BatchTron III

User's Manual

VERSION 3, Oct. 2003

INFORMATION HOT LINE

Should you have any difficulty in installation, operation or maintenance of your BatchTron III batching system, our staffs are available to help you during normal business hours and at any other time by special arrangement.

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CONTENTS

1.0 Introduction

BatchTron is the latest advance in batching controllers. Integrating scale indicators, liquid counters, controls, indicators and formula database, BatchTron is the world's first completely touch-screen controlled batching system. This technology gives the advantages of higher reliability, better control and faster operating speed at a low overall cost. Changes are easier too. Because controls are on the touch screen, new controls and complete screens can be added in software, allowing additions and changes to be made and loaded from a computer or through a phone line and modem. **BatchTron III** stores a variable number of formulas depending of the number of ingredients (e.g. for 16 ingredients there are 260 formulas available), allows adjustment of all batching parameters and is completely self-tuning, giving the highest accuracy at the fastest possible batching speed for the conditions.

2.0 Operational Screens

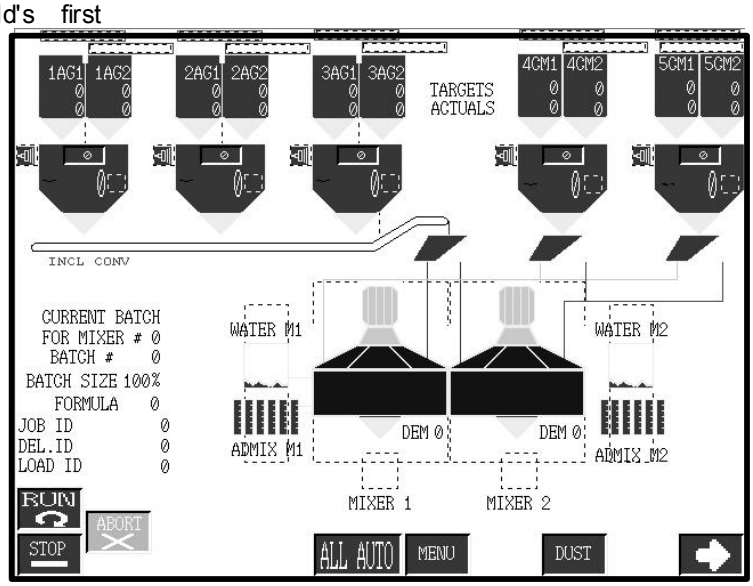
2.1 Control Screens

BatchTron-III has the capability for 250 different screens, although only a few of these are used. Some screens control plant functions while some allow data entry. Scrolling through the screens is done with the arrow buttons in the bottom corners. The **MENU** button provides access to the setup screens, which require a password before they can be altered, as does the formula screen.

Shortcuts are provided from the main screen to other areas; pressing anywhere in the top "bin" area will access the **MENU** screen while pressing the water or admix areas will access the water/admix screen. Other shortcuts will be provided when appropriate.

The screen arrangement is customized to your plant. Thus, some screens will differ from the description or may not appear. Some custom screens will not be described here, but their features and operation conform to the standards of this manual.

2.1.1 Batching screen



Before turning on any equipment, ensure that nobody is working on or around the plant machinery. Ensure that all personnel are aware that equipment will start automatically and warn them before you start. Post warning notices on conveyors and mixers. Check the mixer in particular and ensure that the main power switch is open before allowing access. Keep the large red emergency STOP button in the depressed state until you are ready to start. At any time during operation when you want to stop the equipment or if you think that someone is in danger, press the STOP button. All plant equipment controlled by the BatchTron will stop, but when you restart, it will continue from where it left off.

When you are sure that it is safe, turn on the **POWER** circuit breaker. The batching graphic screen will appear.

The batching screen shows a diagram of the batch plant. Along the top are aggregate bins and cement silos. On top of each bin is marked the name of the ingredient. Two rows of data are displayed. The **TARG** row displays target weights and the **ACT** row displays actual values during and after each material feed. The bin bottoms are actuator buttons, which feed

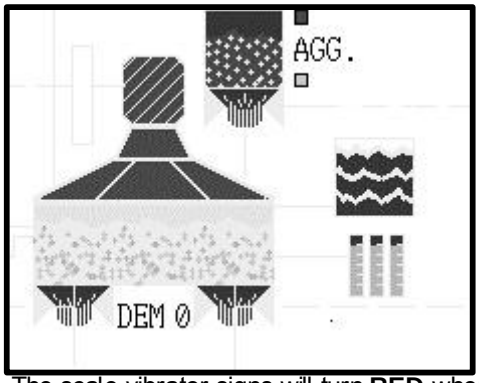
material into the scales. These are active any time that this screen is displayed.

Caution! pressing these FEED buttons will feed material. To prevent accidental feeding when the system is not in use, press the red emergency stop button on the console.

Below the feed buttons are the scale hoppers; each has a weight display, a **Zero** button (in the box) and a discharge button (hopper bottom). The **Zero** button will zero the scale reading to compensate for drift, material buildup and equipment maintenance.

Similar to the **FEED** buttons, the **DISCHARGE** button will open the scale discharge gate. Use caution.

Below the scales are the flop gates symbols witch will change the position to the mixer used (1 or 2) in relationship with the Demand started. Underneath the flop gates are themixer symbols. The top zone of the mixer is the mixer start/stop switch, **RED** when stopped. When it is pressed, the **MIXER START ALARM** sounds for 10 seconds before starting the mixer. This zone turns **GREEN** to indicate that the mixer is running. When the mixer is full it appears as below, representing the **MIX**.



The scale vibrator signs will turn **RED** when related vibrators activated in automatic mode or when buttons are pressed (off position is **BLUE**).
The body of the mixer turns **YELLOW** when the mixer is empty.

The water and admix symbols turn **DARK BLUE** when filling is in process.

Three buttons control the batching action. **RUN** restarts operation when stopped. **STOP** halts material feed or scale discharge. **ABORT** allows the batching process to be cleared when a fault has occurred. The batch must already have been stopped before it can be aborted.

ALL AUTO sets all the **AUTO** buttons throughout the system to **GREEN** with one operation. Most **AUTO** buttons revert to **OFF** when power is turned off or lost.

In **AUTO** mode, discharge occurs automatically when the mixing time is complete and the external input (if connected) is enabled. The scales will automatically discharge into the mixer provided that the previous mixer cycle is completed; if the mixer symbol on the batch screen is representing the **MIX**, it signifies that a mixer cycle is in progress. To cancel a mixer cycle, the discharge must run its full course in **AUTO** mode or the discharge door must be opened in **MAN** mode for at least the normal discharge period (see **SETUP** menu for time). For **MANUAL** control see section 2. 1. 3.

The scale discharge sequence is defined from the delay times in the **SETUP** menu. Normally, aggregate discharges first, followed by cement, water and admixes.

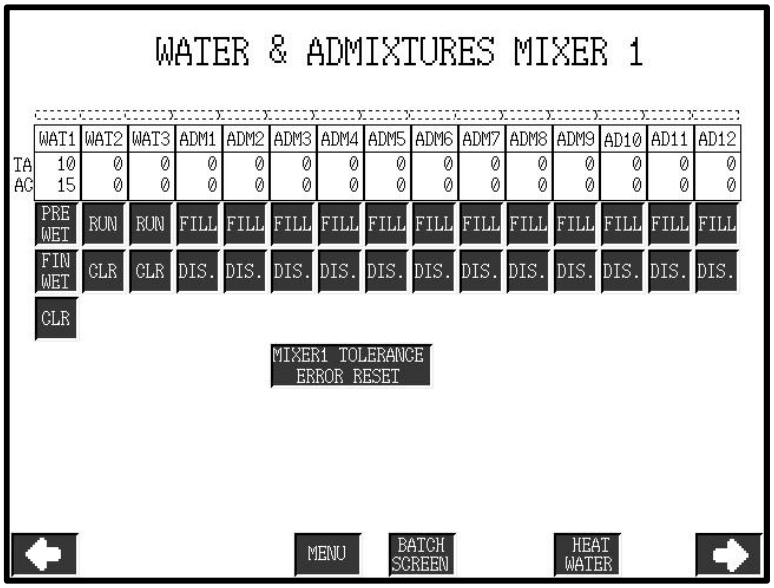
Three buttons are common to all other Control screens:

MENU will bring up the **DATA ENTRY MENU** for System Setup,

BATCH SCREEN will return to the Batch screen,

DEMAND will bring up the **SET UP FORMULA/SIZE TO RUN** screen for normal cycle settings(if in normal operation the demands are started from “Order entry” in host computer this screen will be accessed by password if Batch Link computer faulty; demands will start in “Low priority”).
Refer to Batch Link Manual for Order Entry operation. **JOB ID, DELIVERY ID** and **LOAD ID** will be available only for Order Entry operation.

2.1.2 Water/Admix



This screen can be reached by pressing the water or admix areas, on the batching screen. The water and admix columns show the **TARGET** amounts and then the **ACTUAL** amounts below.

The buttons under the **WAT1** symbol will feed water when pressed and indicate feeding in auto mode by turning **BLUE** (**PREWET** is related to the fast water valve and **FINAL WET** to the slow water valve). The **CLR** button will clear the actual value when pressed, only if mixer shows empty).

The **FILL** and **DIS.** buttons under the admix symbols fill and discharge the sight glasses when pressed. If admixes are fed directly, only the **FILL** buttons are active.

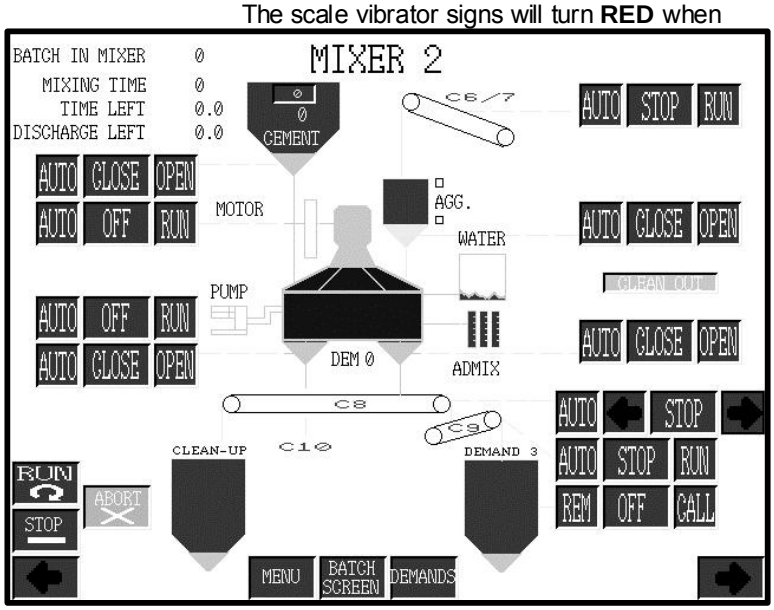
The **MIXER TOLERANCE ERROR RESET** button will turn **RED** when a liquid tolerance error is founded in AUTOMATIC mode. The button has to be pressed in order to reset the alarm and the screen will automatically jump to Batching screen.

2.1.3 Mixer screen

Each mixer, plus the controls associated with charging and discharging, is displayed on a separate screen. To access the individual mixer controls press the \ button until the desired mixer is reached.

At any time individual pushbuttons can be used to manually operate mixer motor, hydraulic pump, flop gates and discharge doors. The conveyors can also be controlled by their respective **AUTO/STOP/RUN** button sets. In the case of reversing conveyors, the arrow buttons are directional **RUN** buttons

When the mixer is full, the mixer symbol turns to the **MIX** representation. After all ingredients have been discharged into the mixer and mixed for a preset time, the mixer symbol flashes. This indicates that the mixer is ready for discharge.
The scale vibrator signs will turn **RED** when



related vibrators activated in automatic mode or manually - when buttons are pressed(off position is **BLUE**).

To discharge the mixer manually when the bucket or container is under the discharge door, press the **OPEN** button on the **MIXER CONTROL** screen to open the discharge door

(**JOG** button, if present, has to be pressed afterwards if jog mode is used to open the door). Pressing **CLOSE** will close it. This method will open the door regardless of whether the mix is ready, and is not the best method.

To manually initiate an automatic discharge when the mix is ready, ensure that the **AUTO** discharge button is off (**BLUE**). When the bucket or container is in place, press the **AUTO** discharge button. Now, when the mix is ready, the door will open automatically, discharge the mix and close when its discharge time is done. This method ensures that the mixing cycle is complete and will discharge the mixer as soon as it is ready. To turn the **AUTO** button off, press the **CLOSE** (or **OPEN**) button.

To automatically discharge the mixer from an external input, ensure that the **AUTO** discharge button is on (**GREEN**) and energize the remote **MIXER DISCHARGE ENABLE** input. This can be connected to a bucket sensor to allow discharge only when safe.

If the normal operation starts from Demand Stations (not from Batch Link computer) then the **BATCHTRON MIXER SCREENS** have **REM, OFF**, **CALL** buttons allow control of the **MIXER** from **DEMAND STATIONS** local to the casting station or bucket filling positions. They allow the delivery of a pre-chosen mix design and batch size whenever the holding bin is empty, or a bucket is in place for filling.

In **REM**ote, batches are requested from the **DEMAND STATION.** In **OFF**, batches are requested from the **BATCHTRON SCREEN.** In **CALL**, batches will be requested even though the bin level is not low. This allows the station to accelerate occasional batches to speed production of large castings.

MIXER CLEANOUT where provided, allows local control of mixer functions and locks out automatic operation during cleaning and maintenance. Pressing the **CLEAN OUT** button will block control of mixer motor (discharge open/close, scale discharge open/close as well as other functions when appropriate). This control can also be used to take a mixer off line when desired.

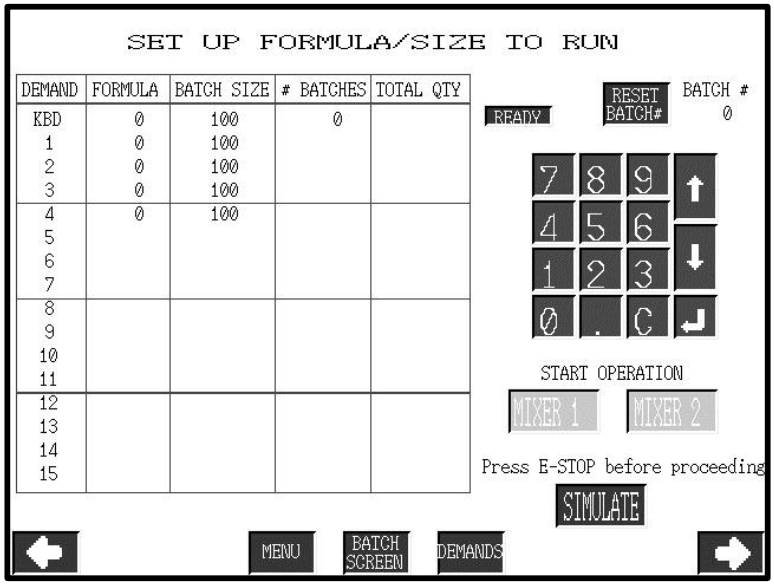
The three keys controlling the batching action. **RUN** . **STOP** and **ABORT** are duplicated on the **MIXER SCREEN**, allowing the cycle to be controlled from this screen. More detail is available on this screen, with batch number and mixer times provided in the top left corner and the demand number of batch in mixer shown beneath the mixer.

2.2 Run batch

2.2.1 From DEMAND button

In precast, block or paver plants, operation is normally set up on the **DEMAND** screen. This is selected by pressing the **DEMAND** button at the bottom of most screens. The **SET UP FORMULA/SIZE TO RUN** screen appears.

For **Batch Link Order Entry** operation, please refer to **Batch Link Manual**.



The **SET UP FORMULA/SIZE TO RUN** screen allows a formula and batch size to be set up for each user location in the plant. These **DEMAND STATIONS** can use the same or different formulas or batch sizes. Each time a station calls for a batch, the chosen formula and batch size will be made and delivered.

The **DEMAND** column represents the destination or **DEMAND STATIONS.** Use the

é and ê buttons to locate the cursor at the **DEMAND STATION** to be edited and press **ENTER.** The cursor moves to the **FORMULA** column which you want to run. Use the é and ê buttons to scroll through the formulas in memory to the required one and then press **ENTER**.. The cursor moves to the **BATCH SIZE** column. If a 100% batch is required simply press **ENTER**. For a different size use the keypad to enter the desired batch size as a percentage of the formula size, then press **ENTER**.

NOTE: Concrete formulas are normally stored as one cubic yard or cubic meter, which is equal to 100%. To batch a 2 cu. yd. or cu. m. mix, enter 200%. To batch a 3/4 cu. yd. (cu. m.) mix, enter 75%.

The cursor moves to the # **BATCHES** column. Enter the number of batches desired for the production run and press **ENTER**. The **TOTAL QTY** column calculates the total quantity based on the mixer capacity in the **SETUP** menu and the number of batches. If the operation calls for continuous production, enter **0** in the # **BATCHES** column, followed by **ENTER.** The process will then not stop unless stopped externally by the demand station switches.

Note that **RESET BATCH** # will return the system to the beginning of the production cycle. Press **READY** in order to effect these changes on the next batch..

If external demand stations are used, the **REM** buttons on the mixer screen enable the system to accept batch calls from each station. The station controls must then be set correctly in order to start batching. These are customized to the plant and are explained specifically during startup.

The **SIMULATE** button allows the production cycle to run in the **SIMULATE** mode. This mode is useful for training or fault-finding purposes.

Note: for this mode, the red E-STOP button on the console must be depressed, to prevent actual plant equipment such as aggregate feeds and conveyors from running.

The system will run through batch and mixing sequences, just as if real batches were being made. Operators can be taught the different functions in this way. Since PLC outputs are live, these can be checked for correct sequencing in the case of an equipment failure. **SIMULATE** mode is cancelled by pressing the **SIMULATE** button once again.

2.2.2 From Batch Link Order Entry operation

Please refer to Batch Link Manual for this kind of operation.

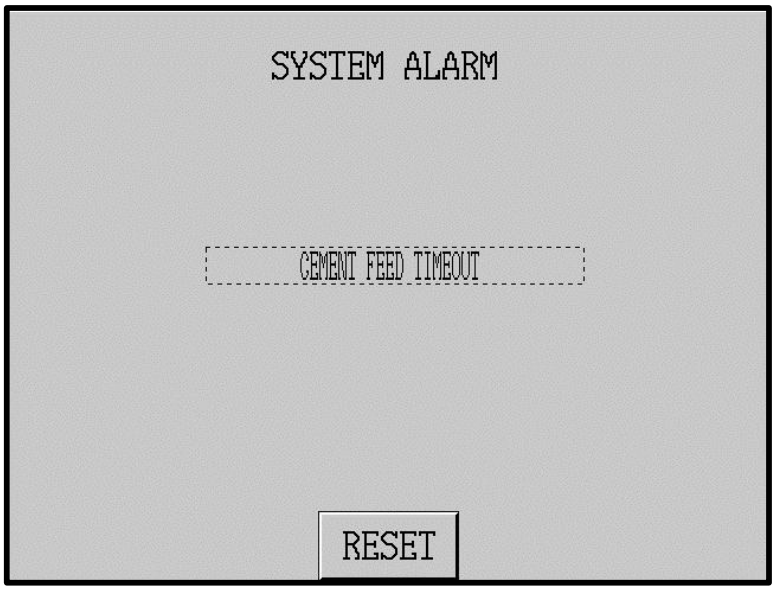
NOTES:

Starting the Demand selects the first line, **KBD**, of the **SET UP FORMULA/SIZE TO RUN** screen.

When all is ready and you have ensured that no personnel are working on the equipment, turn the large red emergency **STOP** button on the console to the right to energize the external equipment. Initiate the batch. The **RUN** button should turn **GREEN** and the target weights should appear on the screen.

If the **STOP** button is still **RED** the pre-start conditions have not been met. These differ from one system to another but check that the scale discharge gates are closed and any other input enabling conditions are met, such as **BIN LOW PROBE** when feeding dry cast to a holding hopper, or a **BUCKET IN PLACE** signal when feeding wet cast buckets.

2.2.3 Alarm screen



If after a few seconds the alarm message **OVER ZERO BAND** appears on the red **SYSTEM ALARM** screen, one of the scales is off zero. Press the **RESET** button and note the scale readings. If one is over the zero check band, check to ensure that no material is sticking in the scale hopper and press the **ZERO** button for the appropriate scale. When the scale indicates zero, press the **RUN** button again (If cannot zero, out of range).

Other alarm messages will appear if the feed time exceeds the timeout value, the weight tolerance for an ingredient is exceeded, the admixes do not fill properly, the scales do not discharge within the allotted time or equivalent faults in the mixing cycle. Note the message and press the **RESET** button to return to the batch screen.

If more than one alarm is active, the messages will alternate. To return to the screen you were viewing, press the **RESET** button.

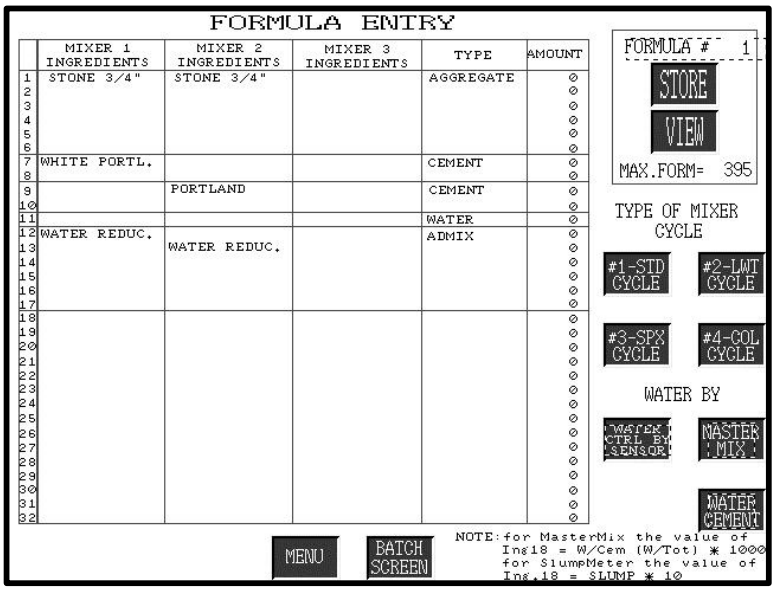
2.2.4 Ingredient trimming

If you need to alter the amount of one or more ingredients, access the **FORMULA ENTRY** screen via the **MENU** button and **PASSWORD** (or use the "short cut" method - touch anywhere above the hopper feed gates). Use the é and ê buttons to locate the ingredient to be changed or touch the entry area.

Enter the new value, press the **STORE** button and the formula will be permanently modified. When you return to the **BATCH** screen, the modified formula will be used on the next batch.

In order to view a formula, enter the formula number, press **Enter** followed by **VIEW** button.

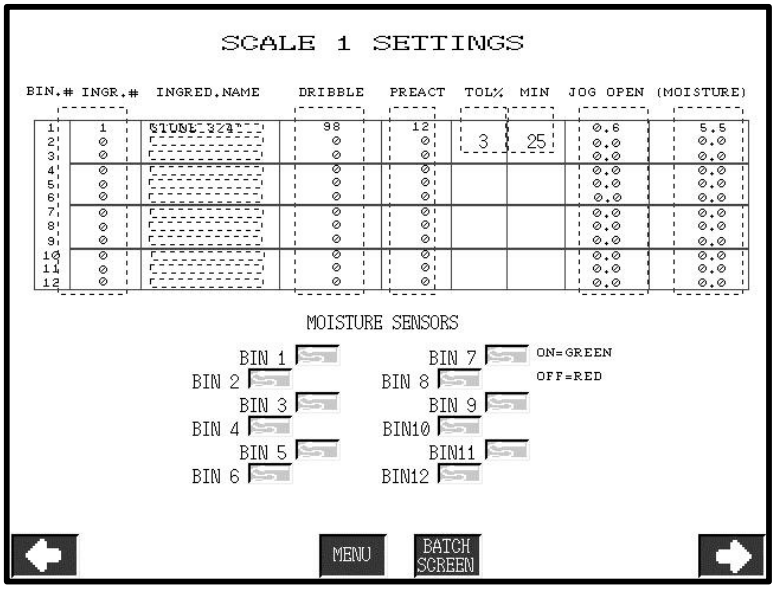
For a detailed description of the **FORMULA** screen see section **3.0 SYSTEM SETUP.**



2.2.5 Feeder timing

The **AUTOMATIC FEEDER TUNING** feature will adjust the dribble, preact and jog open time values during operation. They may need to be corrected if a plant breakdown, material bridging or an empty bin has circumvented the automatic process.

If you do need to adjust the performance of ingredients, these settings are entered on the **SCALE (1 TO 5) SETTINGS** screens.
Also these settings are preloaded from **INGREDIENTS SETTINGS** screens, when screen's button **Enable Load Dr.Pr** is activated; see paragraph 3.3 Ingredient Settings, for details.



These screens are reached by the **MENU** button and appropriate **PASSWORD**.

Highlight the selected entry area using the é and ê **buttons** or simply touch the entry area. This also brings up the keypad.

For more information on these screens see **Section 3.3**.

2.2.6 Aggregate Moisture

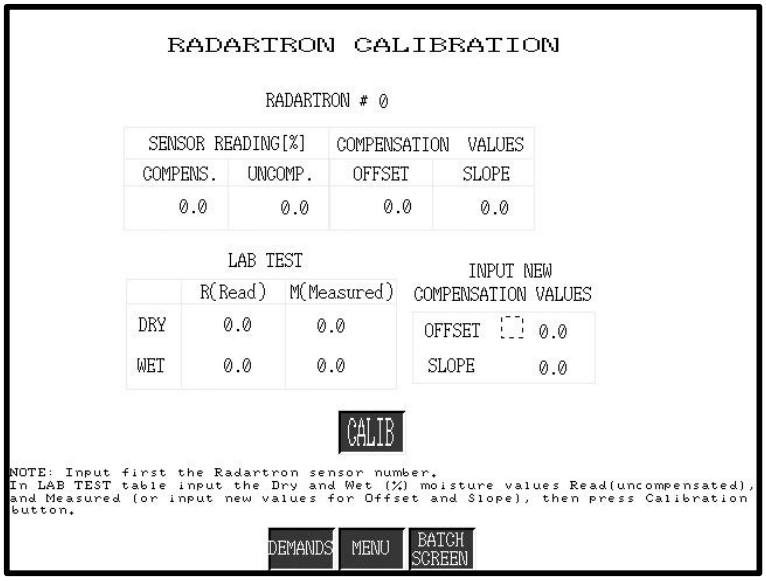
The surface moisture in aggregates will cause an error in the batched weights unless compensated. **BatchTron III** allows both manual and automatic entry of moisture values. Once entered, both the weight of aggregate and the water value are automatically corrected as a result. You will notice that the aggregate target weights on the batch screen will be higher than they were before compensation.

To enter manual Moisture values, select the field for aggregate 1 to 6 using the é and ê buttons. Enter the moisture value, with decimal point, followed by **ENTER**.

To initiate automatic moisture compensation from a sensor such as the **RadarTron 1400C**, press the **AUTO** button (picture of sensor) for the appropriate aggregate bin, which will turn green when activated. Typically, one or two aggregates will use automatic sensors and the others will have manual moisture entry. If an automatic sensor is faulty, turn it off by pressing **AUTO** a second time and enter the manual value on the keyboard.

2.2.7 Radartron calibration screen

This screen is reached by the **MENU** button and appropriate **PASSWORD**.



The operator selects first the appropriate Radarton number.
SENSOR READINGS table shows the actual moisture values compensated and uncompensated for the selected Radartron sensor number.
COMPENSATION VALUES table shows the offset and slope values for the selected Radartron sensor number. These values applied to the uncompensated sensor reading will give the compensated sensor value. The calculation formula:
Moisture(comp)=
[Reading(uncompensated)-Offset]/Slope
The compensated and uncompensated values will coincide initially, when the offset equals “0” and the slope equals “1”.

The operator will take sand samples to determine the humidity upon the dry oven procedure and must write down the moisture M(measured) and R(read-uncompensated from the **SENSOR READING** table), at that specific time.
In order to make a good calibration, two different moisture readings, in a sufficient range of humidity(dry and wet) should be taken.

Then the calculated moisture M(%) and the uncompensated reading R(%) should be entered in the **LAB TEST** table. After the values are entered in the table for the two different points, the **CALIB** button is pressed and the **COMPENSATION VALUES** offset and slope will automatically change upon the data entered and the actual compensated moisture reading will change maching the new calibration curve.

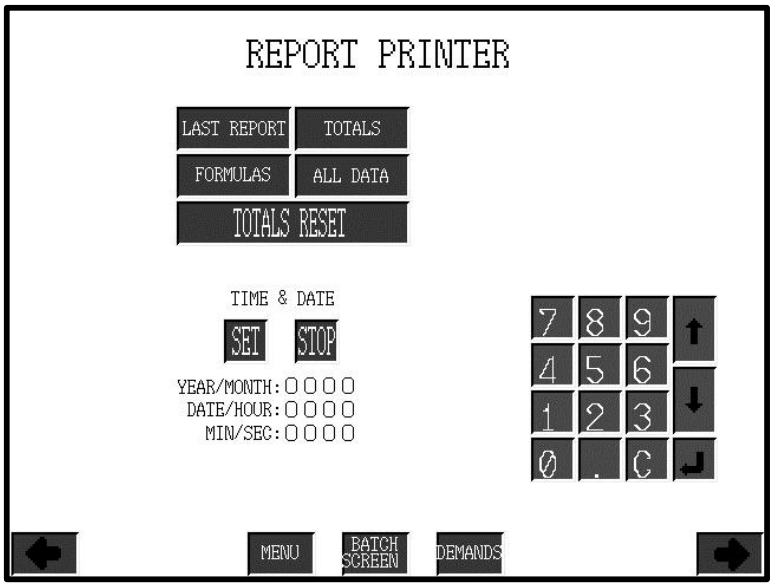
A second calibration procedure can be used, by input the compensation values directlly into the **INPUT NEW COMPENSATION VALUES** table and pressing the **CALIB** button.

Both procedures can be repeated any time for each Radartron sensor.

By simply touching the entry area the entry will be highlighted and the decimal keypad will pop-up.
Then highlight the selected entry area using the é and ê buttons on the keypad.
Up to 12 Radartron sensors can be accomodated.

2.2.8 Print Reports

This is available only on those systems with a



printer and a time and date option.

To enter Time and Date press **STOP** to allow entry. Highlight the **YEAR/MONTH – DATE/HOUR –MIN/SEC** lines in turn, using the é and ê buttons and enter the value by the keypad, followed by **ENTER**. Finally press the **SET** button to set and restart the clock.

LAST REPORT - prints the report of the last batch made. This is useful if the last batch printout was not obtained due to a printer malfunction or lack of paper. Note that this information is available only up to the start of the next batch. When **BATCHLINK** is used this button will retransmit data to the computer for testing purposes.

FORMULAS – (not available on some systems) prints all stored formulas.

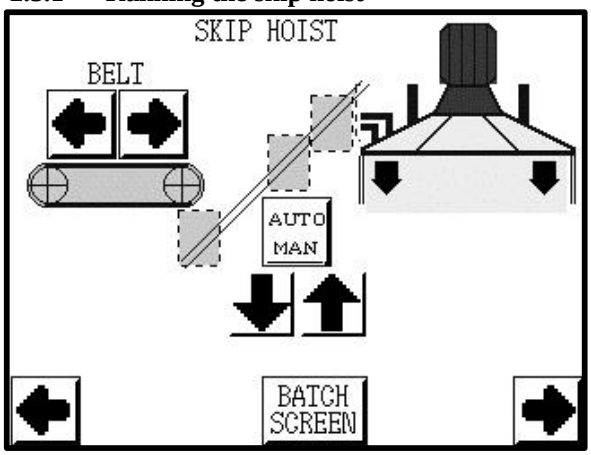
ALL DATA – (not available on some systems) prints formulas plus all setup data. This should be used to keep a record of all parameters in case the PLC unit has to be replaced.

TOTALS – prints total usage quantities of individual aggregates and cements since last **TOTALS RESET**, usually at end of day.

TOTALS RESET – clears the memory of stored totals; it is normally pressed after each **TOTAL**, unless continue accumulating totals.

2.3 Optional Controls

2.3.1 Running the skip hoist



Available on systems with skip hoist option, the skip hoist screen allows the skip hoist to be controlled. Use the è button to locate this screen. Always ensure that during normal running, the **AUTO** button is **ON** (green), which allows automatic charging of the mixer.

During operation, the skip can be stopped by pressing the **MAN** button on this screen and can then be raised or lowered by pressing the é and ê buttons. Pressing **AUTO** will restart the operation where it left off, under the control of the batching system. Skip position (**DOWN**, **HOLDING** and **DISCHARGE**) is shown by the graphic symbols, which turn yellow when the illustrated positions are reached. In between these positions, no indication is given but the manual **RAISE** and **LOWER** buttons light to show operation.

2.3.2 Slump Meter

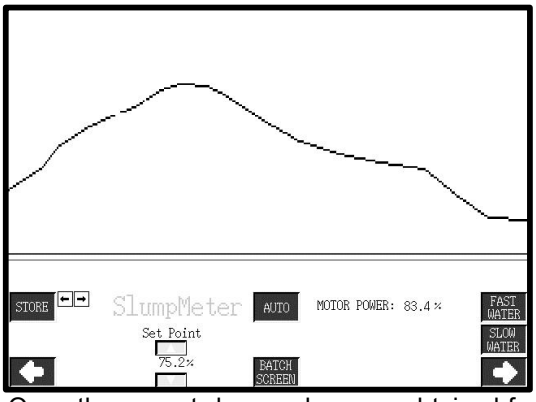
The slump meter screen is available only with the slump meter option. It provides a low cost method of controlling the water to get consistent slump in wet cast concrete.

The reading is a measure of mixer motor power. As water is added to the dry material, the power reading will increase until a "zero slump" mix is attained; the reading will then drop sharply as more water is added. This indicates an **INCREASE** in actual slump.

The curve shows mixer motor power. To operate correctly, the water start delay must be long enough to allow most or all of the dry material to enter the mixer in order to raise the power to a high value. The water will then flow until the power decreases to the set value.

The **FAST** and **SLOW** water turn on and run to set value. **FAST** water then turns off and **SLOW** water runs to the final set value. After a programmed mixing time the mix is ready.

When setting the **SLUMP METER** for the first time, add water by pressing the **FAST** and **SLOW** buttons until the desired slump is obtained. Note the **MOTOR POWER** reading. Set the **SLOW** point at a little above this value. Retain this value in **FORMULA** memory by pressing **STORE**.



Once the correct slump values are obtained for different mixes they can be entered in the **FORMULA** screen. Each formula can have a different slump value, which will be retrieved and executed automatically.

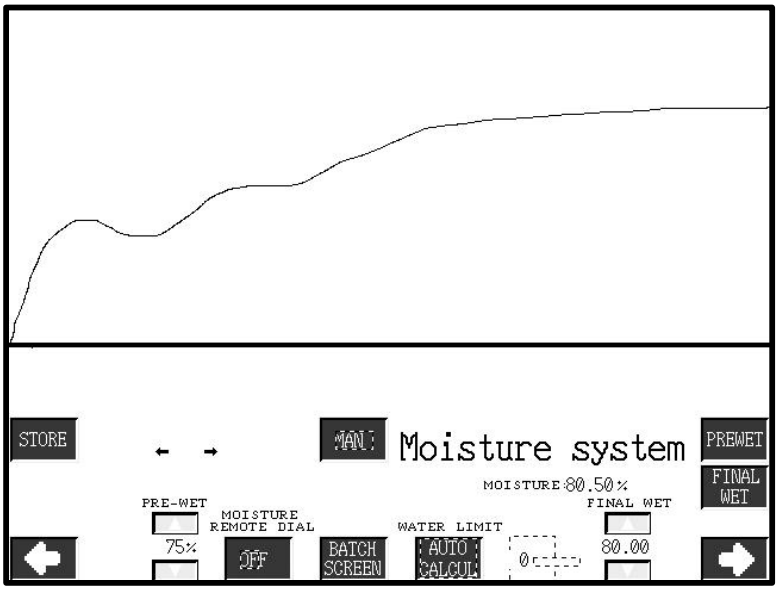
NOTE: 1.Super plasticizer is normally added **AFTER** the water has been added, which will make the slump much greater. Adjust the initial slump for 2" (5cm) and add enough super plasticizer to attain the desired final slump value.

2. The **FAST** water cutting point is automatically processed by the PLC program (when the power is going down).

Since the slump meter measures motor power, the correct setting will change if the batch size changes. Be aware and adjust the set point accordingly.

2.3.3 MicroMix

The MicroMix screen is available only with the MicroMix option. It provides a low cost alternative to the **MasterMix** or equivalent water control system and is suitable when a short mixer cycle time is not of major importance.



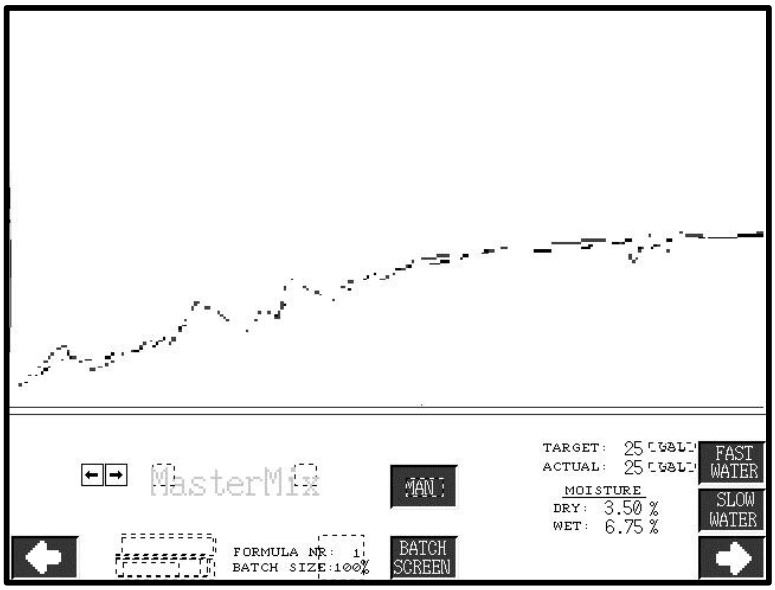
When the mixer cycle starts in **AUTO,** the **PREWET** water runs to set value, which is defined as a percentage of the **FINAL WET** set value. Water then turns off for a programmable delay and then the **FINAL WET** turns on and runs to the set value. After an equal programmed delay, the mix is ready.

PREWET and **FINAL WET** buttons can be used for manual water feed. To set-up the first batch, add water manually by pressing these buttons until the moisture in the mix is correct. Note the "**Moisture**" value on the screen and set the **FINAL WET** indication to this value by using its ↑ or ↓ buttons. Pressing **STORE** enters this value into the formula in use.

The **PRE-WET** value is a fixed percentage of the **FINAL WET** value. After the moisture has been set correctly, monitor the **PREWET** and **FINAL** lamps and time the addition of water in each case. Ideally the **PRE-WET** water should run for 30 to 60 seconds and the **FINAL** water for 45 to 90 seconds. If **FINAL** exceeds 90 seconds, increase **PRE-WET** value, if less than 45 seconds, decrease **PRE-WET** value. When the time is correct, note **PRE-WET** setting, if it is less than 85 seconds, decrease the final wet flow rate by increasing the pressure regulator setting (conical valve on the water valve assembly, turn the adjusting screw clockwise.). If the time is more than 90 seconds, increase the flow rate (turn screw counter clockwise).

The graph shows two curves. The blue curve is the direct moisture reading and the white curve is average moisture. The two curves are used in setting up the system by observing the mixing action. Although this curve will eventually scroll off the screen, it can be viewed by use of the arrow buttons immediately under the graph.

The water limit feature allow the system to set a maximum value for the water added to mix, therefore cutting the water if the target (in water units) is exceeded (requires the water to be metered), even if the moisture target (from the formula or from the remote thumbweel switch moisture dial (if any, when "Remote moisture dial" button in screen is "On") is not yet reached. The water limit target can be set in "AUTO" mode when the system is calculating the maximum from the formula used dry ingredient and the maximum percentage of moisture value set in Micromix settings screen, or in "MAN" when the operator overrides the automatic target calculated by the system.



Semiautomatic and automatic.

***Semiautomatic**:* The system calculates the moisture offset by using the value of the wet moisture entered manually by the operator.
***Automatic**:* The system calculates the moisture offset by using the moisture value in the aggregates either input manually or by Radartron moisture sensor.

To start a calibration, press the calibration button in **MASTERMIX** screen once the mixer has been filled with material. The calibration screen shows a few other buttons described as follows:

2.3.4 MasterMix

The **MasterMix** screen is available only with the MasterMix option. It is used in fast, high production plants. **MasterMix** measures the moisture of the ingredients after a preset dry mix time delay. Based on the known weight of materials in the mixer, the water required for the mix is calculated from the formula value minus the amount contained in the aggregates. The water is then added quickly via **FAST** and **SLOW WATER** valves.
This method is very accurate.

Water target can be based on water/cement ratio for wet cast or water/total solids ratio (moisture) for dry cast, pavers and block. Target moisture or water/cement ratio (water/total) and choice of Standard or Lightweight concrete are stored in the batch formulas, allowing different moistures and mixing sequences to be preset for different products.

FAST WATER and **SLOW WATER** buttons can be used for manual water feed.

MASTERMIX CALIBRATION:

Calibration is performed by recording the moisture values while a mix is being processed. The dry material moisture reading is taken after the material has been mixed and stabilized, then water is added and once stabilized the wet material reading is taken.
There are two types of calibration:

***Auto/SemiAuto**:* This button changes the type of calibration describe above.

***Global Store**:* This button lets you store the actual calibration in all formulas.

***Single Store**:* This button lets you store calibration parameters for the actual formula only. (formula into the mixer)

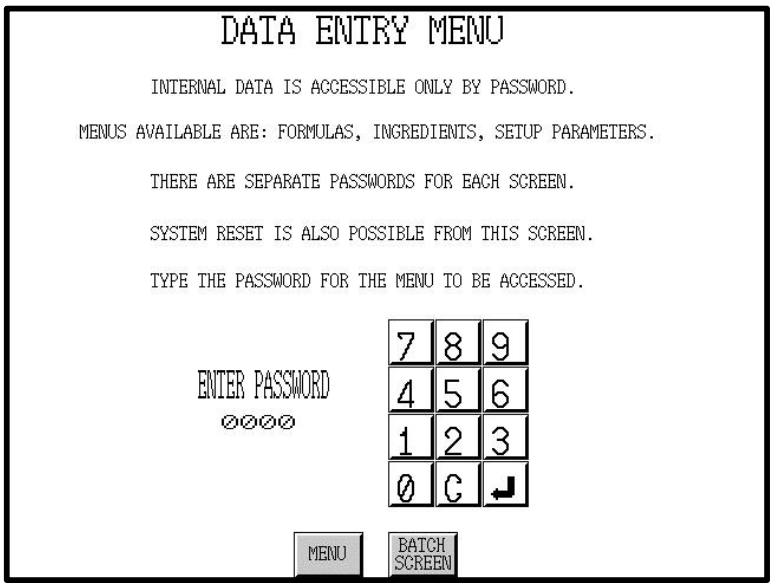
***Default**:* This button loads the default parameters to the run time area. These parameters are set by factory and are very close final calibration parameters to real ones after calibration.

If in semi auto mode, the screen will prompt "**INPUT MOISTURE VALUE**" when the wet reading is ready. Press over it and it will open a numeric keypad. Input the wet moisture value, press enter and close the keypad.

When a calibration is in progress, the mixer will not discharge and will not add any admixtures. The calibration process will finish when the calibration screen is closed. In either Auto or Semi auto calibration mode, the calibration parameters should first be stored. The screen should then be closed to continue with the mixing cycle.

3.0 SYSTEM SETUP

Some screens are only used for initially plant set up. Because this data is critical to correct plant operation, setup screens are password protected. To prevent these settings being inadvertently changed we recommend that setup password only be given to supervisory personnel,



Pressing the **MENU** button displays the **DATA ENTRY MENU** screen

3.1 Passwords

Several passwords can be entered to access the different functions shown on this screen.

Other passwords may be added from time to time. See **APPENDIX 6.1** for list of passwords.

FORMULAS - allows the formula screen to be accessed and ingredient values to be entered, modified, or copied to another formula.

INGREDIENTS: -Allows the ingredient screen to be accessed and the ingredient settings to be entered or modified.

SETUP PARAMETER SCREENS - allows access to those screens that are needed to setup the operational parameters.

SYSTEM RESET - resets all batch operation sequences to their initial state. This is useful after major breakdowns.

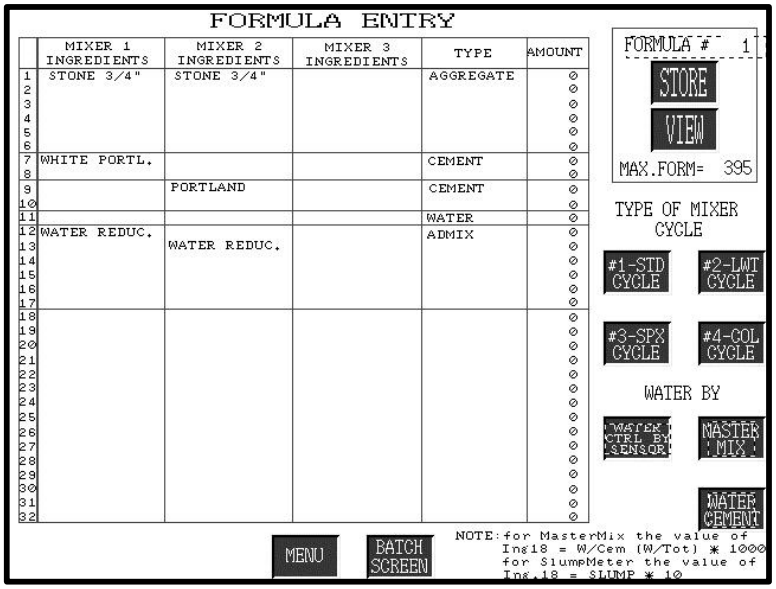
RADARTRON CALIBRATION - allows access to the to **RADARTRON** moisture sensor calibration screen (Radartron sensors are previously calibrated; if, however the measurements on site differ, a correction can be made, allowing sensor indication values to match the lab test values.

For more information on this screen see **Section 2.2.7**.

DEMANDS – allows Demands screen to be accessed in to start batches in low priority as an alternative to Order Entry Batch Screen operation, if host computer not operational.

3.2 Formula Entry

From the **FORMULA ENTRY** screen you can enter and store formulas, retrieve formulas for viewing, modify a formula being run or copy a formula from one memory location, for storage at another location.



To enter a formula, enter the desired formula number in **FORMULA #** box. If you are unsure whether there is already a formula at a particular location, press **VIEW** to retrieve data stored there. If the location holds a valid formula, which you want to preserve, choose another formula number. If the data is unimportant or is zero, enter your new formula over the old.

Use the é and ê buttons to locate each of the ingredients, or touch the entry area to relocate the cursor. Enter the desired values on the keypad, followed by **ENTER**. The **C** button clears a wrong entry.

When formula is viewed the type of mixer cycle and water control will be shown by the buttons.

Press **WATER CTRL BY METER** or **SENSOR** to select method if applicable.

If **WATER CTRL BY SENSOR** chousen, select **MASTERMIX**, **MICROMIX** or **SLUMPMETER** if applicable.

If **MASTERMIX** selected, press button **WATER/CEMENT**, or **WATER/TOTAL** to select desired method.

Select **TYPE OF MIXER CYCLE**; standard (**STD**), lightweight (**LWT**), or others up to four different mixer cycles. To select the Cycle, first deselect the Cycle already selected (if any), then press the new desired CYCLE. Cycle 2 (**LWT**)can not be selected if **WATER CTRL BY METER** is highlighted.

The maximum number of fields per formula is 32. The maximum number of formulas for the specific application, the type of ingredients per scale and the ingredients used per mixer are shown, after scales parameters (screen 24), ingredients per scale (screens 27 – 30) and setup liquids per mixer (screens 31 - 33) are done.

The last input field in the formula is the target value for moisture sensor , if used. For water meter or MasterMix formulas this value represent the water/cement or water/total solids ratio, and will change whenever the water value or total cement (total solids) values are changed allowing the operator to watch both related values simultaneously.

Once all ingredients are entered and correct, store the formula by pressing **STORE**.

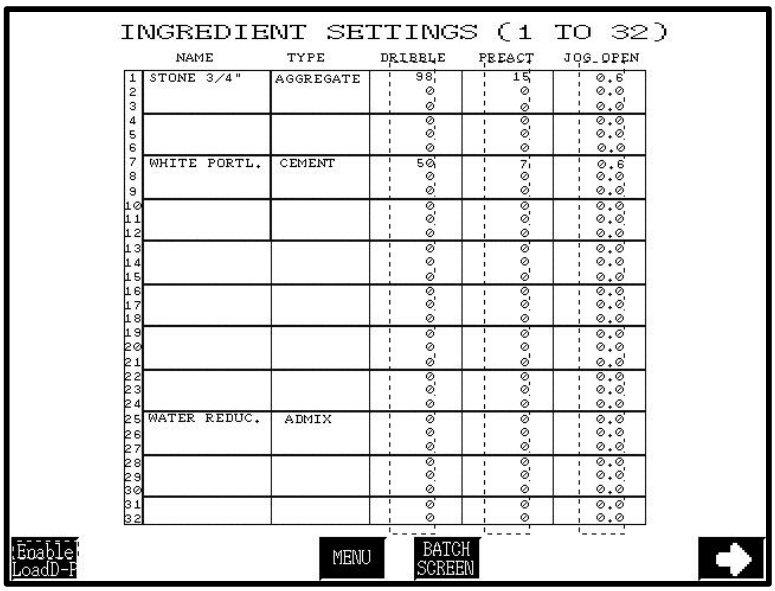
To modify a formula, retrieve it if necessary by selecting its formula number and pressing **VIEW**. Use the é and ê buttons to locate and modify the ingredient amounts. This formula can be stored by pressing **STORE**, or it can be stored at another location by entering a **new** formula number and pressing **STORE**. This is a convenient way to copy a formula with minor changes.

Ensure that you do not override an existing formula.

3.3 Ingredient Settings

INGREDIENT SETTINGS screens can be accessed by appropriate **PASSWORD** in the **DATA ENTRY MENU** screen.

Up to 64 ingredients can be entered in two tables, each one containing 32 ingredients.



When **NAME** and **TYPE** selected, by touching the entry area, an alphanumeric keyboard pops up automatically.

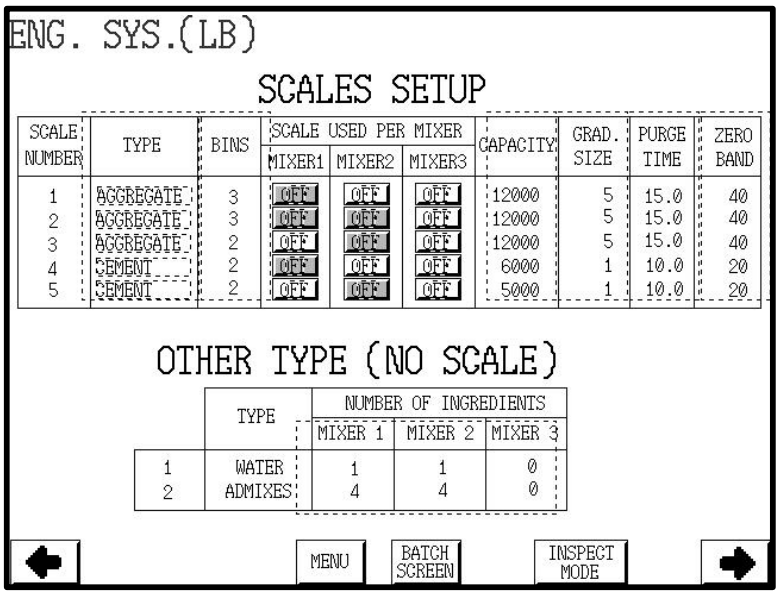
NAME and **TYPE** must be 12 characters max. When dribble, preact and jog open time are selected, a numeric keyboard pops up. These values need to be set initially for each solid ingredient used and will be loaded automatically into **SCALE 1 (TO 5) SETTING** screens, if **ENABLE LOAD Dr.Pr** button is highlighted. See paragraph 3.4 for detailed explanation of these terms.

The dribble, preact and jog open time will be automatically tuned for the corresponding scale they are used, They will not be updated in the **INGREDIENT TABLES** directly, constituting reference values in case of plant breakdown or scales malfunctioning, affecting the tuned values in **SCALE 1 TO 5 SETTING** screens. Therefore it is a good idea to periodically update these values in **INGREDIENT TABLES** from **SCALE 1 TO 5 SETTING** after automatically tuned in by the PLC in good operational conditions.

The maximum number of ingredients per scales and type are:
Scale 1 - 12 ingred.
Scale 2 - 12 ingred.
Scale 3 - 12 ingred.
Scale 4 - 4 ingred.
Scale 5 - 4 ingred.
Water - 3 ingred.
Admixes - 12 ingred. per mixer

3.4 Scales Setup

SCALE CAPACITIES - enter the desired capacity for each scale (scales 1 to 3 allow 5 digits input values).
ZERO CHECK BAND - the weight (lb or kg) within which the system will start a batch and discharge will be terminated. If material buildup exceeds this value, the batch will not start. The entered values should be smaller than the desired accuracy for the average batch but large enough to allow for normal buildup.



SCALE PURGE TIME, SEC - the time for which the discharge continues after the zero check band is reached. This time allows the remainder of the material to be discharged.

SCALE UNITS - press **LB** or **KG** to set the measurement units for the scales.
Note: If both unit systems are used, like in this example, the actual unit system will be set in a special screen (see 3.9).

After either the scale capacity or units are changed, power must be turned off and on again for the change to take effect. DO NOT ATTEMPT TO CALIBRATE SCALES BEFORE THIS HAS BEEN DONE.

NOTE: Changing the scale capacity or units will alter the calibration and give incorrect scale readings. After these items are changed, a scale calibration must be carried out using weights or a SHUNT CALIBRATION UNIT (call Scale-Tron for details).

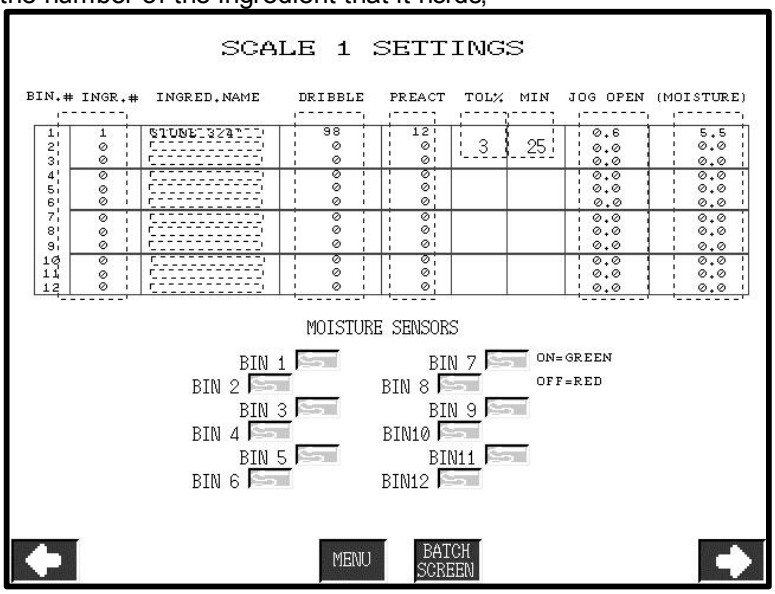
The type of scale, the number of bins per scale and mixer into which each scale feeds (button selected) must be entered before configuring individual scales in **SCALE 1 TO 5 SETTING.** Simultaneously, after pressing the **ENTER** button on the keypad, the names of ingredients and the number of ingredients per type of ingredient will appear in the **FORMULA SCREEN.**

If the scale is not used by any mixer, the **TYPE** field should be empty and the number of bins per scale must be "**ZERO**".

The number of bins per scale or number of ingredients per mixer for **OTHER TYPE** (Water and Admixes) will prevent more ingredients than used in the plant to be added in **SCALE 1 TO 5 SETTING** or **LIQUID SETTINGS PER MIXER** screens.

3.5 Scale 1 (to 5) Settings

Note: ingredients must be entered before this screen can be used. For each bin, enter the number of the ingredient that it holds,



followed by **ENTER**. This can be changed at any time, to "map" the ingredients to the bins. Materials will feed in the numerical order shown in the table. The name of the ingredient, the **Dribble**, **Preact** and **Jog** open time values for solid ingredients will appear, if button **ENABLE LOAD Dr.Pr**, in **INGREDIENT SETTINGS TABLES** is selected. Simultaneously, the names of ingredients will appear in the **FORMULA SCREEN** and **BATCHING SCREEN.**

The **AUTOMATIC FEEDER TUNING** feature will adjust the dribble, preact and jog open time values during operation. They need to be set initially in **INGREDIENT SETTINGS TABLES**, however, and may need to be corrected if a plant breakdown, material bridging or an empty bin has circumvented the automatic process.

DRIBBLE - is the amount prior to the target weight at which the feeder will commence jog or dribble feed. For example, if the target weight is 1000 kg and the dribble is set to 200 kg, the main feed will cut off at 800 kg and slow feed (jog) will continue until the target weight (less the preact) is reached. The dribble amount should initially be set to a high value, allowing the gate to close before the weight overshoots the target. Count the number of jogs and reduce the dribble to achieve approximately 5 jogs.

PREACT - sometimes called Free Fall, it is the amount prior to the target weight at which the feeder will cut off completely, to compensate for the material already falling into the scale and for the gate closing or conveyor stopping delay. The preact amount should be set to your best estimate of the amount of free fall for each ingredient. Both dribble and preact will self-adjust over the first few batches.

NOTE: typical values for dribble and preact are 500-lb/250 kg for aggregate dribble, 10 lb/5kg for aggregate preact and 40lb/20 kg for cement preact.

TOLERANCE CHECK

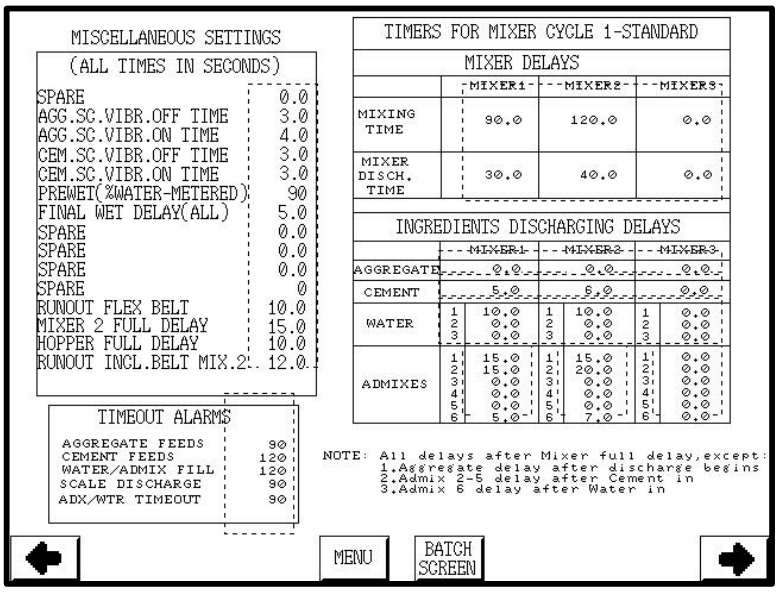
This feature allows you to stop the batching process and sound an alarm if any ingredient weight is not within the specified tolerance amount. Decide on the accuracy requirement of your mix design and enter the tolerance value as a percentage of the batched weight, **TOL%**. Example: if the mix design calls for 2% accuracy on aggregates and 1% for cements, enter "2" for **AGG. TOL** and "1" for **CEM. TOL**.

MIN values are the minimum values that are taken, in lb or kg (depending on the scale units), when calculating tolerances on small batch sizes. If a percentage of the formula value were used, the calculated tolerance could be too small for the feeder to handle without giving frequent tolerance errors. These values should be set to the smallest practical tolerance band (in lb or kg) that - the feeders can attain.

NOTE: Typical values for small concrete batch plants are 20 lb/10 kg for aggregates and 10 lb/5 kg for cements.

3.6 Timer Setup Values

Use the é and ê buttons to locate each of the functions, or touch the entry area to relocate the cursor. Enter the desired values on the keypad, followed by **ENTER**. The **C** button clears a wrong entry.



JOG GATE OPEN TIMES, SECONDS

This parameter is only used on clamshell gates and butterfly valves which are jogged to simulate slow feed. Motor driven devices such as conveyor belts and screw feeders must not be jogged; enter "**0**" for these ingredients. The jogging process closes the gate for 1 second and opens it for the time entered, in seconds and tenths. You should enter a time which allows an amount to fall with each jog which is equal to the tolerance for the ingredient.

NOTE: Typical values for aggregate clam gates are 0.5 to 0.8 sec.

AGGREGATE MOISTURE %

The surface moisture in aggregates will cause an error in the batched weights unless compensated for. **BatchTron III** allows both manual and automatic entry of moisture values. Once entered, the target weights of aggregates and water are automatically corrected and the water value is reduced as a result. You will notice that the aggregate target weights on the batch screen will be higher than they were before compensation.

To enter manual values, select the field for aggregate 1 to 6 using the é and ê buttons. Enter the moisture value, with decimal point, followed by the **ENTER** arrow. To initiate automatic moisture compensation from a sensor such as the **Radartron 1400C**, press the **AUTO** button (picture of sensor) for the appropriate aggregate, which will turn green when activated. Typically, one or two aggregates will use automatic sensors and the others will have manual moisture entry. If an automatic sensor is faulty, turn it off by pressing **AUTO** a second time and enter the value on the keyboard.

MIXING TIME, SEC - this is the time taken for mixing, after the last ingredient is added, before mixer discharge is enabled. In the case of moisture metered water (MicroMix or Lesueur), this is the minimum mixing time after cement and admixes are added, witch runs concurrently with the **FINAL WET** cycle. Both must be complete before discharge can commence.

MIXER DISCHARGE TIME - the time for which the mixer discharge door is open in automatic mode. If discharge takes place manually, the door must be held open for at least this time in order to cancel the automatic mixer cycle. Observe the **MIXER FULL** symbol on the batch screen; it is extinguished when the mixer cycle is complete.

TIMEOUT ALARMS

These timers will create an alarm and stop the batching process if any feed time exceeds the set value. It warns of material bridging or empty bins etc. Enter values that are double the expected feed time for each ingredient.

WATER/ADMIX FILL – will create an alarm if the feed time exceeds the set value.

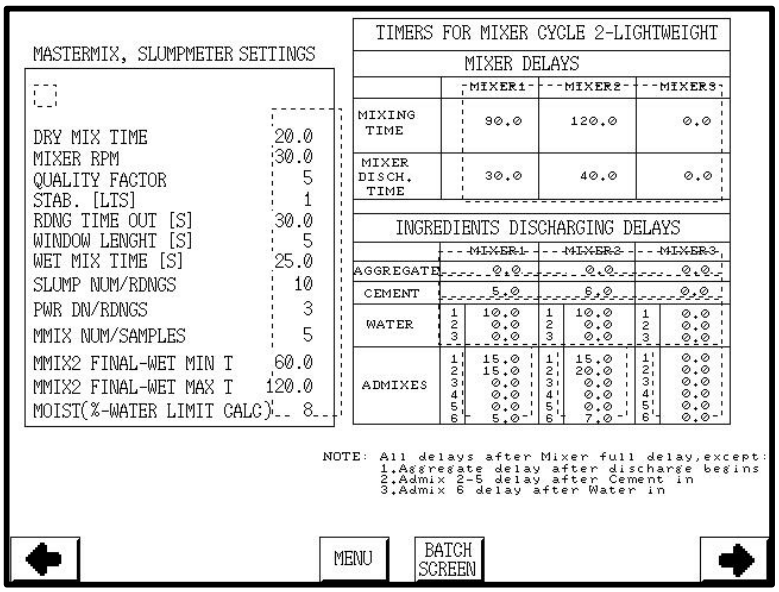
SCALE DISCHARGE - scale discharge timeout will initiate an alarm if the time is exceeded during scale discharge. Allow double the normal scale discharge time.

INGREDIENTS DISCHARGE DELAYS - normally the aggregate is discharged first, followed by cement and water. Some admixes need to be discharged with the aggregate while others should discharge later. These timers start at the start of aggregate discharge, delaying the discharge of other ingredients accordingly.

Admix #6 is usually reserved for super plasticizer, which is timed from the **end of the water feed.**

MISCELLANEOUS SETTINGS - this box is a general-purpose entry area for values customized to individual applications.

It will typically include conveyor runout times and **MicroMix PREWET, % OF FINAL WET** – the point at which **PREWET** water cuts off, expressed as a percentage of the **FINAL WET** value. This setting is duplicated on the **MICROMIX** screen.



3.6.1 MASTERMIX, SLUMPMETER SETTINGS

DRY MIX TIME: Is the time in seconds after discharge into mixer has started , before the measurement of the moisture of dry material in the mixer commences.

MIXER RPM: Is the rotation speed of the mixer in rpm.

QUALITY FACTOR: Is a parameter to indicate in MASTERMIX how fast it tracks the change in the moisture. This value can run from 1 to 10. The bigger this value is, the slower the moisture reading will follow the sensor signal and the more stable the result will be, and hence will increase the stability signal.

STAB [LTS]: Is the target accuracy of the water amount in liters . Increasing this value will decrease the stabilization time but will decrease the accuracy.

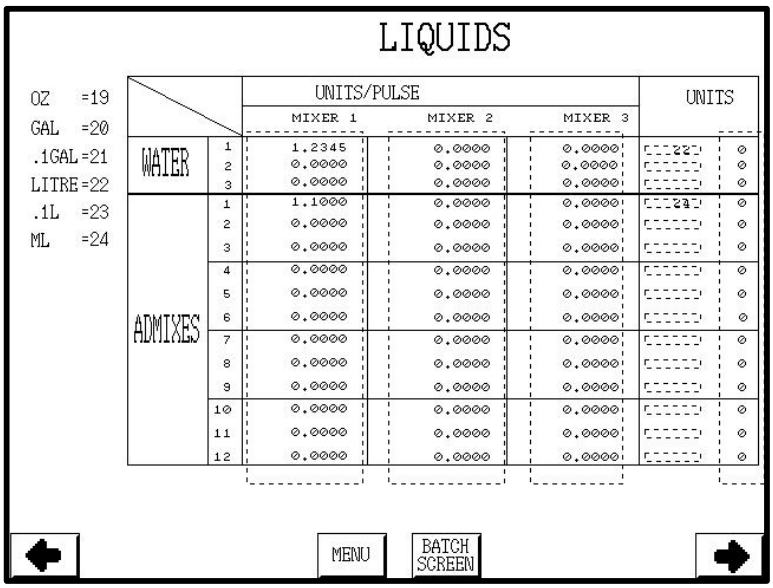
READING TIME OUT: Time in seconds witch will force the end of the dry and wet measurement if stability is not reached .

WINDOW LENGHT: This is the number of seconds that moisture has to be within stability value before signaling that is stable. This value can run from 1 to 10 and the bigger the slower to indicate stability.

SLUMP NUM/RDNGS: Is the number of readings to average the slump sensor input. Larger values will give more stable reading but will increase the response time.

POWER DN/RDNGS: Is the number of readings every .5 seconds to indicate the slump system that the power has started to drop.

3.7 Liquid Units/Pulse and Units

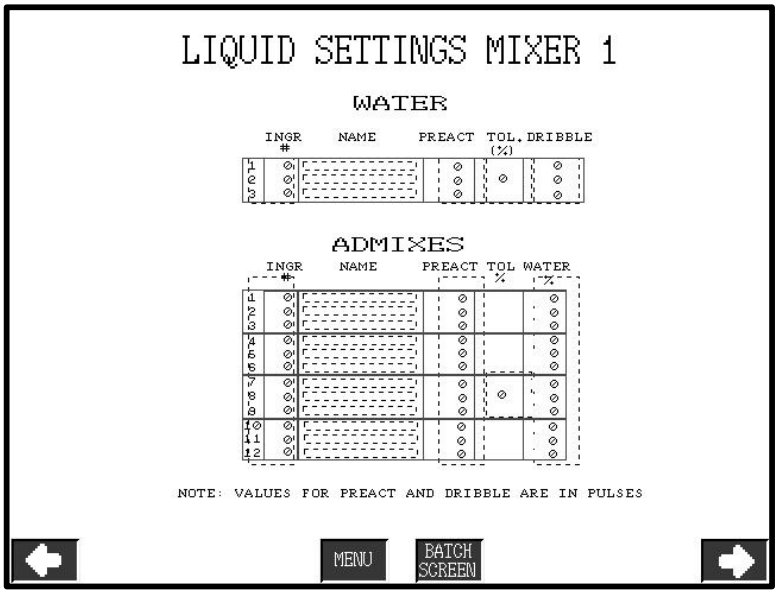


For each of the waters and admixes, the meter pulse ratio must be entered; for example, a meter with an output of 25 ml per pulse is entered as 25. The units of measurement per each mixer must be entered as a number. Possible selections are given on the screen. Example: if tenths of gallons is required, enter 21.

name of the ingredient will appear. Simultaneously, the names of ingredients will appear in the **FORMULA SCREEN** and **BATCHING SCREEN.**

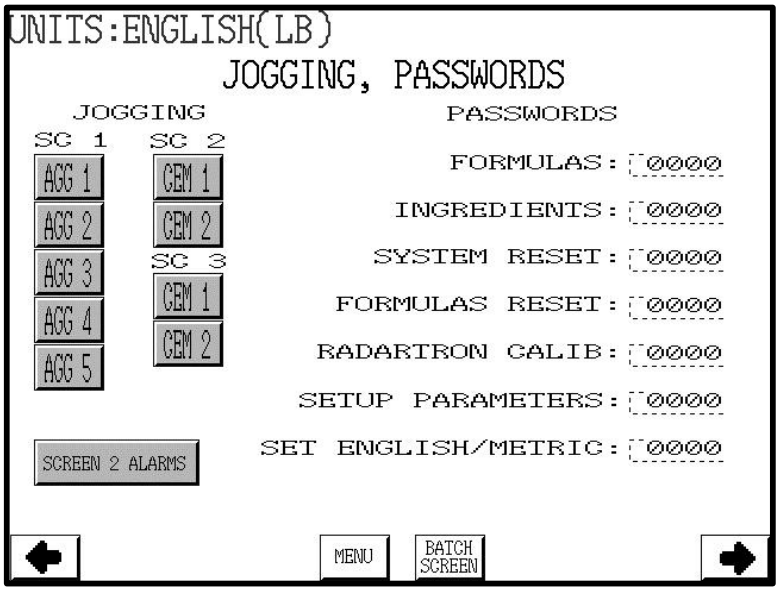
The **Dribble**, **Preact** and admix **Water %** are not imported from the **INGREDIENTS TABLE** and must be manually input in the **LIQUID SETTINGS** screens.

The **LIQUID SETTINGS** for each mixer are **PREACT**, **TOL%,** as for ingredients. Admix **WATER %** is used for correction of the water target due to the amount of the free water in the admix. This is a value from 0% for pure reagent to 100 % for pure water.



Note: ingredients must be entered before this screen can be used. For each bin, enter the number of the ingredient that it holds, followed by **ENTER**. This can be changed at any time, to "map" the ingredients to the bins. Materials will feed in the numerical order shown in the table. The

3.8 Jogging/Change Passwords



This screen allows selection of jogging or continuous feeds. Normally, clam gates and butterfly valves are jogged to simulate slow feed, while motor driven feeders, such as belts and screws, are not. These settings are made during installation of the system and should not be changed afterwards.

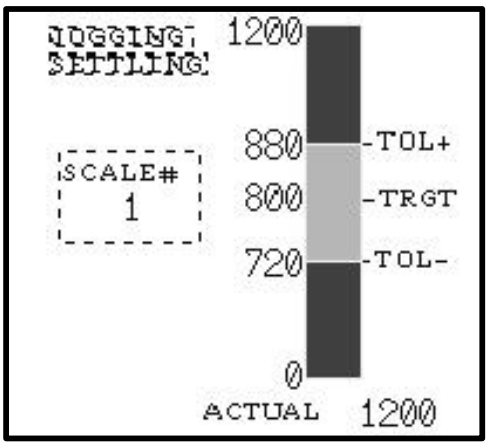
This screen also allows the passwords, other than **SETUP,** to be changed. Select the function to have its password changed. Enter the new password and press the **ENTER** button to save it.

SCREEN 2 ALARMS: When two screens are employed for the operating system, e.g. **BATCH** on screen one and **MIXER** on screen two, only screen one carries the alarms. In the unlikely event of screen one failing the **ALARMS** would be lost. In this event, pressing **SCREEN 2 ALARMS** transfers the alarm function to screen two.

3.9 Metric or English Units

The system allows the customer to chose operation in **English** units or **Metric** units, or as a special feature both systems interchangable from a screen button. In the latter case, the operator must first set up the scale capacities, ingredient units, liquids units per pulse, ingredients used per scale, water and admixes used, etc. then by going in the **Data entry menu** and typing the right password (from **Jogging/ Password** screen) the values in the other units will be automatically set up with a very good aproximation (requiers the liquid units for the other system to be allready setup). The operator can manually override the settings at any time. The units in use will appear in the screens and the correct area will be brought up automatically in the formulas screen. Values that are self-tune such as **Dribble** and **Preact** will be recalculated automatically when the operator changes the system units.

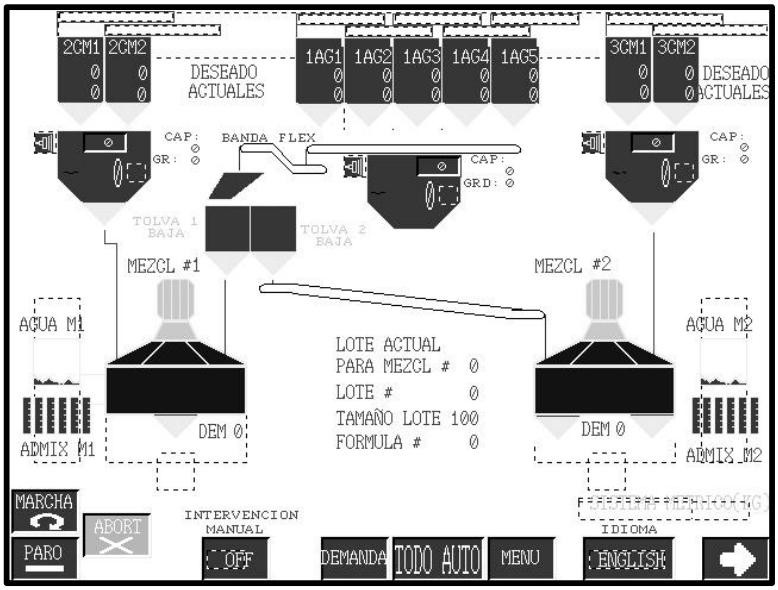
3.10 Scale Inspect Routine



The operator can access this screen by touching a button in the **SCALES SETTING** menu screen. The inspector can watch the target, actual, maximum and minimum tolerance, settling and jogging events for each ingredient in part when they feed into the chosen input scale.

3.11 Second language screens

This feature is optional and will bring up all the screens in the second language, by use of the language button on the batching screen.



4.0 INSTALLATION AND SETUP

4.1 Power Connection

The BatchTron can be powered from 110 volt or optionally 22/240 volt power, 50 or 60Hz. Connect the LINE input to the L1 terminal, the NEUTRAL input to the L2 terminal and POWER GROUND to the green/yellow ground terminal. Route the wires through the cable duct to the bottom of the cabinet and make an opening where appropriate. If using 220/240 volt power, check the jumpers on the 24 volt (or 12 volt) power supply to ensure that they are set for the correct voltage; to change, cut both jumpers with wire cutters and solder together in the 240V position. The PLC and some models of power supply handle both supply voltages without change.

4.2 Input and output connection

Inputs are either 24 volt dc, 110 or 240 VAC, as discussed at the time if the order. Outputs are controlled via relays, which are normally connected to the line voltage (110 to 240 volts). The fuse holders include neon blown fuse indicators, which operate on 110-240 volt power; they will not illuminate on 24 volt power. These are replaced by 24 volt LED indicators for 24 V operation.

Inputs should be connected to the PLC terminal strips according to the schematic diagram supplied. Route the wires, through the cable ducts provided, to the bottom of the cabinet and make openings where appropriate. Leave a loop of wire at least 6" long beneath the PLC terminal strip, to allow the terminal strip to be removed for service.

4.3 Special inputs

Several inputs are provided for central mix applications as follows:

BATCH START - duplicates the **RUN** button to start a batch but does not restart it after an alarm. This input can be connected to a remote push button or to a bin level indicator in a concrete holding hopper, to reorder concrete when the bin level is low. This will give a slow batch delivery since the batch is only started when the bin is low.

SCALE DISCHARGE ENABLE - interlocks the scale discharge. This is in addition to the built-in mixer interlocks, which do not allow the scales to discharge if the mixer is not empty, closed and running. If this input is connected to the bin level indicator in the concrete holding hopper, the batch will be weighed up and held in the scales, allowing it to be mixed as soon as the hopper is low. This gives faster delivery. For automatic scale refilling, connect the **BATCH START** input to the switched power line, or request **DEMAND** operation.

MIXER DISCHARGE ENABLE - interlocks the mixer discharge. This will allow automatic mixer discharge (if the mixer discharge button is in **AUTO** mode) when the circuit is energized. If this input is connected to the bin level indicator in the concrete holding hopper, the batch will be held in the mixer until the hopper level is low. This is not recommended for high-speed mixers (turbine and countercurrent) because the mix can overheat. This input can also be used for wet cast operations, to signal that the bucket or container is in place for filling.

MIXER RUN ENABLE - interlocks the mixer motor. This is normally connected to the mixer cover safety switches to prevent the mixer being started if any of the covers are open. All cover switches and any other mixer safety interlocks should be connected in series with this input.

4.4 Special outputs

MIXER OUTPUTS - BatchTron-III provides complete mixer motor sequencing; there is no need for separate alarm and reduced voltage starting delay relays. All mixers **MUST** be fitted with a startup alarm buzzer, which is energized for 10 seconds prior to the mixer starting. Likewise, mixer cover interlock switches **MUST** be wired to the enable input. Reduced voltage (star/delta) starters have separate start and run outputs provided. Direct starters should be wired to the **MIXER RUN** output.

Note: a separate motor cutoff switch must be wired into the three-phase power to the motor in a convenient position to allow the cleaning and maintenance personnel to cut off and lock out the primary power. This switch must be opened and locked out before anyone has access to the mixer.

If the mixer requires a hydraulic pump output, this is also provided. It is interlocked with the mixer motor when in automatic mode.

4.5 Load cell connection

In multiple load cell scales, all load cells of the same scale should be electrically summed at a summing junction box (These are available from Scale-Tron). The **INDICATOR** output from the summing box, or the single load cell in mechanical scale conversions, should be wired to the connector on the load cell transmitter, located in the BatchTron cabinet. Four conductor-SHIELDED cable must be used, with conductor size 16 to 24 gauge. Connect the shield directly to the BatchTron cabinet ground next to the terminal strip. Route the cables through the cable duct and the rear or bottom openings provided. The load cell transmitter units (model 1410) will supply excitation for up to 4-350 ohm load cells only per scale; for a greater number of load cells, the optional **EXCITATION SUPPLY** must be used.

4.6 Printer/BatchLink connection

The printer (or BatchLink) cable plugs into the RS 232 communication port adjacent to the PLC. See Schematics for details.

4.7 Modem connection

To operate the modem, the modem cable must be plugged into a phone jack and the modem power must be on. Verify that the **POWER** lamp on the modem is lit.

The Modem cable usually plugs into the Peripheral communication port adjacent to the PLC. See Schematic for details.

Locate the PLC main module, labeled CPU 44. Under the RUN and COM1, COM2 lamps is a door. Open it and switch DIP switch number 4 to the **ON(SETUP)** position, **ON** (to the left) if is not already ON.

4.8 Moisture sensor connection

Up to twelve moisture sensors such as the **Radartron 1400C** can be connected to the **BatchTron-III**. See Schematic for connection details.

4.9 Wiring verification

WARNING: before applying power, verify with a test meter that there is no connection between the mains power circuits and the 24 volt dc circuits. Any connection between these circuits will destroy all internal electronics. This damage is not covered by warranty.

After verifying that the power jumpers are in the correct position and that there are no connections between the high voltage and 24 Vdc circuit, apply power and turn on the circuit breaker inside the front panel and the **POWER** keyswitch on the front panel. If the breaker trips now or during testing, there is a short circuit in the added wiring.

Successful operation is shown by the appearance of the batching graphic screen. If the screen does not illuminate, check the 24 volt power supply. Its output should be between 22 and 28 volts DC. If an error message is displayed, proceed to section 5.4.

To verify the output connections to valves and motor starters, press the manual buttons on the various graphic screens while monitoring the appropriate devices. If one or more do not operate, check the LED indicators on the PLC output module, then check the fuses. Use a voltmeter if necessary to verify that the output is energized when the button is pressed and proceed to **FAULT FINDING**. Remember that there is a 10 second warning alarm delay before the mixer motor is energized. During this time, the graphic symbol flashes.

To verify input connections from motor starters and position switches, operate each switch in turn and monitor the appropriate symbols on the graphic screen, which should darken. For the few inputs which do not have a symbol, monitor the **LED** indicator on the PLC input module. It is essential to have all inputs connected; they are interlocked with the internal sequence and will prevent proper automatic operation proceeding if not present. It is possible to operate in this condition but Scale-Tron Inc. cannot be held responsible for the consequences.

4.10 Setup parameters

To prepare for running, the scale and other parameters must be entered. Press the **MENU** button to display the **DATA ENTRY MENU** and enter the password followed by **ENTER**. (The password is given in the APPENDIX). Enter the required values for the parameters in all the setup screens. See Section 3.0 for descriptions.

NOTE: The scale capacities and units must be entered before calibration is carried out. If the capacity is changed after calibration, the calibration procedure will have to be repeated. Turn power OFF and ON again before proceeding with calibration.

4.11 Scale Calibration

Before starting calibration, verify that a reading is displayed on each of the scale symbols on the screen. Have an associate stand on or hang from each scale hopper somewhere near each load cell. Alternatively, use test weights. The readings obtained should be similar for each load cell and the weight display should show an increase (not a decrease) in value each time.

Corner adjustment - Verify that the hopper is empty and attach weight lifting gear such as chain hoists etc. to the hopper. Using a small amount of test weights, place the weights on the hopper or scale structure near each load cell in turn and verify that the readings are identical. If not identical, adjust the summing unit (see summing unit instructions). Increase the amount of test weights used as the correct adjustment is approached.

Offset - Locate the load cell transmitter for the scale to be calibrated, inside the BatchTron cabinet. These transmitters are green circuit boards marked 1410. While monitoring the display, turn the **OFFSET** rotary switch to the position, which gives the lowest positive reading.

Note: Do not press the ZERO control on the touch screen prior to this adjustment. If it has been pressed, turn the power off and on again to reset the system.

Using a small screwdriver turn the transmitter **ZERO** control to obtain a zero reading on the display. If necessary, turn the **OFFSET** switch to its next position.

Caution:-if the OFFSET switch is turned too high, a negative reading will be obtained, which will not vary when the ZERO control is turned. Reduce the OFFSET setting until a positive reading is obtained.

Span - Load the scale with test weights. Using the total weight of test weights added, move the **SPAN** jumper to obtain the closest reading and turn the **SPAN** control until the correct reading is obtained. If necessary, move the **SPAN** jumper to its next position.

Remove the weights and verify that the reading returns to zero within the required accuracy (normally, an error of a few LB or kg is acceptable). If not within desired limits, repeat the offset and span adjustments until the desired accuracy is obtained.

Remove the lifting gear from the hopper and adjust the **ZERO** control to obtain a zero reading again. This completes calibration; repeat for each scale.

Shunt cal. - If you have a **SHUNT CALIBRATION TESTER**, connect it now and record the readings for later use in checking and recalibration.

Damping - For faster scale response, turn **DAMPING** pot fully counterclockwise. If mechanical vibration or electrical interference causes erratic readings, turn **DAMPING** clockwise to increase the response time and filter out the disturbance.

If the height from the aggregate gates to the scale hopper is large, the momentum of the falling material can cause overshoot, which can cause the feed to cut off prematurely. Turn the damping control clockwise to compensate for this.

5.0 MAINTENANCE and FAULT FINDING

5.1 Scale calibration

It is important to verify the scale calibration regularly. We recommend that the scales be checked EACH DAY at the start of operation by having an employee stand on or hang from each scale hopper in turn, while having an associate read the weight display. This will show up any major error before any faulty product is produced. A more accurate check using test weights or the Scale-Tron Shunt Calibration Tester should be carried out once per week and the scales should be verified by a qualified scale technician and test weights every 6 months. It is your responsibility to verify the accuracy of the scales and other equipment. Scale-Tron Inc. cannot be held responsible for the consequences of poor maintenance. The calibration procedure is given in Section 4.11

A scale reading of the capacity value, a fixed negative number or a reading which does not change when the scale is loaded indicates a failure of a load cell, cables, transmitter or PLC input module. Locate the transmitter for the affected scale and jumper the **OUTPUT** and **COM** terminals together with a short piece of wire. The scale reading should change to a small negative number. If this does not occur, the PLC module is probably faulty. If this occurs correctly, jumper the **SIG+** and **SIG-** terminals together. The reading should change to a small negative number, if not showing this already. Both conditions indicate a faulty load cell connection, a faulty load cell or a mechanical fault on the load cell mount. You could try adjusting the **OFFSET** switch and pot to re-zero the display. If successful, the scale zero has been altered, either by some mechanical work being done, an overstressed load cell or an electrical problem. Monitor it closely while running. If the reading does not change, turn the **OFFSET switch** to each extreme position. If the display still remains unchanged, the transmitter is probably at fault.

5.2 Output failure

If a motor or valve fails to operate, first check the fuses (bottom front of cabinet); if one is blown, its indicator will be lit. If fuses are not the problem, check the output associated with the device. Each output has an LED indicator at the top of its PLC module; if the LED is illuminated, the output should be on. Check the output terminal and its associated power wire at the COM terminal (or “A” terminal if all “A”s on the terminal strip are jumpered) with a voltmeter. If the voltage is present at the input but zero at the output, the PLC output module should be replaced.

5.3 Screen failure

If the screen fails to light up, check the 24 volt power supply inside the cabinet. Its output should be between 22 and 28 volts DC. Next check the backlight (section 4.6) If the screen shows **RECEIVE ERROR** plus one of several detail messages such as **PARITY ERROR** etc., communication with the PLC is faulty due to a faulty screen unit, PLC or a communication setting has been changed. Refer to the appendix for screen communication settings. If the message **TIME OUT** is displayed, the cable from screen to PLC is probably disconnected.

5.4 Screen error messages

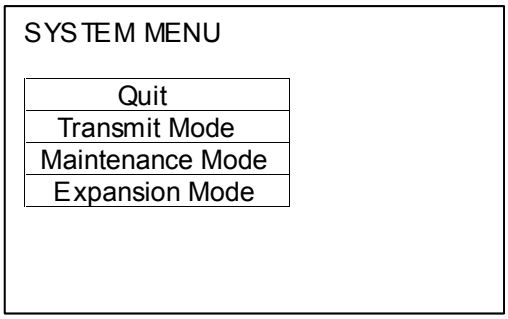
The OMRON screen unit provides for multiple error messages. If the screen shows **PARITY ERROR**, communication with the PLC is faulty due to a faulty screen unit, PLC or a communication setting has been changed and the OMRON Operation Manual should be referred to. When a communications error occurs the buzzer sounds. Pressing the **OK** button on the **ERROR SCREEN** will return it to the operational screen and the operation will restart. If the message **TIME OUT** is displayed, the cable from screen to PLC is probably disconnected. Refer to the OMRON manual for more details.

5.4.1 Screen device checks

The **SYSTEM MENU** screen allows functional checks of:

Buzzer
LED
LCD
Backlight
Screen data memory
Touch switches
Battery voltage

The screen **SYSTEM MENU** can be displayed by lightly pressing any two corners of the screen at the same time. If there are symbols at some corners, first press a clear corner and then any other corner, or access a different screen; the **ADMIXES** screen is a good choice**.** This stops the operation of the unit and the **RUN LED** goes **OFF**.



QUIT - returns you to the operating screen.

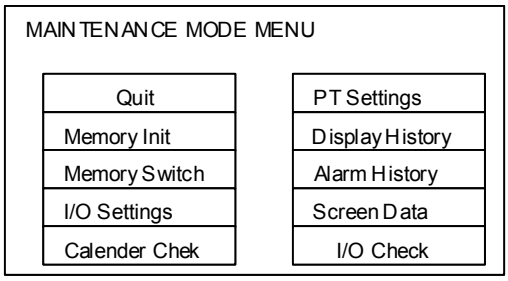
TRANSMIT - MODE is for use in transferring screen programs. This should not be accessed.

MAINTENANCE MODE - will allow you to check operation of the touch screen.

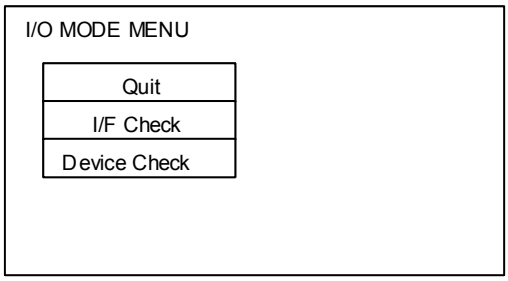
EXPANSION MODE - should not be accessed, it allows access the programming console function.

Relevant sub-menus are selected from the screens.

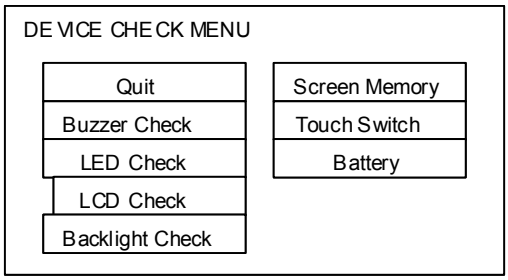
From the **SYSTEM MENU** select **MAINTENANCE MODE** to display the menu.



Select **I/O Check** for the **I/O MODE MENU**



Select **Device Check** for the **DEVICE CHECK MENU.**



Select each device as required.

Buzzer Check - if the buzzer functions correctly, it will sound continuously. At this time the **"Buzzer Check"** will be displayed in reverse video. To stop the buzzer press **Buzzer Check** again.

LED Check - it will be displayed in reverse video and will flash green and red if the **RUN LED** is functioning normally. To end the check touch the **LED Check** again.

LCD Check - the check screen displays all the dots on the screen for three seconds, for each color in turn. On completion of the display it returns to the **DEVICE CHECK MENU**.

Backlight Check - it will be in reverse video and will flash if normal. Touch to end check.

DO NOT select Screen Data Memory except under instruction as it deletes all the operational screens during the test and these will need to be reloaded.

Touch Switch -a grid will be displayed and the **TOUCH SWITCH** areas displayed. When the top right corner block is displayed in **YELLOW** the touch switch blocks can be touched in turn. This will not affect plant operation. If correct each block will be displayed in reverse video while pressed. Press the top right corner block to return to **DEVICE CHECK MENU**.

Battery Check – displays the internal battery status.

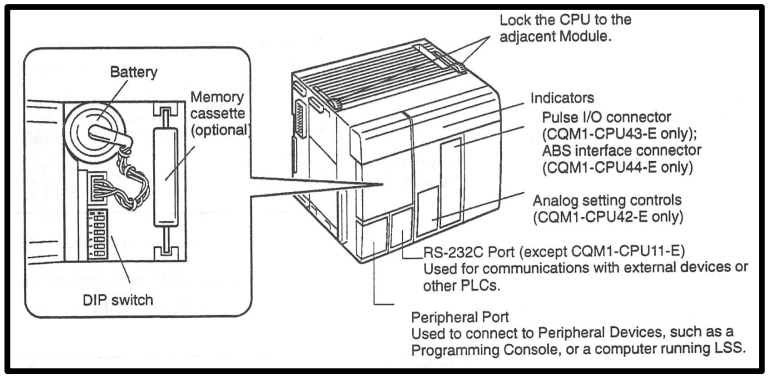
BATTERY CHECK	Quit
The voltage is within the normal range.	

"The voltage is within the normal range." Or "The voltage lowered." is displayed, in which case replace the battery immediately. Press Quit to return to **DEVICE CHECK MENU**.

The PRINTER screen is not valid with the printer connection used and should be ignored.

5.5 PLC unit

The following diagram shows the basic components of the CPU that are used in the general operation of the PLC.



DIP Switch

The DIP switch is located in the battery compartment of the CPU. The switches should normally be set to the following:

Pin	1	2	3	4	5	6
	Off	Off	On	On	Off	Off.

Replacing the Battery

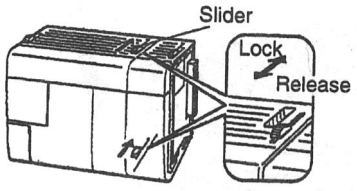
The CPU contains a lithium battery for memory back up. The battery type 3G2A9-BAT08 is good for 5 years at an ambient temperature of 25° C (80°F). Higher ambience will reduce this time. Replacement is warned by the RUN LED showing orange during operation, or red when the unit is stopped. The screen will display "The voltage is lowered" when switching on the power, or when checking the Battery mode in SYSTEM MENU Maintenance.

The battery must be replaced within 5 days of the warning, using the following procedure. Ensure that the unit has been powered for at least 5 minutes to charge the capacitor and then turn off the power. This gives 5 minutes to replace the battery before the memory is lost.

PLC module replacement

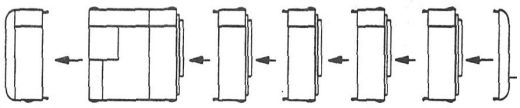
If the PLC output indicators are not illuminating, or the display indicates communication problems, a PLC fault is indicated. Verify that the power indicator on the PLC power supply is illuminated. If not, check the incoming power voltage and the power connections.

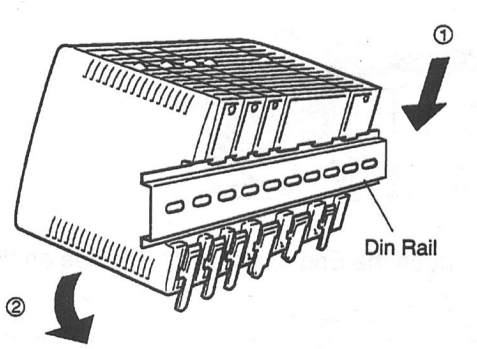
If the **RUN** indicator is not illuminated, check the connection of the plug-in I/O modules. These units all plug together in an end-to-end manner and locking tabs, on the top and bottom of each unit, lock them in place. Verify that all units are tightly plugged together and the locking tabs are pushed towards the rear panel.



If a module is faulty, remove the wiring connector by opening the gray locking tabs on each end of the connector and pulling the connector out of the module body.

Unlock the orange locking tabs at the top and bottom of each side of the faulty module by pulling them forward. Then carefully pry the modules apart sideways until the connectors part. (If locking brackets are fitted at each end of the PLC on the DIN rail, loosen one end).

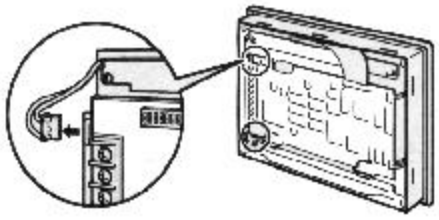




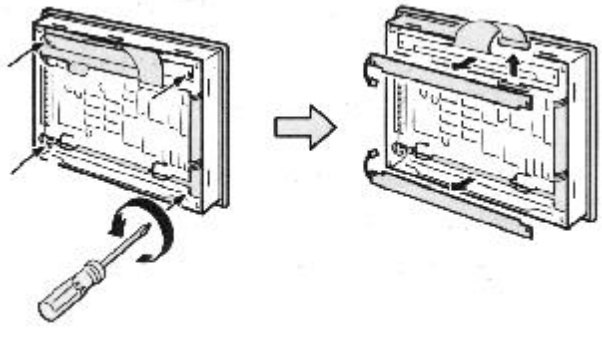
Finally release the module from the DIN rail by levering down the yellow mounting pin, located at the bottom rear of the module, until the module can rotate upward. Pull it free of the rail.

5.6 Screen Unit

Backlight - Turn the power off and disconnect the terminal block wiring, and the communications cable. If a memory unit or interface unit is mounted remove them.

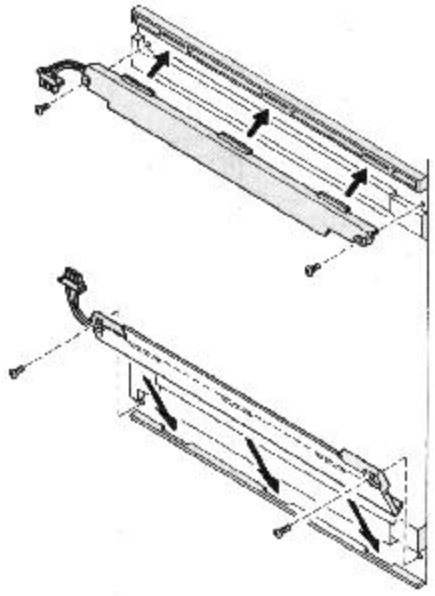


Loosen four screws at corners on the rear face of the NT631 and remove the rear case. From this point on be careful not to touch any electronic parts or printed circuit boards inside the unit, otherwise static damage may occur.



Disengage two backlight connectors at the top and bottom and pull out the touch panel cable. Loosen two mounting screws and remove the backlight. Be sure to use a magnetized Phillips screwdriver, so that screws do not fall into unit. Remove immediately if they do.

Fit new backlights, note that top one is different than the bottom one. Each backlight has three projections. Slot these into slits on the unit and tighten the screws while lightly holding the backlight with fingers. Make sure that the cable does not come out of the backlight.



Re-engage backlight connectors at top and bottom

Replacing the Battery

The Screen unit has the same type of lithium battery for memory back up as the PLC. The battery type 3G2A9-BAT08 is good for 5 years at an ambient temperature of 25° C (80°F). Higher ambience will reduce this time. Replacement is warned by the RUN LED showing orange during operation, or red when the unit is stopped. The screen will display "The voltage is lowered" when switching on the power, or when checking the Battery mode in SYSTEM MENU Maintenance.

The battery must be replaced within 5 days of the warning, using the following procedure. Ensure that the unit has been powered for at least 5 minutes to charge the capacitor and then turn off the power. This gives 5 minutes to replace the battery before the memory is lost.

With a screwdriver prise off the battery cover located at the left top corner on the rear face of the unit..

Remove the battery that is secured under the battery cover, grip the cable and pull the connector straight out.

Insert the connector of the new battery into the connector on the unit, making sure that the projection on it faces left, and press it fully home while keeping it straight.

Close the battery cover making sure that the cable is not trapped.

5.7 Printer failure

Verify that the printer is turned on, its power indicator is illuminated and is on line. Check the paper supply and verify that the print head is not jammed. Turn the printer power off, then on again to clear any internal faults. Verify that the printer goes through its normalization procedure. Locate the section in the printer manual, which details how to do a print test. This is usually done by holding one or more buttons down while turning the power on.

If the printer performs its test correctly, verify the communication by monitoring the COM1 and COM2 lamps on the PLC. One should be pulsing continuously (the display port) and the other should pulse during normal print. If it does not, or the printer still does not print, check the cables and connections for open circuit.

5.8 Modem operation

Using the modem, Scale-Tron service personnel can check the contents of the PLC, check your setup data, upload this data and correct it if necessary. We can also view the system while it runs and locate faults which are holding up operation. If necessary, we can modify the program to overcome problems and download new or updated software.

To operate the modem, the modem cable must be plugged into a phone jack and the modem power must be on. Verify that the **POWER** lamp on the modem is lit.

Open the control panel and locate the cable labeled **MODEM** in the rear area of the cabinet. Disconnect the **PRINTER** cable and replace it with **MODEM** cable. - ***remember to switch it back after you are finished!***

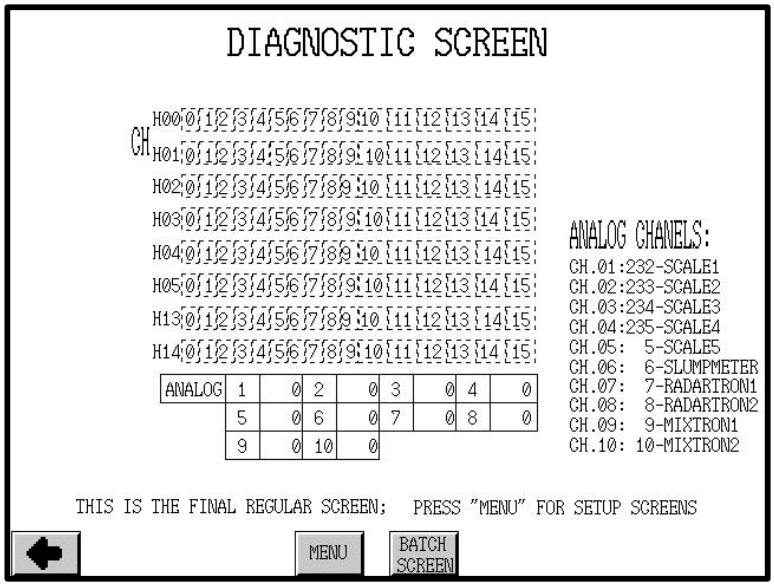
Locate the PLC main module, labeled CPU 44. Under the RUN and COM1, COM2 lamps is a door. Open it and switch DIP switch number 4 to the **PERIPHERAL BY SETUP** position, **ON** (to the left) if it is not already **ON**.

You are now ready to start modem communication. Call Scale-Tron and ask for further instructions. Please have a good description of your problem before calling us.

5.9 Diagnostics Screen

Information from the Diagnostic Screen will be useful in reporting a problem to ScaleTron Inc.

The screen shows rows of lights numbered 0 to 15. Each row is labeled on the left as H0 to H5 – H13 to H14. Combine the light number with the row



number to identify the light fully. For example, light number 12 in the second row (H1) is number H1 12.

During diagnosis we will ask you to locate certain lights and tell us whether they are on or off.

The bottom **ANALOG** row shows the values being received from the scales and moisture or slump sensors. These are useful in determining problems with the displays for these functions.

6.0 APPENDIX

6.1 Passwords

The default passwords should be given to supervisory personnel only; they are intended to prevent unauthorized persons from altering the setup data.

SETUP PASSWORD: **9625**.

FORMULA PASSWORD: **1515**.

GENERAL RESET**:** **9999.**

CLEAR FORMULA MEMORY**:** **9152.**

INGREDIENTS: **1616**.

RADARTRON CALIBRATION: **1919**.

SET ENGLISH/METRIC: **1111**

DEMANDS: **1818.**