the selected digit.
3. Press **Set-Enter** when you new time and date values are correct. TIME AND DATE SET appears in the bottom right message box.

Note: You must press **Set-Enter** after you enter the new time and date or the system does not save the value.

4. Press **Exit** to return to the Main menu.

4.2 Set Screen Contrast

Use the Set Screen Contrast mode to lighten or darken the touchscreen display. Press **Set Cntrst** or the **6** key to access the SET SCREEN CONTRAST screen.



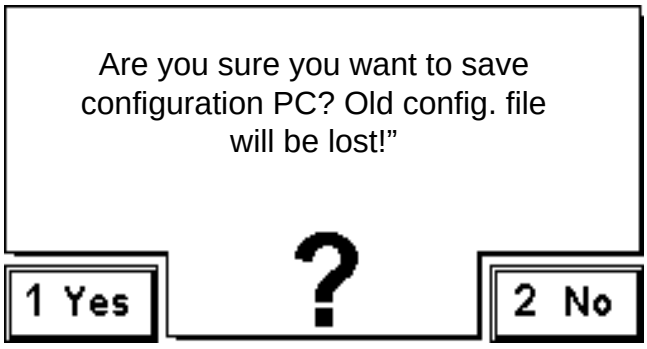
Press the up arrow to lighten the screen. Press the down arrow to darken the screen. **Note:** Pressing the up or down arrow too many times makes the screen unreadable. If the screen is ever unreadable (either all bulie or all white) try repowering they system. Every time the CB-1 is re-started the contrast is automatically adjusted.

Press **Exit** to return to the Main menu.

4.3 Backup Configuration File to PC

Note: You need the optional PC software to use this feature.

After selecting this option, you will be asked "Are you sure you want to save configuration to PC? Old config. file will be lost!"

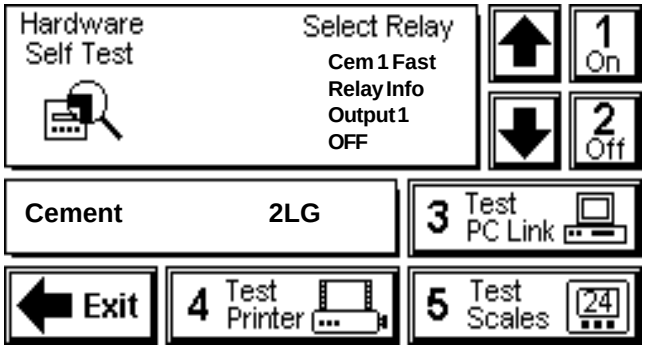


Select "Yes" if this is what you wish to do. If you selected "No", no action would be taken. However, if you selected "Yes" then a message box would appear and inform you of the progress of the data upload or any errors that might have occured. Be patient. This may take up to 5 minutes due to extensive data checking.

4.4 Hardware Test

The CB-1 provides a self test mode which allows you to test the functionality of individual components.

Press **Hardware** from the Main menu to access the HARDWARE SELF TEST screen.



4.4.1 Relay Test

Warning **The relay test energizes the selected relay, activating any field equipment connected. Take precautions to avoid personal injury and product loss or contamination.**

Use the following procedure to test system relays.

1. Press the up/down arrows to select a relay to test.
2. Press **On** or the **1** key to energize the relay. Press the **Off** or the **2** key to deenergize the relay.

   Note: The CB-1 only monitors the status (On or Off) of the input relays.

   If there is a problem with the relay test, check the relay fuse and/or relay connection.

4. Press **Exit** to return to the Main menu.

4.4.2 Test Indicator

Use the following procedure to test the Cement and Aggregate scale (and Water scale if equiped with the Weighed Water Option).

1. Press **Test Scales** to display the current weight on

the Cement scale.

2. Press **Test Scales** again to display the current weight on the water (if so equipped) scale.

   Note: If the scale weight does not appear, check that the baud rate and parity settings match. Also check the indicator wiring.

3. Press **Exit** to return to the Main menu.

4.4.3 Test Printer

Press **Test Printer** to send the following test string to the printer.

TESTING PRINTER 1.....

WEDNESDAY, JUNE 17, 1998

1234567890

ABCDEFGHIJKLMNOPQRSTUVWXYZ

If the test string doesn't print, check that the baud rate and parity settings match and/or check the printer wiring.

Note: The batch ticket requires an 80 column printer.

Press **Exit** to return to the Main menu.

4.4.4 Test PC Link (For PC Option)

For the standard CB-1 system, there is no PC connection. When you press **Test PC Link**, the screen display NO DEVICE SETUP!

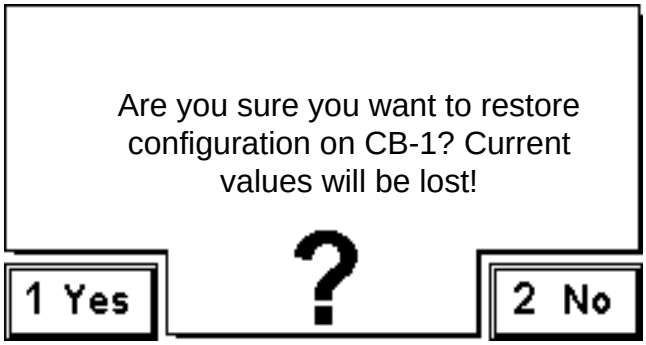
If you have purchased the optional PC software, use TEST PC LINK to test your computer connection.

When you press **Test PC Link**, the CB-1 sends a "PING" to the PC and waits for a response. The CB-1 displays "SENDING PING TO PC" If the ping test was successful, the CB-1 displays "PC COMMUNICATING". If the test was not successful, the CB-1 displays "PC NOT RESPONDING".

4.5 Restore Configuration File to CB-1

Note: You need the optional PC software to use this feature.

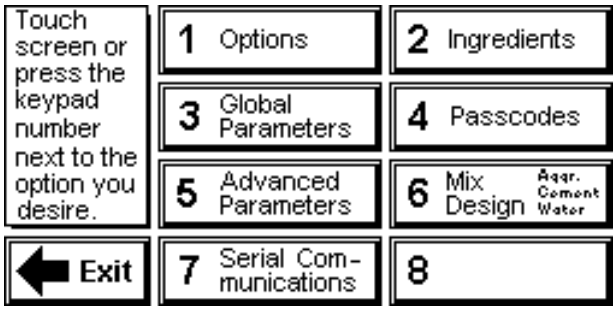
After selecting this option, you will be asked, "Are you sure you want to restore configuration on CB-1? Current values will be lost!"



Select "Yes" if this is what you wish to do. If you selected "No", no action would be taken. However, if you selected "Yes", then a message box would appear and inform you of the progress of the data download or any errors that might have occured. Be patient. This may take up to 8 minutes due to extensive data checking.

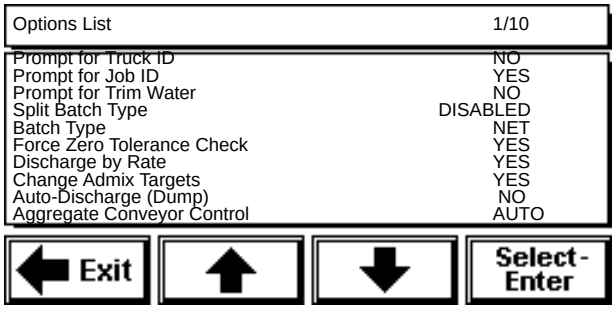
5.0 Configuration Parameters

Use the CONFIGURATION PARAMETERS mode to set values for parameters controlling system operation. Press **Configuration Parameters** or the number **2** key to access the CONFIGURATION PARAMETERS menu.



5.1 Options

The OPTIONS LIST contains several choices to configure the batching routine to suit your operation. The OPTION LIST choices toggle between YES and NO, or a limited number of selections.



5.1.1 Prompt for Truck ID

Use PROMPT FOR TRUCK ID to enable the CB-1 to prompt for a truck ID during the batch preparation.

Select YES to enable the system to prompt for entry of a Truck ID before the batching process. This Truck ID then prints on the batch ticket.

Select NO to bypass the Truck ID prompt and not print a Truck ID on the batch ticket.

5.1.2 Prompt for Job ID

Selecting YES for this option will allow the uses to enter a 20 character alpha-numeric job identifier at the start of each batch. This job ID is then printed on the batch ticket.

5.1.3 Prompt for Adjust Water

Use PROMPT FOR ADJUST WATER to enable the CB-1 to prompt the operator to adjust the water target during the batch preparation.

Select YES to enable the system to allow the user to adjust the water contribution up or down when preparing to start a batch. The actual water addition for the total batch is then adjusted. The amount of water adjusted is printed on the report and a place for the operator to initialize that he/she adjusted the total water for this batch.

If NO is selected, then the operator will not have an opportunity to change the batch water amount.

5.1.4 Split Batch Type

Every concrete plant has a physical maximum that limits the number of cubic yards or meters the system can batch at one time. Likewise, every plant has a minimum number of cubic yards or meters the system can measure accurately. Batches often require the system to fill multiple drafts to reach the desired target volume.

You may choose between DISABLE, OPTIMIZE, SPLT EVN, and EVEN 1/4.

See the following parameter definitions.

Disable

This selection will not allow a batch size greater than "Max Batch Size" entered under global parameters (5.3.5 and 5.3.6). This in effect will disable any batch that cannot be delivered in 1 draft.

Optimize

This selection will allow batches up to 4 times the size of "Max Batch Size". The system will optimize the drafts by always splitting the batch into drafts at the maximum plant capacity. For example, you have an 8 yard plant and you want to batch 12 yards. In this example, the CB-1 would batch one 8 yard draft and one 4 yard draft.

Splt Evn

This selection is similar to **optimize** in that it allows a batch up to 4 times the size of the plant, but it splits up the drafts differently. SPLT EVN tries to "split even" the draft size. For example, a 19 yard batch would require three 6.33 yard batches. The advantages of this is that all batches are the same size and usually not real small. This is good since consistancy usually means accuracy. The disadvantage is that the individual drafts may be 6.33 yards or 3.67 yards.

Even 1/4

This is the same as SLOT EVN except it will round the draft yards to the nearest 1/4 yard to prevent odd draft sizes mentioned above. Using the same example as above, a 19 yard batch on an 8 yard plant would be broken up into two 6.25 drafts, and one 6.50 yard draft.

5.1.5 Batch Type

You can choose between three types of batching: Net, Gross, and Seek Idl.

See the following parameter definitions.

Net

This option will cause the indicator to always read the NET weight for the ingredient being weighed. This is accomplished by the CB-1 sending a Tare command to the appropriate indicator before each ingredient is weighed. In addition, the target and actual weights displayed on the screen during batching and printed on the batch ticket are NET values and do not include any starting weight or the weights of any other ingredient weighed in

that hopper. The % difference is calculated per ingredient. After all ingredients are weighed up, the CB-1 sends a command to the indicator changing them back into GROSS mode for discharging.

Gross

In this mode, the indicators will always remain in the Gross mode and never be tared. The CB-1 will do internal calculations to calculate what the cummulative target weight should be for the next ingredient. In both Gross and Net modes the net target weights for an individual ingredient are independent of the previous ingredient, however, the gross weight is affected.

For example, AGG1 target = 1000, and AGG2 target = 1000. In Net and Gross modes, if the aggregate scale starts at 10 lbs., the target for AGG1 will be 1000 for both. Lets say that AGG was delivered to 1010. In Net mode the scale will be tared and will display 0 (net), so the target weight for AGG2 would be 1000.

In Net mode the scale will be tared and will display 0 (net), so the target weight for AGG2 would be 1000. In GROSS mode, the target weight (on the indicator) for AGG2 would be 2010. Of course the individual target weight for AGG2 was 1000 in both cases. As in NET mode, GROSS mode batching will display and print the individual (net) weights for targets and actuals on the screen and reports.To avoid confusion between cummulative and net weights on a batch ticket, "target" is replaced with "req'd" (required) for individual net weights and "actual" is replaced with "bat'd" (batched) for the actual weight batched per ingredient.

Seek Idl

"SEEK IDEAL TARGETS" is like Gross mode in the fact that all indicators are never tared and remain in gross mode during batching. One difference is that the cummulative " ideal" targets are calculated for all ingredients and do not compensate for over and under amount of previous ingredients. The purpose of this is to make sure the total aggregate and cement amounts are accurate. This, however, has a tendency to change the proportions of sand to rock, or cement to fly ash. In the previous example, the target for AGG1 would be 1000 and the target for AGG2 would be 2000, regardless of the fact that AGG1 actual delivered was 1010. Another difference is that the tolerance is then calculated based on the total aggregate weight. If we were allowed 2.0% tolerance on aggregates then in "Seek Idl" mode we would be allowed 20 lbs. on AGG1 and 40 lbs. on AGG2 since the target was 2000 (2000 X 0.02 = 40). Another difference is that all values for target and actual that are displayed or printed are the true cummulative values that should appear on the indicator.

5.1.6 Force Zero Tolerance Check

Set this value to **YES** will not allow a batch to begin until this scale is within zero tolerance as defined in section 5.3 under "Zero Tolerance".

5.1.7 Discharge by Rate

The CB-1 has the ability to discharge in one of two ways. One way is a semi-auto mode where the operator controls the rate of discharge by using the up/down arrow keys on the keypad. The other way is a fully automatic mode where the CB-1 maintains independent configurable rates of discharge for the aggregates and cements. Choose YES if you want the CB-1 to control the discharge rate.

5.1.8 Change Admix Targets

Selecting YES will enable the user to temporarily change one or all of the admixture contribution to a mix design just before batching. Selecting YES enables the F1 key while waiting to start a batch. When the F1 key is pressed, provided CHANGE ADMIX TARGETS is set to YES, the admix targets for the selected mix design will display on the screen. The user is free to make changes for the present batch and not worry about permanently changing the mix design.

5.1.9 Auto-Discharge (Dump)

In the default mode of operation, the CB-1 pauses after all material is weighed. The user must press the "DISCHARGE" key to start the discharge cycle. The system also checks that the aggregate conveyor is running before starting the discharge. If AUTO-DISCHARGE (Dump) is set to YES, the CB-1 will NOT pause but start the discharge cycle right after ingredients have been weighed (it will still check that the aggregate conveyor is running). Use this option with caution.

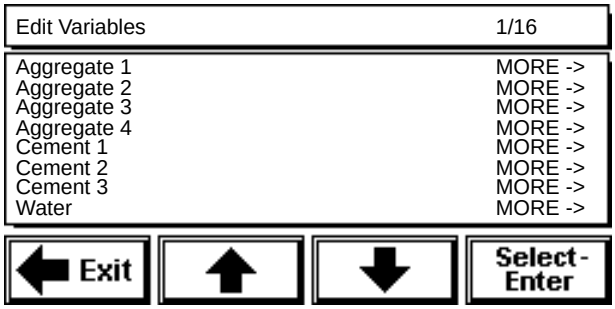
5.1.10 Aggregate Conveyor Control

Toggle between MANUAL or AUTOmatic control of the aggregate discharge conveyor. If MANUAL is selected, then the CB-1 does not attempt to start the conveyor. It does still check the CONVEYOR RUNNING input to make

sure the conveyor is running before discharging aggregates and cements. In AUTOmatic mode, the CB-1 will turn the aggregate discharge conveyor On and Off as needed. If AUTOmatic is selected, **it is critical that an audible alarm and light be wired to the system alarm output to warn that the conveyor will be started**. It is also important that the DISCHARGE WARNING TIME parameter under Global parameters is set to a long enough period of time.

5.2 Ingredients

The CB-1 allows you to control attributes of 14 different ingredients (16 if 4 of 6 aggregate option is installed). Touch **Ingredients** button or press **2** on the keypad to view ingredients.



You should be viewing the EDIT VARIABLES screen displaying the names of the first 8 (eight) ingredients. The MORE -> on the right hand side of the screen indicated that for each ingredient there is a list of parameters associated with that ingredient.

Press the up/down arrows to scroll to the other Ingredients screen. Each ingredient has its own list of parameters to edit. Highlight and select the ingredient to edit.

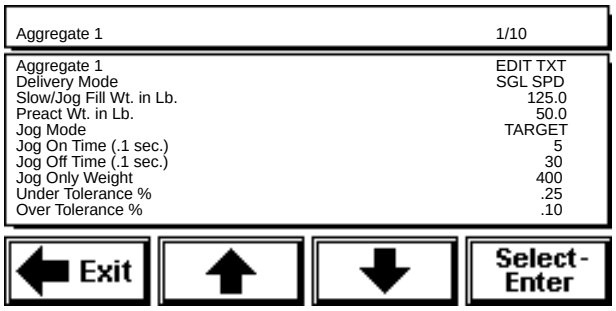
See the following sections for individual ingredient descriptions.

5.2.1 Aggregates/Cements/Weighed Water

The first four ingredients are aggregates,(6 aggregates if the 6 aggregate option is installed, but only 4 of which may be in a mix). The system weighs the aggregates sequentially according to the order they appear in INGREDIENTS LIST. The next 3 are cemen ts, followed by water and admixtures.

Select the ingredient you wish to edit by highlighting that key then hit **Select-Enter**. The system prompts for the new setting with either a numeric or alphanumeric keypad screen. Enter or edit the parameter, then press **enter** to store the new setting and return to the previous list.

Parameters with limited choices require you to toggle through selections by pressing **Select-Enter**. The displayed setting is the selected setting.



See the following parameter definitions.

Label (Ingredient Name)

Alphanumeric name for this ingredient. Highlight and select to access the keypad screen. The system prompts: ENTER A NEW LABEL. Enter a new label or edit the existing name using the keypad screen, then press **enter** to store the new name. There is a maximum of 22 characters.

Delivery Mode

The system fills aggregates using only the single speed fill mode. You cannot change this setting. For cements (and weighed water, if so equipped), you may select dual-speed, 2 concurrant which allows the operator to adjust the filling of both ingredients either fast or slow.

Slow/Jog Fill Weight in Lb.

This weight is the amount of material that is delivered at either slow speed (for dual speed ingredients - like cement), or while jogging, for single speed ingredients. For dual speed ingredients, this parameter allows the CB-1 to turn off the fast fill output x pounds before the calculated setpoint (target minus preact) and turn on (or leave on) the slow fill output until the setpoint is reached. Therefore, if this value is set to 200 lb, the the CB-1 will turn off the fast fill output x pounds before the calculated setpoint (target minus preact). Provided "jogging" is turned on, then the CB-1 will jog the remaining weight. **Note:** the system may jog for single or dual speed ingredients, even if this value is set to zero, provided jogging is turned on, and the settled weight in the hopper is less than required.

Preact Weight in Lb.

The PREACT WEIGHT is an empirical value representing the weight of material that falls into the weigh hopper after the controller initiates action to close the feed gate, and is dependent on many factors. It is often referred to as "freefall." Therefore, the preact value should be

estimated and entered here. The CB-1 subtracts this value from the actual cutoff value (the point at which the feed gate is closed). The CB-1 has an advanced automatic preact compensation algorithm. See Section 5.3.1 for a more detailed description.

Jog Mode

The CB-1 provides the ability to turn "jogging" on/off and the ability to choose from 2 different jogging modes. Highlighting (selecting) the JOG MODE option and pressing the **select/enter** button/key repeatedly will cause the CB-1 to cycle through these options:

JOG OFF - selecting this option will disable all jogging for this ingredient.

UPTO TOL - selecting this option will cause the CB-1 to jog only upto a weight that is considered within tolerance. See UNDER TOLERANCE % in section 5.2.1. The **Upto Tol** selection might be chosen for an expensive ingredient like cement, to ensure that the target is not exceeded.

TARGET - selecting this option will cause the CB-1 to jog until the target weight has been met or exceeded.

Jog On Time (.1 sec)

Automatic jogging, or auto-jog, involves feeding small amounts of material by opening up the feed gate for a specified amount of time, closing the feed gate, waiting a specified amount of time, then checking the weight against the setpoint. This cycle is repeated until the desired weight is achieved. The unique thing about jogging is that the weight isn't looked at while material is feeding. The **Jog On Time** is the amount of time the feed gate is held open in 1/10th seconds. For example, if this value is set to 20, then the feed gates are held open for 2.0 seconds.

Jog Off Time (.1 sec)

Similar to JOG ON TIME, but this is the amount of time the CB-1 waits before looking at the weight. This gives more control than waiting for an out-of-motion condition to occur.

Jog Only Weight

This is the weight at which the CB-1 can no longer deliver accurately by conventional means. Whenever the target weight for this ingredient, or the weight remaining to deliver after a pause or error condition, is less than this weight, the CB-1 will jog this entire amount up to the desired weight, provided jogging is active. The need for this parameter arises because there is a fixed minimum amount that the system can accurately deliver by opening up the feed gate, checking the weight for setpoint, closing feed gate and allowing for preact.

Under Tolerance %

For each ingredient an over/under tolerance percentage may be specified independently. This value is a percentage of the target value for this ingredient. The lower tolerance weight is calculated by the following formula: tolerance lower limit = target value - ((target value) * (under tolerance %)/100). If the actual delivered amount for this ingredient is less than the lower tolerance limit, the CB-1 will pause and alert the user than an under tolerance condition has occurred. The user may press the **Tol Accept** key if this if okay, he/she may manually add the difference, or he/she may choose to abort the batch by pressing the **Abort** key. **Note**: if auto-jogging is set to UPTO TOL, the Under Tolerance % is used to decide when to stop jogging. If auto jogging is turned on, an under tolerance alarm can NEVER occur.

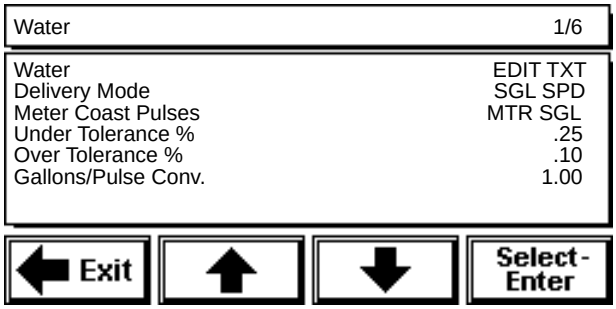
Over Tolerance %

This value is similar to Under Tolerance % except is calculated by the following formula: tolerance upper limit = target value + ((target value) * (over tolerance %)/100).

5.2.2 Water (if water is metered)

The system delivers water using a pulse meter (consult factory for availability of a weighed water option). To deliver a specified amount of water, the CB-1 first calculates the number of pulses (from the pulse meter) required to deliver the target weight of water in gallons or liters. The CB-1 then turns on the water fill output relay and begins checking for pulses. The system can meter and discharge water simultaneously when needed, or first meter the water into a reservoir. The system opens valves on the reservoir to deliver the first and second (washout) water additions. If you are using a reservoir the amount of washout water is a fixed amount dependent upon the reservoir capacity.

Water has a list of parameters to edit in the WATER screen.



Highlight and select the item from the list to edit. The system prompts for the new setting with either a numeric or alphanumeric keypad screen. Enter or edit the parameter, then press **enter** to store the new setting and return to the previous list.

Parameters with limited choices require you to toggle through selections by pressing **Select-Enter.** The displayed setting is the selected setting.

See the following parameter definitions.

Label (Water)

Alphanumeric name for the water. Highlight and select to access the keypad screen. The system prompts: ENTER A NEW LABEL. Enter a new label or edit the existing name using the keypad screen, then press **enter** to store the new name. There is a 22 character maximum.

Delivery Mode

The CB-1 delivers water using a metered single-speed mode. You cannot change this parameter.

Water Coast Pulses

A coast value is the amount of this ingredient that flows after the pump/valve has been shut off or closed. Because valves are usually closed slowly to prevent water "hammer", the CB-1 might deliver too much water. To prevent this a coast value may be entered. The CB-1 will use this value to shut off the water early to compensate for "coasting". This value is similar to a preact for weighed ingredients and should be entered as the number of pulses the meter sends after start of close.

Under Tolerance %

For each ingredient an over/under tolerance percentage may be specified independently. This value is a percentage of the target value for this ingredient. The lower tolerance weight is calculated by the following formula: tolerance lower limit = target value - ((target value) * (under tolerance %)/100). If the actual delivered amount for this ingredient is less than the lower tolerance limit, the CB-1 will pause and alert the user than an under tolerance condition has occurred. The user may press the **Tol Accept** key if this if okay, he/she may manually add the difference, or he/she may choose to abort the batch by pressing the **Abort** key. **Note**: if auto-jogging is set to UPTO TOL, the Under Tolerance % is used to decide when to stop jogging. If auto jogging is turned on, an under tolerance alarm can NEVER occur.

Over Tolerance %

This value is similar to Under Tolerance % except is calculated by the following formula: tolerance upper limit = target value + ((target value) * (over tolerance %)/100).

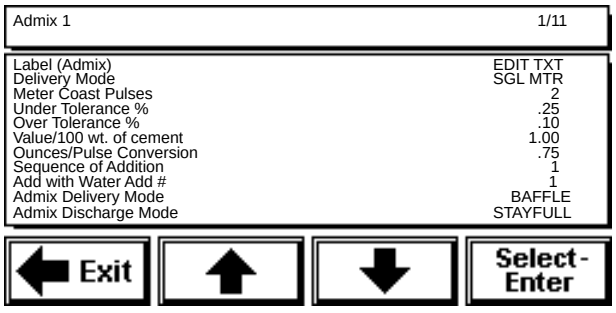
Gallons/Pulse Conversion

Because the CB-1 uses pulse inputs from a pulse meter to deliver water and admixtures, the CB-1 needs to know how much water or admixture is delivered for every pulse from the pulse meter. Enter the amount delivered per pulse from the meter here. The default is 1.00 and this is common in the industry since most meters have a summing board inside them and can be set so 1 pulse = 1 gallon, or 1 pulse = 1 ounce.

5.2.3 Admixtures

Like water, the system measures admixtures by means of a pulse meter. There are a maximum of 6 admixtures, and each requires a unique pulse meter input. You can deliver admixtures manually or use another system sold for this purpose. The system measures admixtures in ounces or milliliters. Enter the desired target value in the mix design. You can base this value on one yard or per "100 weight of cement," which you configure independently in each admix ingredient list.

The CB-1 meters all admixtures used in a given mix design at the same time. "Metering" refers to measuring an amount before adding it to the concrete mix. The system adds admixtures sequentially in the order they appear in the INGREDIENTS LIST (same order they appear in MIX DESIGNS). You can also configure the system to add each admixture with either the first or second (washout) water addition. To actually discharge the admixtures, the CB-1 must open an output relay and monitor an input relay to signal that the admix has been discharged.



Each admixture has its own list of parameters to edit in the ADMIXTURE screen. **Note:** Press the up/down arrows to scroll to the next screen of parameters.

Highlight and select the item from the list to edit. The system prompts for the new setting with either a numeric keypad or alphanumeric keypad screen. Enter or edit the parameter, then press **enter** to store the new setting and return to the previous list.

Parameters with limited choices require you to toggle through selections by pressing **Select-Enter.** The displayed setting is the selected setting.

See the following parameter definitions.

Label (Admix 1)

Alphanumeric name for the admixture. Highlight and select to access the keypad screen. The system prompts: ENTER A NEW LABEL. Enter a new label or edit the existing name using the keypad screen, then press **enter** to store the new name. There is a 22 character maximum ingredient name.

Delivery Mode

The CB-1 delivers admixtures using a metered single-speed mode. You cannot change this parameter.

Meter Coast Pulses

A coast value is the amount of this ingredient that flows after the pump/valve has been shut off or closed. The CB-1 will use this value to shut off the admix early to compensate for "coasting". This value is similar to a preact for weighed ingredients.

Under Tolerance %

For each ingredient an over/under tolerance percentage may be specified independently. This value is a percentage of the target value for this ingredient. The lower tolerance weight is calculated by the following formula: tolerance lower limit = target value - ((target value) * (under tolerance %)/100). If the actual delivered amount for this ingredient is less than the lower tolerance limit, the CB-1 will pause and alert the user than an under tolerance condition has occurred. The user may press the **Tol Accept** key if this if okay, he/she may manually add the difference, or he/she may choose to abort the batch by pressing the **Abort** key. **Note**: if auto-jogging is set to UPTO TOL, the Under Tolerance % is used to decide when to stop jogging. If auto jogging is turned on, an under tolerance alarm can NEVER occur.

Over Tolerance %

This value is similar to Under Tolerance % except is calculated by the following formula: tolerance upper limit = target value + ((target value) * (over tolerance %)/100).

Value/100 wt. of cement

Amounts of admixtures required for a specific mix design are often based on how much cement is in the mix. If you may configure the CB-1 to use the mix design target value for this admix to be the amount per yard or the amount per 100 pounds of cement (the CB-1 use the total weight of all cementateous material when calculating how much admix to add). Press **Select-Enter** to toggle the setting between Yes and No If Yes, the system measures the admixture per 100 weight of cement. If No, the system measures the admixture per one yard of cement.

Ounces/Pulse Conversion

Because the CB-1 uses pulse inputs from a pulse meter to deliver water and admixtures, the CB-1 needs to know how much water or admixture is delivered for every pulse from the pulse meter. Enter the amount delivered per pulse from the meter here. The default is 1.00 and this is common in the industry since most meters have a summing board inside them and can be set so 1 pulse = 1 gallon, or 1 pulse = 1 ounce.

Sequence of Addition

The sequential number assigned to this admixture. The CB-1 delivers admixtures in the order they appear in the INGREDIENTS LIST. You cannot change this parameter.

Add with Water Add

This value determines with which water addition the system delivers the admixture. Press **Select-Enter** to toggle the setting. Select 1 to deliver the admixture with the first water addition. Select 2 to deliver the admixture with the second (washout) water addition.

Admix Delivery Mode

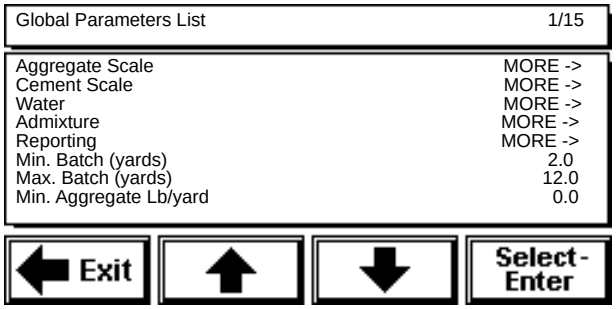
Admixes may be metered into a bottle (sight tube) before discharging into the water line, or they may be metered directly into the water line. Press **Select-Enter** to toggle between BOTTLE and DIRECT.

Admix Discharge Mode

If you chose BOTTLE above, then this parameter is relevant. BOTTLE admixtures may be discharged using a bottle empty signal or they may be discharged using a timer. If you are concerned about the admixture freezing in the line, then you want to blow out the line. If not, you probably want to only discharge the admix from the bottle and leave the line filled with admixture. Press **Select-Enter** to toggle between BLOW OUT and STAY FULL. This parameter has no effect on DIRECT feed admixtures.

5.3 Global Parameters

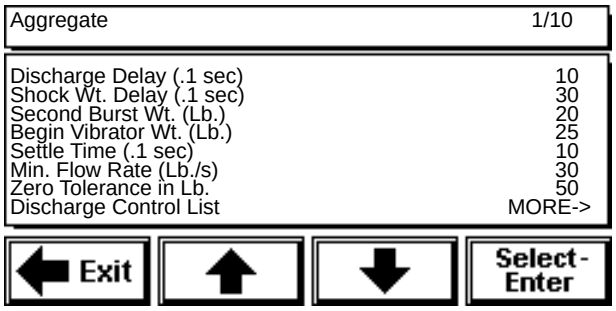
The Global Parameters allow you to configure those variables that control system operation (see following column). There are a total of 15 items in the Global Parameters list, many with parameters of their own to edit.



Note: Press the up/down arrows to scroll to the other GLOBAL PARAMETERS screens.

5.3.1 Aggregate Scale, Cement Scale

Use the AGGREGATE/CEMENT SCALE parameters to edit those variables associated with the aggregate or cement scale. These lists contains 10 items. Here is the Aggregate scale list for example. The Cement scale list is the same.



Note: Press the up/down arrows to scroll to the other AGGREGATE SCALE screen.

Highlight and select the item from the list to edit. The system prompts for the new setting with either a numeric keypad or alphanumeric keypad screen. Enter or edit the parameter, then press **enter** to store the new setting and return to the previous list.

Parameters with limited choices require you to toggle through selections by pressing **Select-Enter.** The displayed setting is the selected setting.

See the following parameter definitions.

Discharge Delay (.1 sec)
The amount of time the system waits before starting the discharge from this hopper.

Shock Wt Delay (.1 sec)
The amount of time the system waits after opening the discharge gate to take a weight reading. This delay prevents errors from spike weights (the force of the initial drop of material onto the scale).

Second Burst Wt. (Lb.)
During the discharge cycle, as the weigh hopper empties, there will be a point at which the material barely flows out of the inch gate at the current opening. The SECOND BURST WEIGHT is the weight remaining in the weigh hopper when the CB-1 will open the inch gate (hold the Open input on for time configured in SECONDARY BURST (under the Discharge Control List), a little further. The secondary burst is only used when the discharge rate is adjusted manually, since it would already be compensating for changes in flow rate when discharging by RATE.

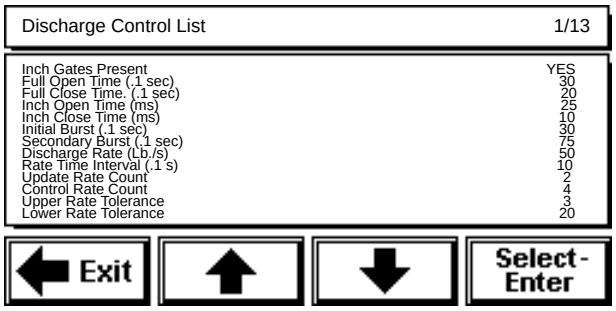
Begin Vibrator Wt. (Lb.)
During the discharge cycle, as the weigh hopper empties, there will be a point at which the material no longer flows out of the inch gate at the current opening. The BEGIN VIBRATOR WEIGHT is the weight remaining in the weigh hopper when the CB-1 will open the inch gate (hold the OPEN input on for time configured in FULL OPEN TIME - under the Discharge Control List) all the way open and start the vibrator. This is used to clear all material from the weigh hopper to achieve a weight within zero tolerance.

Settle Time (.1 sec.)
The maximum amount of time the system should wait to take a weight reading after adding this type of ingredient. The CB-1 will be waiting for the weigh indicator to show the weight is out-of-motion before accepting the weight as valid. In the event out-of-motion condition does not occur, then the weight is taken after the expiration of the SETTLE TIME.

Minimum Flow Rate (Lb./s)
The maximum amount of time that can elapse with no change in scale weight (in 1/10 seconds). If the material does not fill before this time limit, the system displays an error message.

Zero Tolerance (Lb/Kg)
The weight under which the system considers the scale empty. The scale weight must drop below this value before the system will start the next batch, if FORCE ZERO TOLERANCE CHECK is set to **YES**.

Discharge Control List
Highlight and select DISCHARGE CONTROL LIST to access the associated parameters screen located on the following page.



Highlight and select the item from the list to edit. The system prompts for the new setting with either a numeric keypad or alphanumeric keypad screen. Enter or edit the parameter, then press **enter** to store the new setting and return to the previous list.

Parameters with limited choices require you to toggle through selections by pressing **Select-Enter.** The displayed setting is the selected setting.

See the following parameter definitions.

Inch Gates Present

Inch Gates are gates that may be open or closed with 2 different outputs, and hold their position after both outputs are de-energized. Press **Select-Enter** to toggle the setting from Yes to No. Select Yes if your operation has discharge inch gates. Select No if your system does not have inch gates. The displayed setting is the selected setting.

Full Open Time (.1 sec)

The amount of time it takes for the system to fully open the inch gate from the closed position (in 1/10 seconds).

Full Close Time (.1 sec)

The amount of time it takes the system to close the inch gate from the full open position (in 1/10 seconds).

Inch Gate Open Time

During discharge, you can press the front panel **FAST** (up arrow) key to open the inch gate and discharge faster. The INCH GATE OPEN TIME determines how long the system energizes the relay to open the inch gate for every press of the **FAST** key (in milliseconds). This is also the amount of time the CB-1 will automatically open the inch gate when trying to maintain the "Discharge by Rate" if discharge control has been selected to Yes (section 5.1.7).

Inch Gate Close Time

During discharge, you can press the front panel **SLOW** (down arrow) key to close the inch gate to discharge slower. The INCH GATE CLOSE TIME determines how long the system energizes the relay to close the inch gate for every press of the **SLOW** key (in milliseconds).This is also the amount of time the CB-1 will automatically close the inch gate when trying to maintain the "Discharge by Rate" if discharge control has been selected to No (section 5.1.7).

Initial Burst (.1 sec)

This parameter controls how far the system opens the inch gate at the start of the discharge. The system energizes the relay for the amount of time listed as the INITIAL BURST value (in 1/10 seconds).

Secondary Burst (.1s)

This is the amount of time the discharge gate OPEN output is held on for after the weigh hopper has emptied to the SECONDARY BURST WEIGHT.

Discharge Rate (Lb./s)

This value is only used when discharging by RATE See 5.1.7. The value entered here represent the desired discharge rate (flow measured in Lb/s) from this weight hopper during the discharge cycle. If configured to discharge by rate, then the CB-1 will automatically open and close the discharge inching gate to maintain this rate.

Rate Time Interval (.1s)

The RATE TIME INTERVAL is the amount of time used as a reference for measuring how much weight has discharged and calculating the flow rate. For example, if this value is set to 2, then every $2/10^{th}$ seconds (5 times per second), a new discharge flow rate is calculated. How often this new discharge rate is displayed, or how often the system corrects (when discharging by rate) are defined by multiples of this interval. See following explanation.

Update Rate Count

This value is a number of time intervals between updating the calculated discharge rate on the screen. The value also represents the number of discharge rates that are averaged to make up the displayed rate. This is a type of filtering.

Control Rate Count

This value represents the number of discharge rates that are averaged and used to make a decision

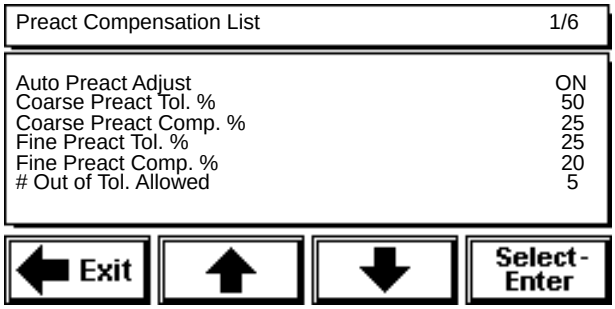
to open or close the inch gates when discharging by rate. The larger the value, the slower the CB-1 will make adjustments to the discharge rate.

Upper Rate and Lower Rate Tolerance

The UPPER AND LOWER RATE TOLERANCE values provide a window within the CB-1 and will not make corrections to the inch gates to control the discharge rate. These values are needed to inhibit the CB-1 from making constant changes to the inch gate positioning based on minute changes in the discharge rate.

Preact Compensation

You can choose to enable or disable the automatic preact compensation under PREACT COMPENSATION in the AGGREGATE/OR CEMENT SCALE LIST SCREEN.



Highlight and select the item from the list to edit. The system prompts for the new setting with either a numeric keypad or alphanumeric keypad screen. Enter or edit the parameter, then press **enter** to store the new setting and return to the previous list.

Parameters with limited choices require you to toggle through selections by pressing **Select-Enter.** The displayed setting is the selected setting.

See the following parameter definitions.

Auto Preact Active

Select to enable or disable the auto-preact function.

Press **Select-Enter** to toggle the settings between ON and OFF.

If you turn the auto-preact OFF, the CB-1 never modifies the preact value you entered under the individual ingredient parameters.

If you turn the auto-preact ON, the CB-1 automatically adjusts the preact every time it fills and ingredient to ensure the most accurate fill. The parameters controlling the adjustment algorithm are explained next.

Course Preact Tolerance %

The auto-preact function uses course and fine adjustment bands to more accurately reach the target weight. The COURSE PREACT TOLERANCE percentage defines the course range outside of which the system does not adjust the preact.

If the ingredient weight is outside of the course preact tolerance percentage band, the CB-1 does not adjust the preact but displays a warning that the weight is not within the tolerance. The CB-1 then keeps adjusting automatically to reach the target weight.

If the ingredient weight is within the course preact tolerance percentage band, the CB-1 adjusts the preact using the COURSE PREACT COMPENSATION percentage (see below).

Course Preact Compensation%

If the ingredient weight is within the course preact tolerance band, the CB-1 adjusts the weight by this percentage of the difference to fill closer to the target.

Fine Preact Tolerance %

The auto-preact function uses course and fine adjustment bands to more accurately reach the target weight. The fine preact tolerance percentage defines the fine range within which the system does not adjust the preact.

If the ingredient weight is outside of the fine preact tolerance percentage band, the CB-1 does not adjust the preact (unless the weight is within the course adjustment percentage) but displays a warning that the weight is not within the tolerance.

The CB-1 then keeps adjusting automatically to reach the target weight.

Fine Preact Compensation%

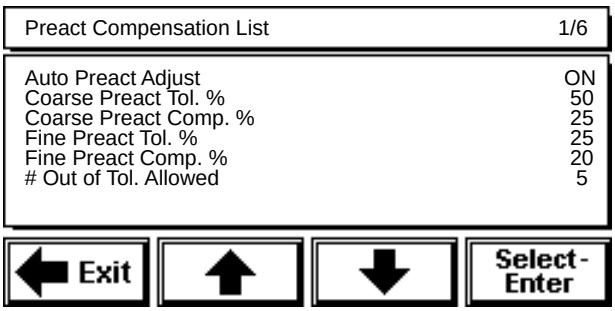
If the ingredient weight is within the fine preact tolerance band, the CB-1 adjusts the weight by this percentage of the difference to fill closer to the target.

Out of Tolerance Allowed

Set how many out of tolerance messages the system must encounter before going into an error condition.

Preact Compensation Example

The following example uses the data listed below.



Our example ingredient, Sand, has a preact of 50 lbs and a target weight of 1000 lbs. The CB-1 fills the Sand, then shuts the feed gate when the aggregate hopper scale reads 950 lbs.

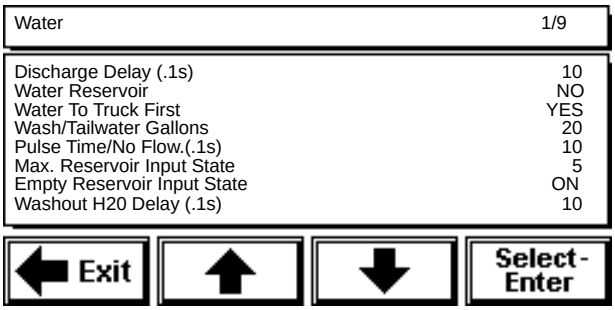
After the Scale Settle Time expires (or the scale reaches standstill) , the weight for the delivered Sand is 1030 lbs (after the preact material settles). This is 30 lbs (or 3%) over the target weight. The fine adjustment band iu 0–25%, and the course adjustment band, 26–50%.

In this case, the CB-1 would adjust the preact by 20% of the difference (the FINE PREACT COMPENSATION percentage), which is 6 lbs. The new adjusted preact would be 56 lbs. Note: Increasing the preact decreases the weight delivered. Decreasing the preact increases the weight delivered.

The auto-preact function adjusts the preact every time the system uses the ingredient. After a short time, the CB-1 will deliver the ingredient exactly to the target weight. Thereafter, the auto-preact function will only alter the preact when the flow characteristics of the ingredieno†´hange.

7.3.2 Water

Select WATER to edit those variables associated with water. If your system is equiped with the Weighed Water option, the list will look quite different.



Discharge Delay

The amount of time the system waits before starting the water metering (or water discharge if using a reservoir).

Water Reservoir

Designate whether or not your operation uses a water reservoir during batching. Press **Select-Enter** to toggle the setting between YES and NO. The displayed setting is the selected setting.

If you select NO, the system meters the target amount of water minus the washout value for the first addition. The system then delivers the remaining amount for the second (washout) addition.

If you select yes, the system fills the reservoir to the specified target value while metering the admixture at the start of a batch. The system then opens the hi/low water outputs sequentially for the first and second (washout) additions.

Water to Truck First

If this value is set to YES, then the water will be added at the beginning of the discharge cycle, and the aggregates and cements will NOT start discharging until all water (not including the washout/tailwater) has been added. If this value is set to YES, the discharge delay parameter is ignored.

F2 for Water Start

The F2 key may be used to preload the truck with water and admixtures. Setting this value to YES enables the F2 key. If set to NO, the F2 key has no effect.

Wash/Tailwater Gallons

This is the number of gallons that are delivered after the aggregates and cements have been discharged (weigh hoppers are zero). The washout, or "Holdback" water is used to wash off the "boot" and truck orifice.

Pulse Time/No Flow .1s

When metering admixtures, the system considers it a No Flow error if the time between pulses exceeds this value.

Max. Reservoir Discharge Time (s)

This is the maximum amount of time allowed for a water reservoir to empty. The system detects an input sensor. If this time is exceeded, then the CB-1 will generate a no discharge error condition.

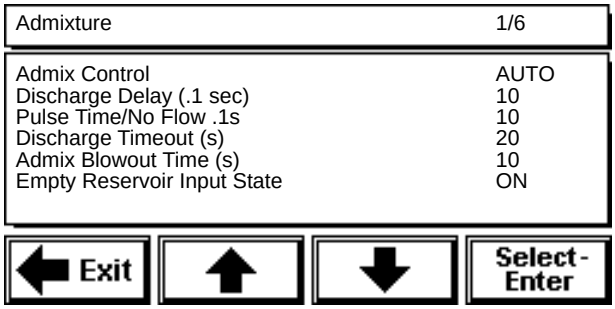
Empty Reservoir Input State

This is the state of the sensor on the water reservoir. Select ON if the sensor is closed (input relay is ON) when reservoir is empty. Select OFF if the sensor is open (input relay is OFF) when the reservoir is empty.

Washout H2O Delay (.1s)
This value represents the amount of time delay starting from when the aggregates and cements are completely discharged, and the start of the washout water addition.

5.3.3 Admixture

Select ADMIXTURE to edit those variables associated with all admixtures.



Highlight and select the item from the list to edit. The system prompts for the new setting with either a numeric keypad or alphanumeric keypad screen. Enter or edit the parameter, then press **enter** to store the new setting and return to the previous list.

Parameters with limited choices require you to toggle through selections by pressing **Select-Enter.** The displayed setting is the selected setting.

See the following parameter definitions.

Admix Control
Toggle between Auto and Manual. If you don't want the CB-1 to control the admix metering and discharging select MANUAL. When configured for Manual admix fill, the CB-1 will ignore all admixture additions even if the mix design specifies an admix configuration. Select AUTO if you want the CB-1 to meter and discharge admixtures.

Discharge Delay
The amount of time the system waits before starting the first admixture discharge.

Pulse Time/No Flow .1s
When metering admixtures, the system considers it a NO Flow error if the time between pulses exceeds this value.

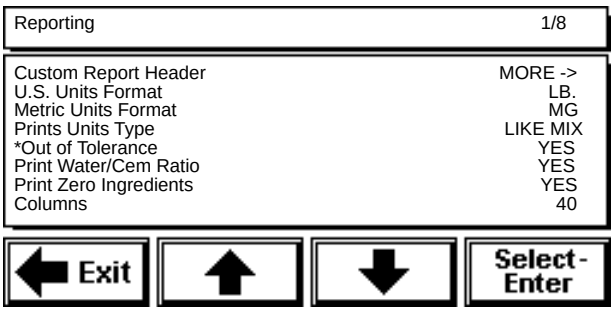
Discharge Timeout (s)
This is the maximum amount of time allowed for a water reservoir to empty. The system detects an input sensor. If this time is exceeded, then the CB-1 will generate a no discharge error condition.

Admix Blowout Time (s)
If you have admixtures, configured as Bottle and have configured the lines to BLOW OUT, to prevent freezing in colder climates, then this is the time the bottles are blown out for.

Empty Reservoir Input State
Select the state of the bottle empty sensor when the bottle is empty. Select ON if the sensor is closed (input relay is ON) when the bottle is empty.

5.3.4 Reporting

Selections under the REPORTING LIST configure what information appears on reports and how this information is formatted.



Highlight and select the item from the REPORTING LIST to edit.

Custom Report Header
The CB-1 provides an 8 line by 30 character editable header. This header will print on the top of each report. Use this space to enter plant name, address, phone number, etc. Leaving one or more lines blank will sause the CB-1 to not print those lines. If you want a blank line in the header, you must put one or more spaces at the beginning of the line.

U.S. Units Format
When configured to print in U.S. units, the CB-1 needs to know if it should print in tons or pounds. Toggle between "LB/G/OZ" and "TN/G/OZ" for tons or pounds. The system default U.S. units for volume of water is gallons and for admixtures it is ounces. These can not be changed. This is for the Batch Ticket only. Material usage always prints in TONS and GALLONS.

Metric Units Format
When configured to print in Metric units, the CB-1 needs to know if it should print in megagrams or kilograms. Toggle between "MG/L/ML" and "KG/L/ML" for tons or pounds. The system defaults Metric units for volume of water is Liters and for admixtures it

is milliliters. These can not be changed. This is for the Batch Ticket only. Material usage reports are always printed in Megagrams and Liters.

Prints Units Type

Regardless of what system of units you have chose as your primary units (see DIP switch 3 in section 2.3), U.S. or Metric, you may configure the units that are printed on reports. For example you may batch in U.S. units and print in U.S. or metric or both! By pressing the **Select-Enter** button, you can change between "LIKE MIX" - always print whatever units are specified in the mix design, "US ONLY" - always prints in US units regardless of what primary units are or what units are in mix design, "SI ONLY" - always prints in metric units using format specified in "Metric Units Format", "BOTH" - this will force both US and metric units to be printed on all reports.

Note: When printing "Both" units on the Batch Ticket, some information is ommitted for space concerns.

*Out of Tolerance

Select YES if you want OUT OF TOLERANCE ingredients to be marked with an asterisk.

Print Water/Cem Ratio

Select YES if you want to print the water/cement ratio on the batch ticket.

Print Zero Ingredients

Select YES if you want to show that a given ingredient has no contribution (zero target weight) to a mix design.

Columns

An 80 column printer is required.

5.3.5 & 5.3.6 Minimum/Maximum Batch Volume (yards & cubic meters)

The CB-1 uses the MIN and MAX BATCH VOLUME values to determine whether or not to use multiple drafts to reach the target weight. These parameters affect the SPLIT BATCH TYPE (5.1.4) in the OPTIONS LIST

Min Batch Volume

Highlight and select to set the minimum number of cubic yards that your system can measure accurately.

Max Batch Volume

Highlight and select to set the maximum number of cubic yards that your system can batch at one time. If you try to batch more yard than the MAX BATCH VOLUME value, you will need to enable the multi-draft option or change the mix design formula.

The CB-1 allows batches that exceed the MAX BATCH VOLUME value by breaking up the target number of yards into smaller drafts. Note: You must have SPLIT BATCH TYPE, see section 5.1.4.

The CB-1 calculates the number of drafts required and the number of yards per draft required to meet the target weight. The CB-1 then adjusts the last and second-to-last drafts so that they will always be greater than the MIN BATCH VOLUME. This allows you to mix large amounts of concrete without having to reenter the mix design number, batch volume, and trim water for each draft. The CB-1 will pause to make adjustments between drafts, if needed. If this happens, press the front panel **Start** key to continue on to the next draft.

5.3.7 & 5.3.8 Minimum/Maximum Aggregate Wt/Yard

Highlight and select to set the minimum and maximum weight for aggregates per yard of concrete. The total weight of all the aggregates for one yard of concrete must be within the minimum and maximum aggregate weight per yard values.

5.3.9 & 5.3.10 Minimum/Maximum Cement Wt/Yard

Highlight and select to set the minimum and maximum weight for cement per yard of concrete. The total weight of all the cement for one yard of concrete must be within the minimum and maximum cement weight per yard values.

5.3.11 & 5.3.12 Minimum/Maximum Water Per Yard

Highlight and select to set the minimum and maximum amount of water per yard of concrete. The total amount water for one yard of concrete must be within the minimum and maximum water per yard values.

5.3.13 Discharge Warning Time (s)

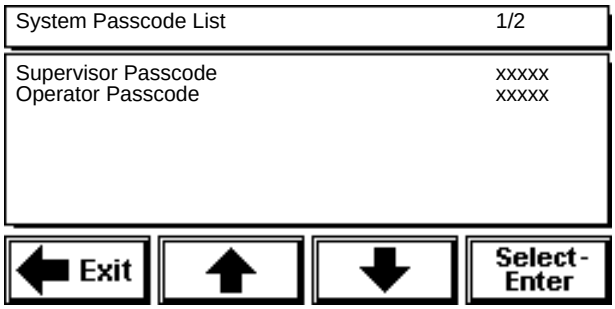
This is a configurable pause between pressing the "DISCHARGE" key and the system actually starting the discharge cycle. This serves as a warning time and gives the operator a moment to press **pause** if he/she didn't really want to start discharging. This also serves as a warning that the aggregate conveyor will be starting.

5.4 Systems Passcodes List

The CB-1 provides a two-level passcode protection system—supervisor, and operator. Passcodes are numeric entries with a maximum range of zero to 9,999,999. The default supervisor and operator passcode

is 0. The CB-1 doesn't ask the user to verify a passcode if it is set to zero. Setting (or leaving) a passcode to zero, effectively disables passcode protection. Therefore, we strongly recommend changing the supervisor and operator passcodes to a non-zero number as part of the initial system setup. To change the passcodes, highlight and select SYSTEM PASSCODES LIST from the MASTER VARIABLES LIST.

Enter the supervisor password to access the System Passcodes List.



Note: The system allows three attempts when you enter a passcode. After the third try, the system aborts the passcode entry screen and returns to the previous screen.

Use the up/down arrows to highlight the desired passcode to edit. Press **Select-Enter** to access the numeric keypad screen. Enter the existing passcode, then press **enter**. The system then prompts for the new passcode (seven digits maximum). Enter the new passcode, then press **enter** to store the new passcode. The system prompts you to verify the new passcode by entering it again. Reenter the new passcode and press **enter** to store the new passcode.

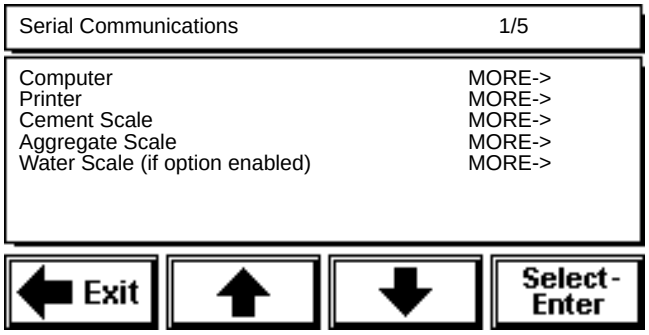
All configuration screens and mix designs are supervisor-level passcode protected The system requires an operator to enter their passcode to abort a batch or change the moisture compensation for aggregates.

5.5 Advanced Parameters

The advanced Parameters list is primarily used by the Rice Lake Weighing Systems programmer to access options that control the CB-1 software functions and hardware setup. Some items in this list may be edited if needed under supervisory personnel at RLWS for rare circumstances.

5.6 Serial Communications

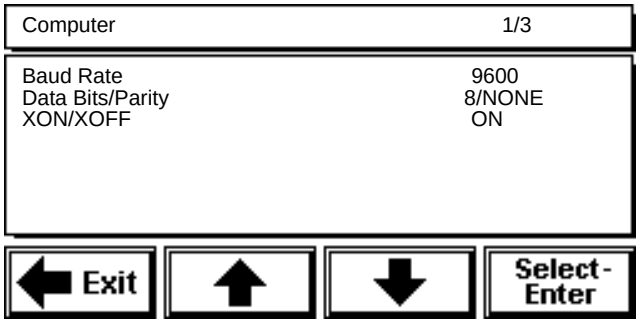
Highlight and select to access the SERIAL COMMUNICATIONS parameters list.



Each item in the Serial Communications list has parameters of its own to edit. Highlight and select to access the associated parameters screen.

5.6.1 Computer

The computer parameter contains several variables to edit. This is only relevant if you have the optional PC program to backup/restore the configuration file.



Baud Rate

Select the baud rate you are using to connect the PC and CB-1. Press **Select-Enter** to toggle through the BAUD RATE settings. The displayed setting is the selected setting. The default BAUD RATE setting is 9600.

Data Bits/Parity

Select the data bits and parity you are using with the PC connection. Press **Select-Enter** to toggle through the DATA BITS/PARITY settings. The displayed setting is the selected setting.

XON/XOFF Enabled

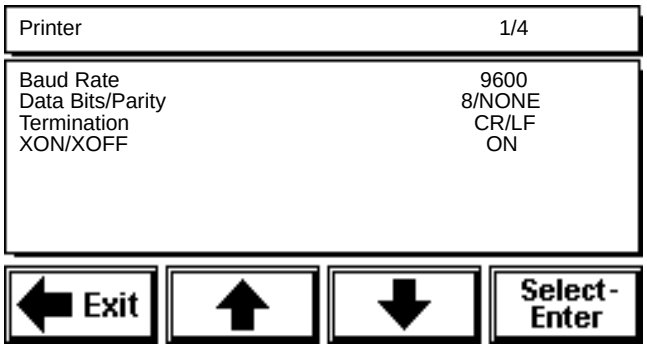
You should never need this for PC communication. This option controls the software handshaking which prevents the communications buffer from overflow.

Select YES to enable the CB-1 to use XON/XOFF software handshaking. If Yes, make sure the PC has also enabled handshaking.

Select NO to have the CB-1 use a print line delay after each line to prevent overload.

5.6.2 Printer

The printer parameter contains several variables to edit.



Baud Rate

Select the baud rate you are using to connect the printer and CB-1. Press **Select-Enter** to toggle through the BAUD RATE settings. The displayed setting is the selected setting. The default BAUD RATE setting is 9600.

Data Bits/Parity

Select the data bits and parity you are using with the printer connection. Press **Select-Enter** to toggle through the DATA BITS/PARITY settings. The displayed setting is the selected setting.

Termination

Select the termination characters the printer uses to end a print ticket. Press **Select-Enter** to toggle the setting between CR/LF (Carriage Return/Line Feed), CR (Carriage Return), and ETX (End of Text). The displayed setting is the selected setting.

XON/XOFF Enabled

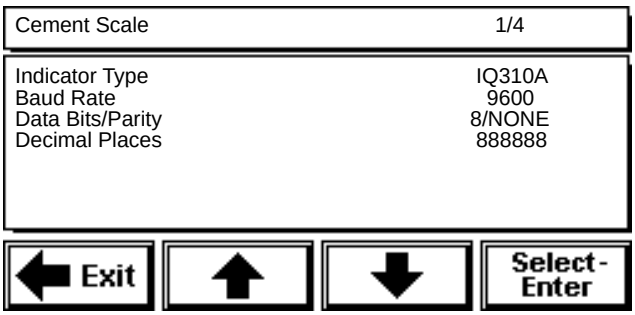
This option controls the software handshaking which prevents the printer buffer from overflow.

Select YES to enable the CB-1 to use XON/XOFF software handshaking. If Yes, make sure the printer has also enabled handshaking.

Select NO to have the CB-1 use a print line delay after each line to prevent overload.

5.6.3 Cement/ Aggregate/Water Scale

The CEMENT SCALE and AGGREGATE SCALE and WATER SCALE (if option enabled) parameters contain the same variables to edit.



Indicator Type

Select the indicator type you are using on the cement scale and the aggregate scale. Press **Select-Enter** to toggle through the INDICATOR TYPE selections. The displayed setting is the selected setting.

Baud Rate

Select the baud rate you are using to connect the indicator and CB-1. Press **Select-Enter** to toggle through the BAUD RATE settings. The displayed setting is the selected setting. The default BAUD RATE setting is 9600.

Data Bits/Parity

Select the data bits and parity you are using with the indicator connection. Press **Select-Enter** to toggle through the DATA BITS/PARITY settings. The displayed setting is the selected setting.

Decimal Places

This should match the decimal place format on the indicators. The CB-1 uses this value to decide if one or more decimal places should be displayed on the screen and on the batch ticket. This value may be different if secondary units are being used to batch in.

6.0 Mix Design

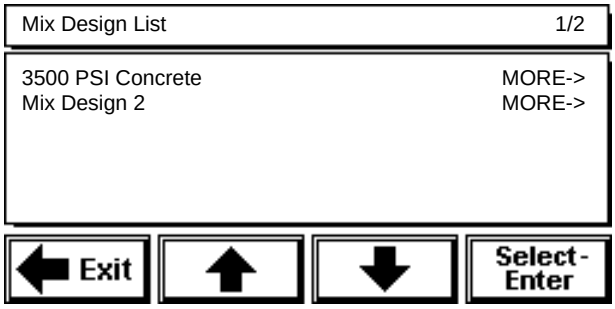
The CB-1 allows you to create up to 100 unique mix designs. Each mix design contains 14 numeric values (4 aggregates, 3 cements, 1 water, and 6 admixtures) and 1 alphanumeric string (a user-definable mix design name). The mix design menu provides options to CREATE, EDIT, VIEW, and CLEAR one or more mix designs.

Note: If the 4 of 6 aggregate option is installed, 6 aggregates will appear in the mix design. Only 4 may be used.

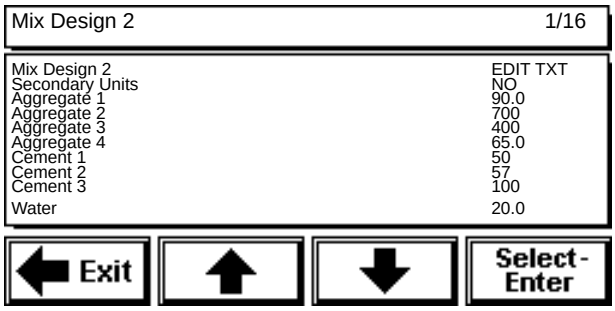
Note: The CREATE A MIX DESIGN and EDIT MIX DESIGNS menu options are supervisor-level passcode protected.

6.1 Create a Mix Design

Press **Create a Mix Design**. Enter the supervisor passcode to access the list of all the current mix designs. The CB-1 automatically adds and highlights a new mix design with a generic name (MIX DESIGN 2, for example).



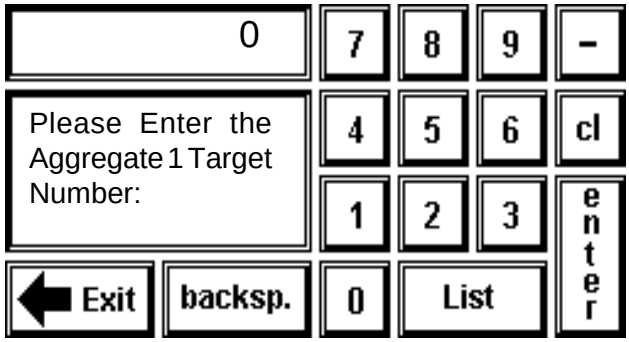
Press **Select-Enter** to edit the new highlighted mix design. The system displays the ingredient list for the mix design.



You may enter a 22 character mix design name by highlighting EDIT TEXT and pressing **Enter**.

To batch in Secondary Units, toggle "No" to "Yes". This will only effect this mix design. If this mix is setup to run in Secondary Units, all values entered must be in secondary units.

Press the up/down arrows to scroll through the ingredients on the screen. Highlight and select the ingredient to edit the target weight and other ingredient parameters. The system displays a numeric keypad screen.



Enter the ingredient target weight using the touchscreen keypad, then press **enter** to set the ingredient target weight.

You can also press **List** to view a list of ingredients and select a new ingredient. Enter the new ingredient target weight using the touchscreen keypad, then press **enter**.

6.2 Edit Mix Designs

You can change any mix design you previously created by entering the EDIT MIX DESIGN mode. Press **Edit Mix Designs**. Enter the supervisor passcode to access the list of all the current mix designs.

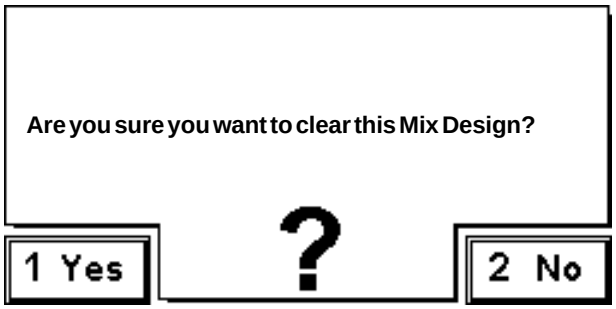
6.3 Clear Mix Designs

You can clear mix designs from the MIX DESIGN LIST by using CLEAR MIX DESIGNS. The CB-1 clears the mix design but does not remove the mix design from memory.

When you choose to clear a mix design, the CB-1 retains the mix design in the **mix design list**, but resets the mix design label to the default (MIX DESIGN X) and sets all the associated target values to zero (the same state as when you first create them). You can always edit a cleared mix design and modify it into a new mix design.

Press **Clear Mix Designs**. The system prompts for a supervisor passcode. Enter the passcode and press **Enter**.

The system prompts with the numeric keypad screen. Enter the number of the mix design to delete, or enter zero to clear all mix designs. You can also choose a mix design by pressing List and choosing from the list of mix designs. Press **Enter** to delete. The system prompts with the following warning:



Press **Yes** or the **1** key to continue to the numeric keypad screen and delete one or more mix designs.

Press **No** or the **2** key to cancel and return to the Mix Design menu screen.

6.4 View Mix Designs

Press **View Mix Designs** to view the current list of all mix designs. **View Mix Designs** does not require you to enter a passcode; however, you can only view the mix designs, not edit them. See Section 6.2 to edit mix designs.

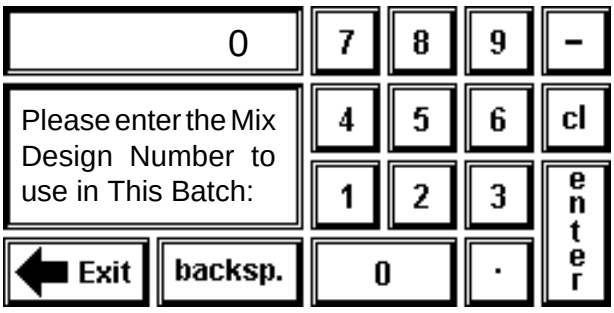
7.0 Run Batch

Use **Run Batch** to prepare and run a batch. There are several steps to actually running the batch, the first of which is to prepare the batch.

7.1 Preparing a Batch

Use the following procedure to prepare a batch for the batch run.

1. Press **Run Batch** or the **1** key to enter the Run mode. The system displays a numeric keypad screen and prompts for the mix design to run. The last mix design used should appear in the window.



2. Enter the mix design number, or press **List** to select the mix design to run from the MIX DESIGN LIST. Press **enter** to continue. If only 1 mix has been created, then the system doesn't prompt for a mix design, it loads the only one created.The mix # is the sequential order it appears in the mix design list. This # cannot be changed.
3. The system displays a numeric keypad screen and prompts for the number of cubic yards to batch. The number of yards last batched will appear in the window.
4. Enter the number of cubic yards to batch, the press **enter** to continue.
5. The system prompts for a truck ID, if configured to do so. Enter the truck ID, then press **enter** to continue, see Section 5.1.1. The last truck ID entered will appear in the window.
6. The system prompts for a Job ID, if configured to do so. Enter the job ID, then press **enter** to continue, see Section 5.1.2. The last job ID entered will appear in the window.
7. The system prompts for the water target adjust, if configured to do so. Adjust the water target, then press **enter** to continue, see 5.1.3.

The system then verifies that the mix design is valid by checking the Global Parameters you entered against the values you entered above to prepare the batch.

If the system determines that the mix design is not valid, an error message appears and the system won't allow the batch to continue.

If the system determines that the mix design is valid, the exact target weights are then calculated.

7.1.1 Calculating Target Weights

The system uses the Global Parameters, Mix Design targets, and the batch size and moisture compensation (see Section 7.1 above) to calculate the target weights. At any time you are in the Main menu or in Pause mode in the Run screen, you can press the front panel **MOISTURE** key to view a list of the aggregates and their moisture compensation percentage values. The default moisture compensation is 0.00% for each aggregate.

If a moisture compensation is greater than 0.00%, the CB-1 adjusts the target weight for that aggregate (by adding more aggregate to compensate for the higher percentage of water). The CB-1 then uses the moisture compensation percentage to calculate an exact target

weight (for aggregates) and target volume (for water) for a given draft.

7.2 The Run Screen

After you enter the initial batch information and the CB-1calculates the exact target values, the display changes to the Run screen.

Press 'Start' when ready to begin batch

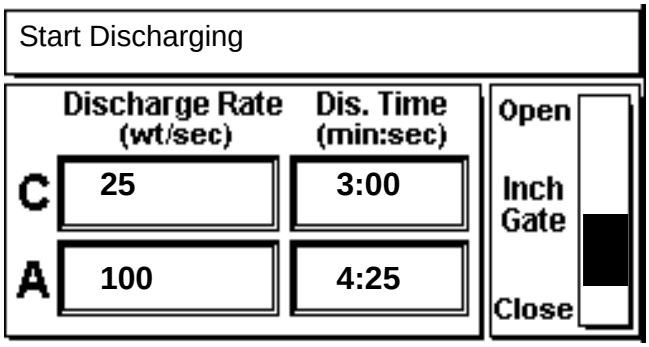
Ingredients	Target	Actual
Sand	1500	0
3/4 inch rock	750	0
Cement	450	0
Water	15.0	0.0
Admix Status	not initiated	
3500 PSI Concrete	1.50 Yd^3Lb	0

The system checks that the scales within the Zero Tolerance if configured to do so, then starts to fill ingredients. As the system fills each ingredient, the Run screen monitors the fill process in the message window (top area of the Run screen) with messages such as METERING ADMIXTURES...and WEIGHING CEMENTS AND AGGREGATES CONCURRENTLY...

The system monitors the TARGET and ACTUAL weights, updating the ACTUAL weight values in real time.

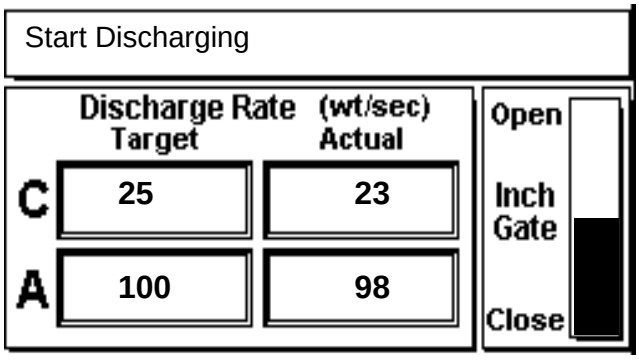
When the system is ready to discharge, the DISCHARGE screen appears.

For Manual Discharge:



While discharging, use the Up/Down arrow keys to increase or decrease the discharge rate.

For Automatic Control of Discharge



When the system finishes filling and discharging ingredients, the CB-1 automatically prints a batch report (see Section 11.3 in the Appendix for an example report). The screen displays the message: DONE WITH THIS BATCH...

7.3 Batch Pause

You can pause batching at any time by pressing the **Pause** key on the front panel. The system pauses the batch routine and displays the message: SYSTEM IS PAUSED, PRESS START TO CONTINUE. At this time, you can abort the batch, or press the front panel **Start** key to continue the batch.

7.3.1 Abort Batch

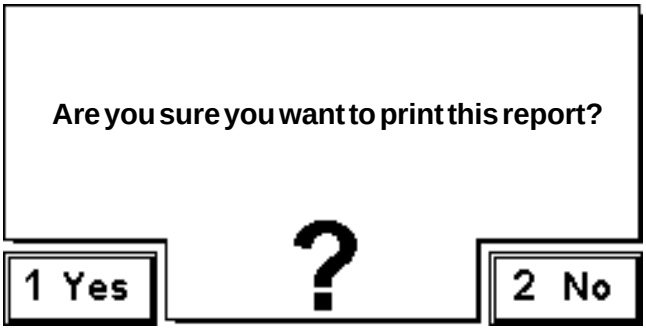
Press the front panel **Abort** key when the SYSTEM IS PAUSED to abort the batch. The system displays a warning and prompts for the Operator passcode. Enter the Operator passcode, then press **Enter** to abort the batch.

8.0 Reports

The CB-1 provides several report options. Press Reports from the Main menu to access the Reports menu.

Press the touchscreen button or the designated number key to print a report.

The system prompts: ARE YOU SURE YOU WANT TO PRINT THIS REPORT?



Press **Yes** or the **1** key to print the report, or press **No** or the **2** key to cancel the print request and return to the Reports menu.

8.1 Re-Print Last Batch Ticket

This button will print a batch ticket for the last batch run. Use this feature to get additional copies of a batch ticket, or if the printer jammed while printing.

Concrete Batch Report -
Example #1 - (Batch Type = NET, Print Units Type = LIKE MIX)

ABC Redi-Mix
1234 Main Street
Webster, WI 54789
Phone (715)455-1234

Serving Northwestern Wisconsin for more than 40 years.

"REPRINT"
Truck Number: 77
Time of Discharge: WED OCT 14 1998 11:07:08AM

Job ID: WI 12d
Name of Purchaser: _____
Job Name: _____
Job Location: _____
_____
Class: _____

Mix Design Number: (1) 3500 PSI Concrete

Batch Number: 1
Drop: 1 of 1
Amount Batched: 3.00 Cubic Yards
Water Adjust: -5.0 Gallons Initials _____

Ingredient	Req'd	Bat'd	Mix	% Tol	Wat	%Mst
3/4 inch Rock	5250	5250 lb	1750	0.00	0.00	0.00
Sand	5006	5084 lb	1600	1.55	26.2	4.30
Cement	2250	2252 lb	750	0.09	0.0	
Fly Ash	450	451 lb	150	0.22	0.0	
Water	59.2	59 gal	30.0	-0.32	59.0	
Air Entrainment	70.2	71.0 floz	2.6	1.14	0.0	
Water Reducer	121.5	123.0 floz	4.5	1.23	0.0	

Water/Cement Ratio: 0.2629
*denotes out of tolerance ingredient

End of Report

Concrete Batch Report -
Example #2 - (Batch Type = NET, Print Units Type = BOTH)

ABC Redi-Mix
1234 Main Street
Webster, WI 54789
Phone (715)455-1234

Serving Northwestern Wisconsin for more than 40 years.

Truck Number: 77
Time of Discharge: WED OCT 14 1998 11:07:08AM

Job ID: WI 12d
Name of Purchaser: _____
Job Name: _____
Job Location: _____
_____
Class: _____

Mix Design Number: (1) 3500 PSI Concrete

Batch Number: 1
Drop: 1 of 1
Amount Batched: 3.00 Cubic Yards
Amount Batched: 2.29 Cubic Meters
Water Adjust: -5.0 Gallons Initials _____
Water Adjust: -18.9 Liters

Ingredient	Req'd	Bat'd	Req'd	Bat'd	% Tol	%Mst
	U.S. Units		S.I. Units			
3/4 inch Rock	5250	5250 lb	2381	2381 kg	0.00	0.00
Sand	5006	5084 lb	2271	2306 kg	1.55	4.30
Cement	2250	2252 lb	1021	1022 kg	0.09	
Fly Ash	450	451 lb	204	205	0.22	
Water	59.2	59 gal	224.0	223.3 L	-0.32	
Air Entrainment	70.2	71.0 floz	2075.8	2099.5 mL	1.14	
Water Reducer	121.5	123.0 floz	3592.8	3637.1 mL	1.23	

Water/Cement Ratio: 0.2629
*denotes out of tolerance ingredient

End of Report

8.2 Print Material Usage Report

If you want to print a report of the total accumulated amounts of all ingredients since the accumulators were last cleared, press button number **2**. The date last cleared and the current date are printed on the report.

Material Usage Report -

Redi-Mix Concrete
9876 Main Street
Rice Lake, WI 54868
Phone (715)455-1234

Material Usage Report

From: MON JUNE 22 1998 1:24:48PM
To: TUES JUNE 23 1998 3:06:16PM
Total Cubic Yards Batched: 657.5

Ingredient	Tons
3/4 Inch	550.66
Sand	487.40
1 1/2 inch stone	33.09
Aggregate 4	0.00
Cement	246.56
Fly Ash	50.51
Slag	0.00

Ingredients	Gallons
Water	17095
A.E. 260 Air	28.89
1000 N Water Reducer	96.31
2000 RHE Non-chl Acc	308.20
1000 HE Chloride Acc	0.00
Admix	0.00
Admix	0.00

End of Report

8.3 Print Configuration

When getting started, it's a good idea to print out the complete list of system parameters with their default values. This may be a helpful reference while setting up the system

8.4 Print Mix Designs

After pressing the Print Mix Designs button, the operator will be asked to enter the mix design number. Press 0 to print reports of all mix designs.

Mix Design Report

Redi-Mix Concrete
9876 Main Street
Rice Lake, WI 54868
Phone (715) 455-1234

Mix Design Report

Time: MON OCT 12 1998 3:09:02PM

Mix Design Number: 1
Mix Design Name: 7 Bag mix

Ingredient	Target Value
3/4 inch	1700 lb
Sand	1410 lb
Cement	620.0 lb
Water	22.0 gal
Air Entrainment	2.6 fl oz

Mix Design is based on 1 cubic yard
End of Report

8.5 Reporting Options

Access to the REPORTING options is also available on the REPORTS MENU for convenience.

See REPORTING under section XX under the GLOBAL PARAMETERS section, for a description of these options.

8.6 Clear Material Usage Accumulators

Use CLEAR MATERIAL USAGE ACCUMULATORS to reset the ingredient accumulator values to zero. Press **Clear Material Usage Accumulators** or the number **4** key to clear the accumulators. The system prompts with the following warning: ARE YOU SURE YOU WANT TO CLEAR THE ACCUMULATORS?

Press **Yes** or the number **1** key to clear the ingredient accumulators. The system resets the accumulators to zero.

Press **No** or the number **2** key to return to the Reports menu without clearing the accumulators.

9.0 Appendix

9.1 Indicator Configuration Requirements

- EPD/MODE/STREAM
- EPD/BAUD/9600
- EPD/BITS/8 NONE
- EPD/TERMIN/CR/LF
- EPD/EOL DLY/O MS
- EPD/FORMAT/CC
- SETUP/TARE RS/INDUST if Batch Type = NET

9.2 CB-1 Digital I/O Map

The following table shows the CB-1 input/output relays and their associated numbers. See section 4.4.1 to test relay wiring.

Outputs			
Relay #	Function	Relay #	Function
1	Cement 1 fast feed/fill	25	Admixture 1 fill
2	Cement 1 slow feed/fill	26	Admixture 2 fill
3	Cement 2 fast feed/fill	27	Admixture 3 fill
4	Cement 2 slow feed/fill	28	Admixture 4 fill
5	Cement 3 fast feed/fill	29	Admixture 5 fill
6	Cement 3 slow feed/fill	30	Admixture 6 fill
7	Aggregate 1 fast feed/fill	31	Admixture 1 discharge
8	Aggregate 2 fast feed/fill	32	Admixture 2 discharge
9	Aggregate 3 fast feed/fill	33	Admixture 3 discharge
10	Aggregate 4 fast feed/fill	34	Admixture 4 discharge
11	Water feed/fill	35	Admixture 5 discharge
12	Cement hopper discharge gate open	36	Admixture 6 discharge
13	Cement hopper discharge gate close	37	Reserved
14	Aggregate hopper discharge gate open	38	Reserved
15	Aggregate hopper discharge gate closed	39	Reserved
16	Cement hopper vibrator on	40	Reserved
17	Aggregate hopper vibrator on	41	Reserved
18	Aggregate conveyor	42	Reserved
19	Lower dust shroud	43	Reserved
20	Water reservoir top discharge valve open	44	Reserved
21	Water reservoir washout discharge valve open	45	Spare 4
22	Mixer discharge	46	Spare 3
23	Mixer run	47	Spare 2
24	System alarm	48	Spare 1
Inputs			
1	Admixture 1 is empty	13	Water reservoir is empty
2	Admixture 2 is empty	14	OK to discharge
3	Admixture 3 is empty	15	Water pulse meter signal
4	Admixture 4 is empty	16	Cement hopper discharge gate is closed
5	Admixture 5 is empty	17	Aggregate hopper discharge gate is closed
6	Admixture 6 is empty	18	Mixer discharge gate is closed/manual
7	Admixture 1 pulse per meter signal	19	Conveyor is running
8	Admixture 2 pulse per meter signal	20	Emergency stop released
9	Admixture 3 pulse per meter signal	21	Reserved
10	Admixture 4 pulse per meter signal	22	Reserved
11	Admixture 5 pulse per meter signal	23	Reserved
12	Admixture 6 pulse per meter signal	24	Reserved

9.3 Front Panel Description

The CB-1 features a 32-key membrane keypad for operator input. The operator can also use the touchscreen for most functions. See the following sections for front panel key function descriptions.

Numeric Keypad

Use these keys for numeric value entries. The CB-1 prompts with a numeric keypad screen for numeric entries. Use either the touchscreen keypad or the numeric keys on the front panel to enter these numeric values. Press **EXIT** to clear an incorrect numeric entry. Press **EXIT** a second time to abort the numeric entry function. Press the **ENTER** key to store an entered value.

Many touchscreen buttons display a number on them. Press the displayed number to activate the associated touchscreen button.

ALARM SILENCE

The CB-1 activates an alarm whenever there is an Error or Warning condition. The system installer may wire an audible alarm, light, or both to the dedicated alarm output. Press the ALARM SILENCE key to shut off the alarm output. The alarm remains off until activated by a new Error or Warning condition.

This key also functions as a left arrow (◄) key when the CB-1 is in edit variables mode.

REPORTS

This key functions the same as the touchscreen **Reports** button, or selecting **5** from the Main menu screen. Press **REPORTS** to access the Reports menu and print any of the available reports (see Section 10.0). The **REPORTS** key is active when the CB-1 displays the initial startup screen, Main menu, and the Run, Discharge, or Mix Design screens.

CONFIGURE

This key functions the same as the touchscreen **Configuration Parameters** button, or selecting **2** from the Main menu screen. Press CONFIGURE to access the configuration parameters mode and edit system parameters (see Section 7.0). The configuration parameters mode is supervisor passcode protected. The **CONFIGURE** key is active when the CB-1 displays the initial startup screen, Main menu, and the Run, Discharge, or Mix Design screens.

MOISTURE

Press the **MOISTURE** key to to display a list of the aggregates and their associated moisture compensation percentages. This key is supervisor passcode protected and is active when the CB-1 displays the initial startup screen, the Main menu, and the Run, Discharge, Mix Design, and Reports screen.

The default moisture percentage for each aggregate is 0.0% The CB-1 does not activate any moisture compensation unless you enter a moisture percentage over 0.0%. To edit the moisture percentage, highlight and select the desired aggregate from the list. See Section 9.1.1 for more information on how the system uses moisture compensation.

START

Use the START key to start the batching sequence after you have prepared a batch (selecting the mix design number and entering the volume).

The START key also serves as a re-start key if the system is Paused after you press the PAUSE key, after an Error condition occurs, or some other user input is required.

The START key functions the same as selecting 1 Run Batch from the Main menu. In this case, the CB-1 begins batching by displaying the prompts for the mix design number, volume, and other batch preparation screens.

ABORT

When the CB-1 is in Pause mode and displaying either the Run or Discharge screen, press the **ABORT** key to abort the current batch. Note: You must Pause the batch in order to abort. Pressing the **ABORT** key while the batch is running has no effect. This abort function requires a supervisor passcode. If you abort a batch, theCB-1 warns you that aborting a batch may leave material in the weigh hoppers. Some used ingredients may not be recorded for accumulation when you abort a batch.

PAUSE

Use the **PAUSE** key to pause the batching sequence. The Pause mode closes all gates, but mixers, augers, and belts continue to run. All material stops filling or discharging. The CB-1 enters a Pause mode if it detects an Error condition

or some other user input is required (between drafts, for example).

UNITS

Press the **UNITS** key to change the units on the IQ plus 350 indicators from Lbs to Kgs, or vice versa. The **UNITS** key is active in the initial startup screen, the Main menu, and the Run and Discharge screens if the the batch is not running. Note: The units displayed on the Run screen represent the units you configured for the mix design. See 2.3 “DIP Switch 3” for using Metric as your primary unit.

Before beginning a batch, the CB-1 checks that the units you configured for the mix design is the same as the units the indicator is displaying. If not, the CB-1 displays a warning.

The **UNITS** key also functions as an up arrow key (▲) in edit variables mode.

TOLERANCE ACCEPT

Use the TOLERANCE ACCEPT key to allow the CB-1 to accept that is outside the preset tolerance band. Note: You can configure the upper and lower tolerance values separately in the Ingredients list.

When the CB-1 encounters an out of tolerance condition, the system pauses and displays an Error message. Press the **TOLERANCE ACCEPT** key to accept the out of tolerance weight and continue batching. Note: The only other option for out of tolerance weights is press the **ABORT** key and abort the batch.

The **TOLERANCE ACCEPT** key also functions as the down arrow key (▼) when in iedit variables mode.

FAST/OPEN RATE CONTROL

While the CB-1 is discharging the ingredients, use the **FAST/OPEN** key to inch open the gates on the aggregate and cement hoppers to fill faster. Each time you press this key, the CB-1 energizes the gate open relay for a specified amount of time (see Section 5.3.1).

The **FAST/OPEN** rate control key also functions as an up arrow key (▲) while in edit variables mode.

SLOW/CLOSE RATE CONTROL

While the CB-1 is discharging the ingredients, use the **SLOW/CLOSE** key to inch close the gates on the aggregate and cement hoppers to fill slower. Each time you press this key, the CB-1 energizes the gate close relay for a specified amount of time (see Section 5.3.1).

The **SLOW/CLOSE** rate control key also functions as a down arrow key (▼) while in edit variables mode.

Power ON/OFF Turn Key

This turn key controls the power to the two IQ plus 350 indicators, the LCD touchscreen, the two 5-volt power supplies, and the CB-1 board set.

EMERGENCY STOP

The EMERGENCY STOP or E-STOP is a large red mushroom push-button located on the front of the CB-1 enclosure. Press the E-STOP button to immediately pause the current batch sequence and deenergize all outputs.

Once you press the **E-STOP** button, you have two options:

1. Release the **E-STOP** button (push in and turn), then press the **START** key. The CB-1 then resumes batching from that point at which you pressed the **E-STOP**.

2. Leave the **E-STOP** button pressed, then press the **ABORT** key. This allows you to abort the current batch and reset the system. Note: You must manually discharge any materials remaining in the weigh hoppers from a partial batch. If you do not clear the remaining materials, the dead weight will cause a zero tolerance alarm.

EXIT

This key is mapped to the **Exit** button on the screen. Its purpose is to quit what ever editing function or menu is currently displayed and return to the previous screen. The Exit key is only active when the Exit button on the screen is displayed.

F1

Function key 1 used to tweak admixture targets for the current batch. For the F1 key to be active (it must be active otherwise pressing it will have no effect), “Change Admix Targets” under the Option List must be set to YES and a batch is ready to run. If active, pressing the F1 key will show all the admixes and their amount for 1 yard of the current mix design. At this point, the user is free to edit how much

of each admix he/she wants in this, and only this, batch. The target values for admixes are changed, for the current batch only, but the mix design remains un-edited.

F2

Function key 2 is used to preload the water for the current batch. *MAKE SURE A TRUCK IS IN POSITION BEFORE PRESSING THE F2 KEY!* For the F2 key to be active (it must be set to YES and a batch must have be "prepared" and ready to run, in the weighing cycle, or waiting for the "DISCHARGE" key to be pressed, and the system is configured to meter water directly into the truck (not into a reservoir). If active, pressing the F2 key will start the water addition. If there are admixtures that are configured as bottle, they will be metered into their bottles first.

F3

Function key 3 is used to view, edit and print the preact array for each ingredient. Pressing the F3 key while in CONFIGURATION PARAMETERS menu is displayed will allow the user to view and edit all the preacts for all the ingredients. Press **Exit** to abort view/edit of preact arrays. Edit then press **Enter** or just press **Enter**, to move to next preact value. If you press F3 key while in the REPORTS MENU, the preact matrix report will be printed. All other time the F3 key is disabled.

F4

Function key 4 is reserved for future use.

LCD Touchscreen

The CB-1 uses a 256 × 128 pixel (16 × 32 character) backlit LCD touchscreen to display information and as an input device. You can enter most input either by using the front panel or the keypad; however, alphanumeric entries require the use of the alphanumeric screen available only on the touchscreen display. You can adjust the screen contrast by selecting 6 **Set Contrast** from the Main menu (see Section 5.0).

9.4 Wiring Diagrams

The reference numbers for the wiring diagrams included with this manual are listed below.

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CB-1 Limited Warranty

Rice Lake Weighing Systems (RLWS) warrants that all RLWS equipment and systems properly installed by a Distributor or Original Equipment Manufacturer (OEM) will operate per written specifications as confirmed by the Distributor/OEM and accepted by RLWS. All systems and components are warranted against defects in materials and workmanship for one year.

RLWS warrants that the equipment sold hereunder will conform to the current written specifications authorized by RLWS. RLWS warrants the equipment against faulty workmanship and defective materials. If any equipment fails to conform to these warranties, RLWS will, at its option, repair or replace such goods returned within the warranty period subject to the following conditions:

- Upon discovery by Buyer of such nonconformity, RLWS will be given prompt written notice with a detailed explanation of the alleged deficiencies.
- Individual electronic components returned to RLWS for warranty purposes must be packaged to prevent electrostatic discharge (ESD) damage in shipment. Packaging requirements are listed in a publication, "Protecting Your Components From Static Damage in Shipment," available from RLWS Equipment Return Department.
- Examination of such equipment by RLWS confirms that the nonconformity actually exists, and was not caused by accident, misuse, neglect, alteration, improper installation, improper repair or improper testing; RLWS shall be the sole judge of all alleged non-conformities.
- Such equipment has not been modified, altered, or changed by any person other than RLWS or its duly authorized repair agents.
- RLWS will have a reasonable time to repair or replace the defective equipment. Buyer is responsible for shipping charges both ways.
- In no event will RLWS be responsible for travel time or on-location repairs, including assembly or disassembly of equipment, nor will RLWS be liable for the cost of any repairs made by others.

THESE WARRANTIES EXCLUDE ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING WITHOUT LIMITATION WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. NEITHER RLWS NOR DISTRIBUTOR WILL, IN ANY EVENT, BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

RLWS AND BUYER AGREE THAT RLWS'S SOLE AND EXCLUSIVE LIABILITY HEREUNDER IS LIMITED TO REPAIR OR REPLACEMENT OF SUCH GOODS. IN ACCEPTING THIS WARRANTY, THE BUYER WAIVES ANY AND ALL OTHER CLAIMS TO WARRANTY.

SHOULD THE SELLER BE OTHER THAN RLWS, THE BUYER AGREES TO LOOK ONLY TO THE SELLER FOR WARRANTY CLAIMS.

No terms, conditions, understanding, or agreements purporting to modify the terms of this warranty shall have any legal effect unless made in writing and signed by a corporate officer of RLWS and the Buyer.

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