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S-7 Weigh/Fill System

What is the Logical Machines S-7?

The S-7 is used to fill containers with an operator specified amount (weight) of material from a supply hopper. It can be used in **Automatic** mode where the S-7 Logical Controller II's determine the operating parameters or in **User** mode where the operator supplies the operating parameters.

In **Automatic** mode the operator tells the S-7 how much material he/she would like in the container fills the machine with product and presses the footswitch. The S-7 will automatically "learn" how to fill the container optimizing for accuracy and speed.

In **User** mode the operator can manually input all of the machine parameters. With a little experience **User** mode can be quicker and more accurate than **Automatic** mode.

Unpacking & Assembling Your New S-7

Some setup is necessary when unpacking and assembling your S-7 for the first time.

Remove packing material

- Install the 4 casters on the bottom of the machine. Use a 9/16" wrench to tighten.

Remove the travel locks

- These are C-clamps on the left and right side of the Discharge Funnel/Weigh hopper. They secure the Weigh Hopper during shipment and must be removed before using the S-7. There are a total of 4 clamps that need to be removed.

Mount the Controller boxes

- The Controllers are shipped in a box located in the Supply Hopper. Using the supplied 1/4" hardware mount the controllers to the front right vertical tube of the chassis. Be sure to mount the Controllers in their labeled locations. "M" for Master in the top location and "S" for Slave in the lower. The toothed nut should be in contact with the square tube chassis. This will require two 7/16" wrenches.

Table of Contents:

- Unpacking & Assembling Your New S-7 1
- Getting to Know the S-7 2
- Getting to Know the Logical Controller II 2
- Logical Controller II Menu Tree..... 4
- Operating Your S-7 5
- User Mode 6
- Automatic Mode..... 10
- Calibrating Your S-7 13
- Technical Support 13
- Glossary of Terms 14
- Tips From The Experts 16



Connect The Wires

- Once the Controllers are mounted you will need to hook up the electrical connectors. The connectors on the machine are labeled as to which controller they go to, "M" for Master and "S" for Slave.
- Each Controller will have two silver 9 pin connectors. Each of these has a small flat head screw to secure the plug to the Controller. Be careful when installing these to not overtighten the screw. It is small and requires very little force to tighten.
- Next the vibrator plugs can be connected to the Controllers. This plug looks like a regular 3 prong household cord. It gets plugged into the receptical on the bottom of the Logical Controller II. One gets attached to each of the controllers.
- Now connect the power cords to the Controllers. The cords are shipped in the same box as the Controllers. One end will fit in the six sided three prong receptical on the bottom of each Controller. The other end gets plugged into a 120v outlet. Due to the high precision of our Controller, we recommend using a power conditioner if available.
- Finally plug the footswitch into the upper, Master Controller. The footswitch is shipped in the same box as the Controllers. We provide three wire ties under the Controllers to neatly route the power cords and footswitch wires to the floor.

Attach compressed air supply

- The S-7 regulator is factory preset at 25-30 psi. The S-7 has a 1/4" male industrial shape hose coupler. A 1/4" female industrial shape hose coupler is required to connect compressed air to the S-7.

Getting to know the S-7

Supply Hopper

This large stainless steel hopper is where you will put your bulk material.

Supply Hopper Gates

These are small, adjustable gates located on the Supply Hopper that control the level of the material flowing on the Feed Pans. The S-7 comes with two different size Supply Hopper Gates.

Feed Pan/Vibrator Assembly

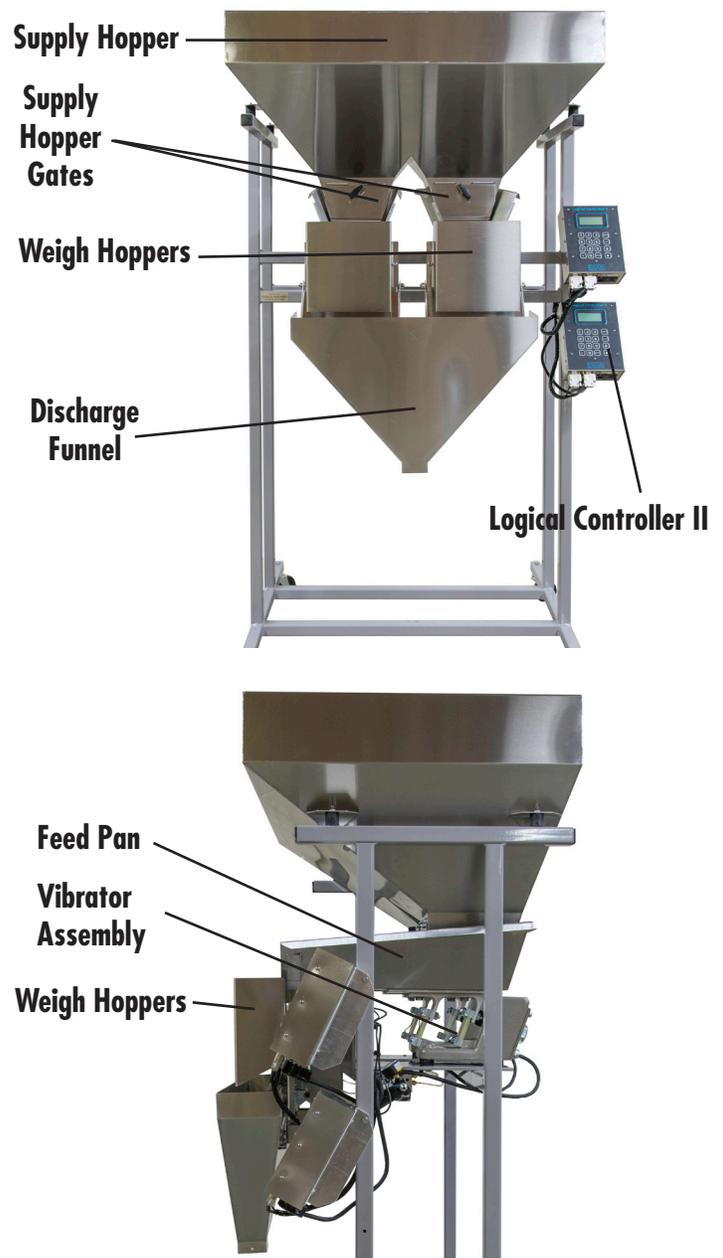
The product flows down from the Supply Hopper onto the Feed Pans. The vibrators shake the Feed Pans moving the product into the Weigh Hoppers.

Optional Dribble Gate

The purpose of the optional Dribble Gate is to restrict the flow of material during the dribble cycle.

Weigh Hoppers

The Weigh Hoppers acts as scales by accumulating and weighing material during each fill cycle.



Discharge Funnel

The material flows into your container through the Discharge Funnel. Generally the S-7 is shipped with a common exit discharge funnel. So it funnels both Weigh Hoppers into one central location to fill your container. Depending on your needs the S-7 can be outfitted with individual Discharge Funnels or Discharge Chutes.

Logical Controller II

The Logical Controller II is the “brain” of the S-7. It controls the speed of the vibrator motor and interfaces with the operator through the footswitch, keypad, and LCD screen. The S-7 has two controllers which operate the two lanes.

Footswitch

The footswitch will normally sit on the floor. The footswitch is used by the operator to start a fill cycle. Pressing the footswitch will pause the S-7, unless the machine is in Bagger mode or at least one of the lanes is ready to dump. At any time the machine can be paused by pressing any key on the controller (except home).

Getting to Know the Logical Controller II

Power Switch

The power switch is located on the bottom of the Controller.

LCD Screen

The LCD screen is a 4 line by 16 character display that is used by the Controller to communicate to the user.

Keypad

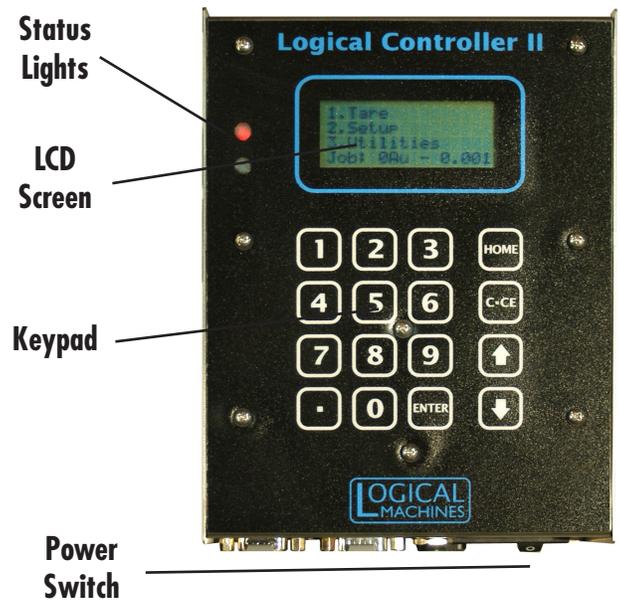
The Keypad is used by the operator to communicate with the Controller. The keys **0** thru **9**, **“.”** and **ENTER** are used to make menu selections and to enter values. The **C/CE** key is used to clear an accidentally entered value while entering a new parameter. The up and down arrow keys are used for scrolling through menus or data. The **HOME** key takes you back to the main menu from any screen anytime. For example, no matter what screen you are in, pressing **HOME, 1** will tare the scale. Pressing **HOME, 2, 4** will save the current job.

Fuse

The fuse is located in the power entry block next to the power switch. The power cord must be removed to replace the fuse. If there is no display when the power switch is turned on, remove the fuse and visually inspect the condition. If the fuse is blown, replace it with a fuse of the correct value (4 amps). Your new machine includes a spare fuse in the power entry block.



Footswitch



Power Switch

Controller Menu Tree

Home Screen

(Expanded descriptions of all menu items can be found in the Glossary on page 14.)

- 1. Tare (zeros the scale)
- 2. Setup
 - 1. Edit This Job
 - 1. Bulk Cutoff Weight (*weight to end bulk part of fill cycle*)
 - 2. Bulk Motor Speed (*motor speed for bulk part of fill cycle, as a percentage*)
 - 3. Dribble Cutoff Weight (*weight to end the dribble part of the fill cycle*)
 - 4. Dribble Motor Speed (*motor speed for dribble part of fill cycle, as a percentage*)
 - 5. Target Weight (*desired net weight of the material*)
 - 6. Check High (*weight at which green status light turns off*)
 - 7. Check Low (*weight at which green status light turns on*)
 - 8. Drop Open Delay (*time weigh hopper door stays open*)
 - 9. Drop Close Delay (*time between weigh hopper door beginning to close and start of product flow*)
 - 0. Dribble Delay (*time the feed pauses while the dribble gate closes.*)
 - 2. Edit Modes
 - 1. Mode (*use button #1 to toggle between User and Auto modes*)
 - 2. Auto Dump (*use button #2 to toggle On/Off*)
 - 3. Auto Tare (*use button #3 to toggle On/Off*)
 - 4. Settle Time (*Input time: 0.01-2.5 seconds. See Glossary for details on Settle Time*)
 - 5. Machine (*use to select software for your machine. Should be set as "S7"*)
 - 6. Dribble Gate (*use button #6 to toggle On/Off*)
 - 7. Bagger (*use button #7 to toggle On/Off*)
 - 8. Synchronous Dump (*use button #8 to toggle On/Off*)
 - 3. Load Job (*load a saved job*)
 - 4. Save This Job (*saves current job parameters*)
- 3. Utilities
 - 1. Calibrate (*calibrate scale with a known weight*)
 - 2. Empty Hopper (*empty entire machine of product*)
 - 3. Learn (*use button #3 to toggle between Learn On/Off in Auto Mode*)
 - 4. Manual Dump (*empty weigh hopper*)

Operating Your S-7

The following steps need to be followed individually for each of your S-7 controllers.

Confirm the Weigh Hopper is Empty

If there is any product in the Weigh Hopper it can be emptied by pressing **HOME, 3, 4** (fig 1). This keystroke will open the Weigh Hopper Drop Gate for a couple seconds to empty the Weigh Hopper.

Tare the Scale

With nothing in/on the Weigh Hopper, press **HOME, 1** to tare or zero out the scale. After doing this, the weight display should read "0.000" (fig. 1). Note that, due to the sensitivity of our weighing equipment, you may find that a breeze or vibration from other machinery may cause a fluctuation of 0.001 or so.

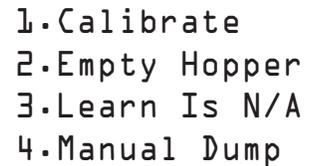
Confirm Calibration on your S-7

Place a **known weight*** on/in the Weigh Hopper and check the accuracy. You should see the weight of your known weight displayed in the lower right hand corner of the display. From the factory, the S-7 is calibrated in pounds. If, after calibration, you find that the Controller is not displaying the correct weight or if you would like to calibrate your S-7 in a different unit of measure, see page 12 for calibration instructions. If, after calibration your S-7 is reading a negative weight or zero weight, see the second column in the *Tips from the Experts* section located at the end of this manual.

*What's a "known weight"? A known weight can be any object – a calibration weight, a book, a shoe, your watch – as long as you know how much it weighs.

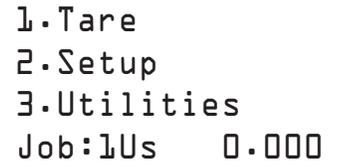
Press: HOME, 3, 4

Fig. 1: Screen showing Manual Dump command

- 
1. Calibrate
 2. Empty Hopper
 3. Learn Is N/A
 4. Manual Dump

Press: HOME, 1

Fig. 2: Home screen indicating that scale has been tared to zero

- 
1. Tare
 2. Setup
 3. Utilities
- Job: 1Us 0.000

User Mode

We recommend that new users familiarize themselves by operating the S-7 in User mode, thereby gaining a more complete understanding of how all of the machine's parameters work together. When using the Logical Controller II in **User** mode, the operator must input all of the job parameters. Because the S-7 uses two controllers to operate its lanes you must follow these instructions for both of the controllers. The lanes may require slightly different settings even if the Target Weight is the same. This is due to slight manufacturing variations, it could also be caused by not having the Supply Hopper Gates adjusted exactly the same.

The Weigh Process

In **User** mode, the Logical Controller II fills a major portion of the target weight at a high speed (**Bulk Speed**) until it reaches a specific weight (**Bulk Cutoff**). It then operates at a slower speed (**Dribble Speed**) until it reaches a terminal weight (**Dribble Cutoff**). The terminal weight is usually a bit less than the target weight because a small amount of material is in free-fall.

For example, if an operator was filling bags with 5 pounds of rice, they might program the Controller to fill the first 4.75 pounds at a high vibrator motor speed. The Bulk Cutoff would be 4.75 pounds and the Bulk Speed might be 70% of full motor speed. The remaining 0.25 pounds of material might then get filled at a lower vibrator motor speed. The operator might program a Dribble Speed of 40% and a Dribble Cutoff of 4.98 pounds guessing that the final 0.02 pounds will fall into the Weigh Hopper after the controller turns off the vibrator motor.

The following is a step-by-step description of operating the S-7 in **User** mode.

Turn on the Logical Controller II

Every time the Logical Controller II is turned on, the LCD screen displays a short "splash" screen (fig. 3) that indicates the machine model number and software revision number. You should see a line like "S7 Rev 2.072". In this example, "S7" tells you that the Controller is setup for the Model S-7 machine. If this first part shows "S4", "S5" or "S6", refer to the Glossary section at the end of the manual to change it to "S7". The "Rev 2.072" indicates the software revision in the Controller (2.072 in this example). Write this down so if you need to call Logical Machines with a question, we will know which machine and software revision you have.

Once the "splash" screen has passed, the Home screen (fig. 4) will show a short menu, a "Job Number", an indication of whether the current job is **Automatic** or **User**, and the weight indicated by the scale.

A "Job" is a set of parameters that tell the Controller how to fill a specific container with a particular amount of material. The "Job Number" is the job currently being used. The Controller can store several Jobs that the operator has setup and saved in its memory. The operator can recall these jobs later on. All saved Jobs are retained when the power is removed.

There are 2 characters after the job number. They will either be "Au" indicating that the currently loaded Job is an **Automatic** mode job or "Us" indicating the current job is a **User** mode job. An **Automatic** Job means



Bulk Speed, Bulk Cutoff, Dribble Speed, Dribble Cutoff—these can be confusing terms! You can think of it this way:

Imagine that you're piloting a motor boat across a big lake with a load of stuff. As you're crossing the lake to your destination, you want to go quickly so your boat's throttle is opened up and you're going fast (your **Bulk Speed**). As you approach the dock, you have to start slowing down (so you don't crash!) so you pull back on the throttle to get to a safe speed as you near the dock (your **Dribble Speed**).

Bulk Cutoff simply refers to the weight at which the machine will go from Bulk Speed to its Dribble Speed (you're approaching the dock...) **Dribble Cutoff** is the weight at which the motor shuts off (you're at the dock...) allowing the last of the material that has left the feed pan to fall into the Weigh Hopper.

Example Starting Parameters:

Target Weight 1.25 lb
Bulk Cutoff 0.95 lb
Bulk Speed 65%
Dribble Cutoff 1.23 lb
Dribble Speed 40%

You can use these ratios as a starting point for most products

Fig. 3: Startup "splash" screen showing controller software version number

```
Logical Machines  
S7 Rev 2.072
```

Fig. 4: "Home" screen showing Job Number, Automatic or User modes, and weight of material in the Weigh Hopper

```
1. Tare  
2. Setup  
3. Utilities  
Job: 0Us 0.000
```

Job Number **Mode Indicator** **Current Weight**

the Controller will constantly adjust the job parameters during operation and a **User** Job will use fixed operator supplied parameters and will make no adjustments.

The weight of the product currently in the Weigh Hopper will be shown on the bottom right corner of the LCD screen. When the scale is connected, you should be able to make this weight change by lightly pressing on the Weigh Hopper.

Load a Job

We will load Job number 1 for this example. Load Job number 1 from the controller's memory by pressing **HOME, 2, 3** to get to the Load Job screen (fig. 5). You will be asked to input the Job Number that you want to load. Press **1** and then **ENTER** to load the parameters currently saved in Job 1. After pressing **ENTER** you will be returned to the Home screen. Notice that the bottom line of the display starts with "Job: 1" (fig. 6). This is telling you that Job Number 1 is being used.

Set the Operating Modes

Now we need to confirm that the Controller is operating in **User** mode for this Job. This causes the Controller to use operator supplied parameters. Press **HOME, 2, 2** to get to the "Edit Modes" menu (fig. 7). The first item in this menu should be "Mode". If necessary, press **1** to toggle the mode from "Auto" to "User".

While you are in this menu, notice the other menu items. For initial setup, Auto Dump and Auto Tare should be off. Confirm these settings. If necessary, press **2** to toggle the "AutoDump" setting to "Off". Press **3** to toggle the "AutoTare" setting to "Off". Press **4** to input the Settle Time. This is the time given to the Controller to evaluate the final weight. We have found that 1.0 second is a good settle time for most products.

Arrow down to the second page in the Edit Modes menu. Here you will find settings for your machine type which should read "S7". You will also see the option to turn the Dribble Gate on/off and the Bagger on/off. If your machine is equipped with a Dribble Gate, toggle the Dribble Gate "On" using **6**. Bagger should only be used if your machine is integrated with a conveyor or bagger machine. The last option is Synchronous Dump, toggle this on to have both Weigh Hoppers dump at the same time, used for mixing products or large combined fill weights.

Once you have made the above changes to the operating Modes, press **HOME** to go back to the home screen.

Set the Bulk Cutoff Weight

If we are running the Job described above we will want to input the Bulk Cutoff weight of 4.75 lbs. Press **HOME, 2, 1** to get to the Job menu. Press **1** to edit the Bulk Cutoff Weight (fig. 8). If you make a mistake while entering the parameter, press **C/CE** to clear your entry and reinput the parameter. Input the desired Bulk Cutoff Weight and press **ENTER** to confirm. (Your Model S-7 comes calibrated in pounds. If you wish to change to a different unit of measure, see the section on calibration.) You will be returned to the Edit Job menu. You can use the arrow keys to view all of these parameters.

Press: Home, 2, 3

Fig. 5: Load Job screen

```
ENTER Job Number
Current:      0
Input(0-99)->1
```

Press: 2, ENTER

Fig. 6: Home screen indicating Job 1 is current job number

```
1.Tare
2.Setup
3.Utilities
Job:1Us      0.000
```

Press: HOME, 2, 2; then press 1 to toggle mode

Fig. 7: Edit Modes screen with mode toggled to "User"

```
1.Mode = User
2.AutoDump = Off
3.AutoTare = Off
4.Settle = 1.00
```

```
5.Machine = S7
6.DribGate = Off
7.Bagger = Off
```

Press: Home, 2, 1; then 1

Fig. 8: Bulk Cutoff Weight edit screen. Input value here

```
Bulk Cutoff
Current:00.400
Input->
```

Press: 2, 1; then 2

Fig. 9: Bulk Speed edit screen. Input value here

```
Bulk Motor Speed
Current: 99
Input->
```

Set the Bulk Speed

If you're not already at the Edit Job menu, press **HOME, 2, 1**. Press **2** to edit the Bulk Speed (fig. 9). Input the desired Bulk Speed and press **ENTER** when you are done. (Both Bulk and Dribble speeds are displayed as a percentage. In this case, full speed is 99%.)

Set the Dribble Cutoff Weight

If you're not already at the Edit Job menu, press **HOME, 2, 1**. Press **3** to edit the Dribble Cutoff weight (fig. 10). Input the desired Dribble Cutoff weight and press **ENTER** to confirm.

Set the Dribble Speed

If you're not already at the Edit Job menu, press **HOME, 2, 1**. Press **4** to edit the Dribble speed (fig. 11). Input the desired Dribble Speed weight and press **ENTER** to confirm.

Set the Target Weight

If you're not already at the Edit Job menu, press **HOME, 2, 1**. (You can use the up and down arrow keys to view all the parameters.) Press **5** to edit the Target Weight (fig. 12). Input the desired Target Weight and press **ENTER** to confirm.

Set Check High & Check Low

If you're not already at the Edit Job menu, press **HOME, 2, 1**. Press the **6** and **7** keys respectively to adjust the Check Hi & Check Lo settings. This sets the weight at which the green light turns on (Lo) and off (Hi). (See the Glossary for a more thorough explanation.)

Set the Drop Gate Open Time

The Drop Gate Open Time is the time, in seconds, that the controller leaves the gate open. This and the Drop Gate Close Time can be adjusted to optimize cycle speed. If you're not already at the Edit Job menu, press **HOME, 2, 1**. Press **8** to edit the Drop Gate Open Time (fig. 13). Input the desired Open Time and press **ENTER** to confirm. We find that 1.0 seconds is a good starting point for most products.

Set the Drop Gate Close Time

The Drop Gate Close Time is the time, in seconds, between the door beginning to close and the start of the product flow. If you're not already at the Edit Job menu, press **HOME, 2, 1**. (You can use the up and down arrow keys to view all the parameters.) Press **9** to edit the Drop Gate Close Time (fig. 14). Similar to the Drop Gate Open Time, we find that 1.0 seconds is a good starting point for most products.

Save the Job

You should now save the job so that you don't lose job parameters if you turn off the machine or lose power. **The S-7 does not automatically save your job parameters!** To do this simply press **HOME, 2, 4** (fig. 15.) This will save all of the current Job parameters so that the next time you load this job from the Controller's memory, it will operate just as it did the last time you saved the job. We recommend that you save your Job anytime you make a change to it.

Press: HOME, 2, 1; then 3

Fig. 10: Dribble Cutoff edit screen. Input value here

```
Dribble Cutoff
Current: 0.490
Input->
```

Press: HOME, 2, 1; then 4

Fig. 11: Dribble Speed edit screen. Input value here

```
Dribble Speed
Current: 40
Input->
```

Press: HOME, 2, 1; then 5

Fig. 12: Target Weight edit screen. Input value here

```
Target Weight
Current: 0.50
Input->
```

Press: HOME, 2, 1; then 8

Fig. 13: Drop Gate Open Time edit screen

```
Drop Open Time
Current: 1.0
Input->
```

Press: HOME, 2, 1; then 9

Fig. 14: Drop Gate Close Time edit screen

```
Drop Close Time
Current: 1.0
Input->
```

Press: HOME, 2, 4

Fig. 15: Setup screen showing "Save This Job" command

```
1.Edit This Job
2.Edit Modes
3.Load Job
4.Save This Job
```



Be sure to Save your Job! The S-7 will not do it for you!

Tare the Scale

With nothing on the Scale, press **HOME, 1** to tare or zero out the Scale. After doing this, the display should read "0.000" (fig. 16). This removes any offset in the scale so that anything you now put on the scale will be weighed from a value of zero.

Note that, due to the sensitivity of our weighing equipment, you may find that a breeze or vibration from other machinery may cause a fluctuation of 0.001 or so.

Confirm Calibration of the Scales

Place a known weight on the Scale to check the accuracy. You should see the weight of your known weight displayed in the lower right hand corner of the display. From the factory the S-7 is calibrated in pounds. If you find that the Controller is not displaying the correct weight, or if you want to calibrate your machine in a different unit of measure, see page 12 for calibration instructions. If your S-7 is reading a negative weight or zero weight, see the Tips From The Experts section located at the end of this manual.

Put some product in the Supply Hopper

Put your product in the Supply Hopper. It should flow down into the Feed Pans/Vibrators. We recommend filling the Supply Hopper at least half way to achieve consistent flow.

Adjust the Supply Hopper Gates

Adjust the Supply Hopper Gates to a height such that you have the shallowest consistent flow possible. You may have to adjust these later on.

Press the Footswitch

Press the footswitch to start the fill cycle. The Drop Gate will open and close and the vibrator will start. If you have the optional Dribble Feed Gate, it will open. The Logical Controller II will use the supplied parameters to fill the Weigh Hopper. When the Weigh Hopper has been filled the display will indicate that the Job is done and the weight of material in the Weigh Hopper will be displayed on the screen. Press the footswitch again to dump the material and begin another cycle.

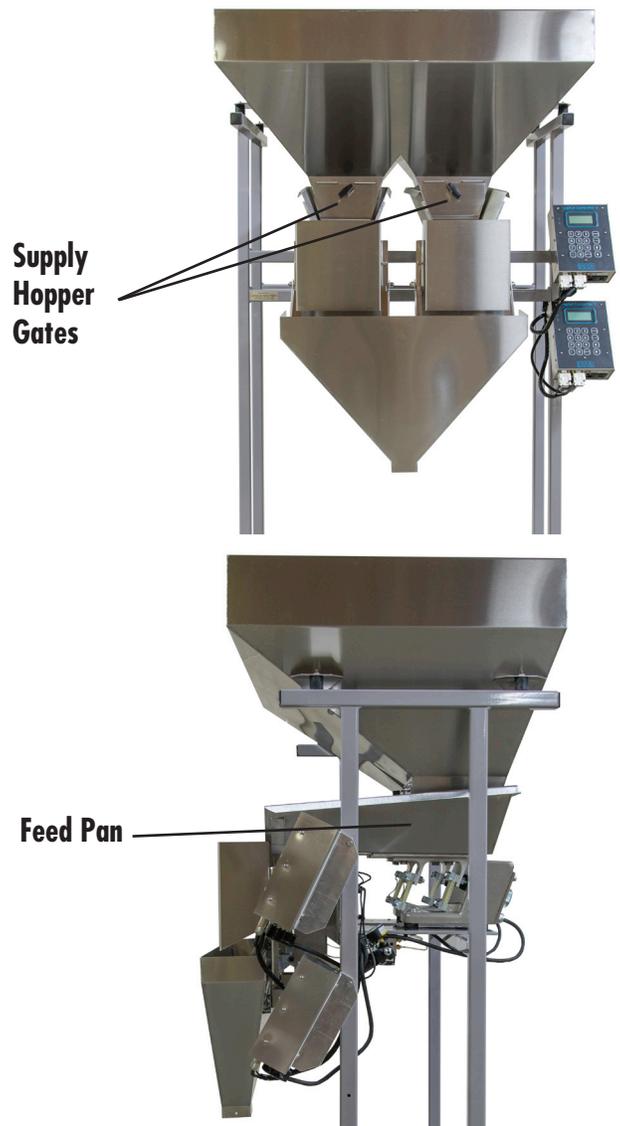
Fine Tuning

If you find the vibrator is running very fast and/or it takes a long time for the Weigh Hopper to fill, the Supply Hopper Gate may be restricting the product in the Supply Hopper. On the other hand, if the Weigh Hopper fills quickly and is not very accurate, the Supply Hopper Gate may not be restrictive enough and should be lowered. Generally the Feed Pan should contain one layer of product when the Weigh Hopper is filling. For example, if you are filling a container with beans, you should observe a continuous flow of beans in the Feed Pan, one bean deep that flows smoothly and evenly. If there are gaps or open spots where you can see the bottom of the Feed Pan, you should raise the Supply Hopper Gate. There are two gate sizes included with the machine to allow for more adjustability. For more helpful hints on getting the most out of your S-7 see the "Tips from the Experts" section.

Press: HOME, 1

Fig. 16: Home screen indicating that scale has been tared to zero

1.Tare	
2.Setup	
3.Utilities	
Job:1Us	0.000



Automatic Mode

Automatic mode allows the Logical Controller II to adjust itself for optimum performance. This requires the input of only three Job parameters. Because the S-7 uses two controllers to operate its lanes you must follow these instructions for both of the controllers. We will first setup a new job filling 0.50 lb containers in **Automatic** mode.

Load a Job

We will load Job number 2 for this example. To load Job number 2 from the Controller's memory press **HOME, 2, 3** to get to the Load Job screen (fig. 17). You will be asked to input the Job number you want to load. Press **2** and then **ENTER** to load the parameters currently saved in Job number 2. Pressing **ENTER** will return you to the Home screen (fig. 18). Notice that the bottom line of the display starts with "Job: 2". This is telling you that job number 2 is being used.

Set the Operating Modes

Now we need to confirm that the Controller is operating in **Auto** mode for this Job. Press **HOME, 2, 2** to get to the "Edit Modes" menu (fig. 19). The first item in this menu should be "Mode". If necessary, press **1** to toggle the mode from "User" to "Auto".

While you are in this menu, notice the other menu items. For initial setup, Auto Dump and Auto Tare should be off. Confirm these settings. If necessary, press **2** to toggle the "AutoDump" setting to "Off". Press **3** to toggle the "AutoTare" setting to "Off". Press **4** to input the Settle Time. This is the time given to the Controller to evaluate the final weight. We have found that 1.0 seconds is a good settle time for most products.

Arrow down to the second page in the Edit Modes menu. Here you will find settings for your machine type which should read "S7". You will also see the option to turn the Dribble Gate on/off and the Bagger on/off. If your machine is equipped with a Dribble Gate, toggle the Dribble Gate "On" using **6**. Bagger should only be used if your machine is integrated with a conveyor or bagger machine.

Once you have made the above changes to the operating Modes, press **HOME** to go back to the home screen.

Set Target Weight

Since we are going to run in Automatic mode for this example, the first parameter we need to adjust is the Target Weight. Press **HOME, 2, 1, 5** to navigate to the Target Weight entry screen (fig. 20). This will prompt you to input a Target Weight. Input "0.5" followed by the **ENTER** key. You will now be returned to the Job parameter menu which shows all of the operating parameters. Since we will be running in Automatic mode you will not have to change the Bulk and Dribble Cutoff and Speeds. (You can use the arrow keys to view all of these parameters.)

(Optional) Set Check High & Check Low

If you're not already at the Edit Job menu, press **HOME, 2, 1**. Press the **6** and **7** keys respectively to adjust the Check High & Check Low settings. This sets the weight at which the green light turns on (Lo) and off (Hi). (See the Glossary for a more thorough explanation.)

Press: HOME, 2, 3

Fig. 17: Load Job screen

```
ENTER Job Number
Current:      0
Input(0-99)->
```

Press: 1, ENTER

Fig. 18: Home screen indicating Job 2 is current job number

```
1.Tare
2.Setup
3.Utilities
Job:2Au    0.000
```

Press: HOME, 2, 2; then press 1 to toggle mode

Fig. 19: Edit Modes screen with mode toggled to "User"

```
1.Mode = Auto
2.AutoDump = Off
3.AutoTare = Off
4.Settle = 1.00
```

```
5.Machine = S7
6.DribGate = Off
7.Bagger = Off
```

Press: HOME, 2, 1, 5

Fig. 20: Target Weight entry screen with "0.5" input.

```
Target Weight
Current: 0.700
Input-> 0.5
```

Set the Drop Gate Open Time

The Drop Gate Open Time is the time, in seconds, that the controller leaves the gate open. This and the Drop Gate Close Time can be adjusted to optimize cycle time. If you're not already at the Edit Job menu, press **HOME, 2, 1**. Press **8** to edit the Drop Gate Open Time (fig. 21). Input the desired Drop Gate Open Time and press **ENTER** to confirm. You will be returned to the parameter edit list. (You can use the arrow keys to view all of these parameters.)

Set the Drop Gate Close Time

The Drop Gate Close Time is the time, in seconds, between the door beginning to close and the start of the product flow. If you're not already at the Edit Job menu, press **HOME, 2, 1**. You can use the up and down arrow keys to view all the parameters. Press "9" to edit the Drop Gate Close Time (fig. 22). Input the desired Close Time and press **ENTER** to confirm. You will be returned to the Edit Job menu.

Turn On Learn Mode

The last thing we need to do is to tell the Controller to do a Learn Cycle. The Learn Cycle is done the first time a new Job is run in Automatic mode so the Controller can get a "feel" for how the product flows. The Controller is actually learning on every cycle if it is running in Automatic mode, but for the very first cycle we will tell it to very carefully learn the characteristics of the product and how it flows.

To tell the Controller to "Learn" on the first cycle press **HOME, 3** to go to the "Utility" menu (fig. 23) and then press **3** to toggle the **Learn** mode from "Off" to "On". Press **HOME** to return to the Home screen.

Save the Job

You should now save the job so that you don't lose job parameters if you turn off your machine or lose power. **The S-7 does not automatically save your job parameters!** To do this simply press **HOME, 2, 4** (fig. 24.) This will save all of the current Job parameters so the next time you load this job from the Controller's memory, it will operate just as it did the last time you saved the job. We recommend that you save your Job anytime you make a change to it.

Tare the Scale

With nothing on the Scale, press **HOME, 1** to tare or zero out the Scale. After doing this, the display should read "0.000" (fig. 25). This removes any offset in the scale so that anything you now put on the scale will be weighed from a value of zero.

Note that, due to the sensitivity of our weighing equipment, you may find that a breeze or vibration from other machinery may cause a fluctuation of 0.001 or so.

Confirm Calibration of the Scales

Place a known weight on the Scale to check the accuracy. You should see the weight of your known weight displayed in the lower right hand corner of the display. From the factory the S-7 is calibrated in pounds. If you find that the Controller is not displaying the correct weight, or if you want to calibrate

Press: HOME, 2, 1; then 8

Fig. 21: Drop Gate Open Time edit screen

```
Drop Open Time
Current:      1.0
Input->
```

Press: HOME, 2, 1; then 9

Fig. 22: Drop Gate Close Time edit screen

```
Drop Close Delay
Current:      1.0
Input->
```

Press: HOME, 3; then 3 to toggle mode

Fig. 23: Utility screen with Learn mode toggled to "On"

```
1. Calibrate
2. Empty Hopper
3. Learn is On
4. Manual Dump
```

Press: HOME, 2, 4

Fig. 24: Setup screen showing "Save This Job" command

```
1. Edit This Job
2. Edit Modes
3. Load Job
4. Save This Job
```



Be sure to Save your Job! The S-7 will not do it for you!

Press: HOME, 1

Fig. 25: Home screen indicating that scale has been tared to zero

```
1. Tare
2. Setup
3. Utilities
Job: 2Au    0.000
```

your machine in a different unit of measure, see page 12 for calibration instructions. If your S-7 is reading a negative weight or zero weight, see the Tips From The Experts section located at the end of this manual.

Put some product in the Supply Hopper

Put your product in the Supply Hopper. It should flow down into the Feed Pans/Vibrators. We recommend filling the Supply Hopper at least half way.

Adjust the Supply Hopper Gates

Adjust the Supply Hopper Gates to a height such that you have the shallowest consistent flow possible, this gives you better control and accuracy. You may have to adjust this later on.

Press the Footswitch

Press the footswitch to start the fill cycle. The Drop Gate will open and close and the vibrator will start. If you have the optional Dribble Feed Gate, it will open. The Controller will slowly increase power to the vibrator as it “learns” how to most efficiently and effectively execute a fill cycle. When the Weigh Hopper has been filled the screen will indicate the job is done and display the weight of the product in the Weigh Hopper. Press the footswitch again to dump the product and begin another cycle. You will notice that the second cycle runs much more quickly than the first.

Fine Tuning

If you find the vibrator is running very fast and/or it takes a long time for the Weigh Hopper to fill, the Supply Hopper Gate may be restricting the product in the Supply Hopper. On the other hand, if the Weigh Hopper fills quickly and is not very accurate, the Supply Hopper Gate may not be restrictive enough and should be lowered. Generally the Feed Pan should contain one layer of product when the Weigh Hopper is filling. For example, if you are filling a container with beans, you should observe a continuous flow of beans in the Feed Pan, one bean deep that flows smoothly and evenly. If there are gaps or open spots where you can see the bottom of the Feed Pans, you should raise the Supply Hopper Gates. For more helpful hints on getting the most out of your S-7 see the “Tips from the Experts” section.

Re-entering the Learn Cycle

If you make a major adjustment to the Supply Hopper Gates, you should begin a new Learn Cycle. To do this, simply press **HOME, 3, 3** to toggle the Learn Cycle on. You can usually make small adjustments to the Supply Hopper Gates without re-entering the Learn Cycle.

Save the Job

You should now save the job so that you don't lose job parameters if you turn off the machine or lose power. **The S-7 does not automatically save your job parameters!** To do this simply press **HOME, 2, 4** (fig. 15.) This will save all of the current Job parameters so that the next time you load this job from the Controller's memory, it will operate just as it did the last time you saved the job. We recommend that you save your Job anytime you make a change to it.



Be sure to re-enter the Learn Cycle if you make major adjustments to the Supply Hopper Gate!

Be sure to Save your Job! The S-7 will not do it for you!

Calibrating Your S-7

Calibrating your new S-7 is a very important step that will ensure that the Logical Controller II can accurately weigh your product. Calibration is the process that gives the Controller a weight reference point. For example, if you use a one pound weight (recommended), the Controller will know what one pound “feels like” and will use that reference to calculate all other weights. We recommend that you recalibrate your S-7 at one month intervals or when you find that you’re not getting accurate product fills.

Calibration is a system parameter and not a job parameter. You do not have to recalibrate when changing jobs.

Please use the following procedure to calibrate your S-7. Remember you must use the procedure on each lane to individually calibrate your machine.

Tare the Scale

With nothing on or in the Weigh Hopper, press **HOME, 1** to tare or zero out the scale. After doing this, the weight display should read “0.000” (fig. 26). Note that, due to the sensitivity of our weighing equipment, you may find that a breeze or vibration from other machinery may cause a fluctuation of 0.001 or so.

Put a Known Weight* on the Scale

Place a known weight on/in the Weigh Hopper and check accuracy. If your S-7 does not accurately display your weight, you may need to recalibrate your scale. To calibrate the scale, first tare the scale (see above), then put an object of known weight on/in the Weigh Hopper. Press **HOME, 3, 1** to get to the calibration screen. You will be prompted to input the weight of the object you placed on/in the Weight Hopper (fig. 27). Input the weight of the object and press **ENTER**. You will be returned to the main screen where you should see the correct weight of the object on/in the Weigh Hopper.

***What’s a “known weight”?** A known weight can be any object—a book, a shoe, your watch—as long as you know how much it weighs. The Controller uses this weight as a base reference for calibration. The accuracy of the S-7 depends on how accurate your known weight is. The S-7 will be much more accurate in its measurements if your calibration weight is known within a few thousandths of a pound.

To set the S-7 to use metric weights, simply use a known weight of metric value to calibrate the scale. In other words, if you have a calibration weight of 1.000 kilogram (exactly!) then place that on the scale. during calibration (see section above) and input “1.000” as the calibration value. The weight reading on the scale is now in kilograms.

Press: HOME, 1

Fig. 26: Home screen indicating that scale has been tared to zero

```
1.Tare
2.Setup
3.Utilities
Job:1Us    0.000
```

Press: HOME, 3, 1

Fig. 27: Calibration screen showing 1.000 lbs input as a calibration value

```
Input Cal Weight
Input -> 1.000
ENTER to Confirm
HOME to Escape
```

Technical Support

Logical Machines is dedicated to supporting its customers. If you have any questions concerning the operation of the S-7, please don’t hesitate to contact us!

On the web: www.logicalmachines.com

Via email: support@logicalmachines.com

By phone: 802.425.5360

Glossary of Controller Terms

Home Screen: This is the main menu that is displayed when you power-up your machine. Any time your controller is powered on you can press the Home button and be brought to this screen. All of the menu items in the controller can be accessed from this screen.

Home button: This button will bring you back to the home screen at any time. This includes when a cycle is running. This is helpful if you need to stop the machine at any time, or if you are lost in the menus and need to get back to the home screen.

Tare: Pressing **1** on the home screen will tare the machine. This provides the zero location for the weight the controller displays. With an empty weigh hopper, if you don't see 0.000 in the lower right hand corner of the display on the home screen, you can press the tare button to zero the machine.

C-CE button: This button will clear your entry if you make a mistake while inputting job parameters.

Enter button: This button is used to confirm an entry when inputting job parameters.

Up and down arrows: These buttons are used to navigate menus that have multiple screens. For example the "Edit this Job" menu and the "Edit Modes" menu.

Setup Menu: This menu allows you to access job parameters and modes. It also allows you to load a job and save your current job.

Edit This Job Menu (Edit Job): This menu contains all the job parameters that control how your fill cycle runs.

Bulk Cutoff Weight (Blk Cut): Unit of measure: weight. The controller fills the weigh hopper at the Bulk Motor Speed (high speed) until it reaches the Bulk Cutoff Weight. At this weight the controller switches into the dribble feed portion of the cycle.

Bulk Motor Speed (Blk Spd): Unit of measure: percentage (0-99). Speed at which the vibrating feeder runs during the bulk feed portion of the cycle.

Dribble Cutoff Weight (Drib Cut): Unit of measure: weight. This is the weight at which the controller stops the dribble feed portion of the cycle and evaluates to see if the cycle has reached the target weight.

Dribble Motor Speed (Drib Spd): Unit of measure: percentage (0-99). Speed at which the vibrating feeder runs during the dribble feed portion of the cycle.

Target Weight (Target): Unit of measure: weight. This is the fill weight you are trying to achieve.

Check High (Chk Hi): Unit of measure: weight. The Check Hi and Check Lo control the red and green status lights on the front of the controller. They do not affect how the job runs. They are a visual indicator to the operator that the weight in the weigh hopper is within an acceptable range. The

Check High is the upper end of this range. This is the weight at which the light goes from green to red, to indicate to the operator that there is too much product in the weigh hopper.

Check Low (Chk Lo): Unit of measure: weight. The red light will turn off and the green light will turn on when the Check Lo weight is reached. Because your machine is designed to never be underweight we recommend setting the Check Low at the same weight as your Target Weight. The green light will only be illuminated when the weight is between the Check Low and Check High, otherwise the red light will be illuminated alerting the operator that the fill is not within your predetermined range.

Drop Gate Open Time (DropOp): Unit of measure: time (in seconds). This is the amount of time that the drop gate is open. When you load a new job this setting is preset at 1.0 seconds. This is typically a good place to start for this setting and it can be optimized to improve cycle time.

Drop Gate Close Time (DropCl): Unit of measure: time (in seconds). This is the amount of time between when the Drop Gate is told to close and the feed resumes. When you load a new job this setting is preset at 1.0 seconds. This is typically a good place to start for this setting and it can be optimized to improve cycle time.

Dribble Delay Time (Drib Dly): Unit of measure: time (in seconds). This is an optional setting that is only displayed when the Dribble Gate is enabled. This delay pauses the feed while the Dribble Gate closes. This is used if when the gate closes it pinches product between the Dribble Gate and the Feed Pan, or if it knocks product out of the machine.

Edit modes menu: The Edit Modes menu allows the operator to adjust other features depending on application and configuration of your machine.

Mode (Mode): Toggle User or Auto. In User Mode all of the job parameters are controlled by the operator. In Automatic mode the controller adjusts the bulk and dribble parameters to what it thinks will make the job run the best. Note that there is a difference between User/Auto mode and Auto Dump.

Auto Dump (AutoDump): Toggle on or off. With Auto Dump off the controller requires the footswitch to be pressed to start and dump every cycle. With Auto Dump on the controller requires the footswitch to be pressed to start the first cycle and it will dump the weigh hopper each time it reaches weight until the machine is paused or sent back to the home screen. Only the Master controller needs to be toggled on for Auto Dump to function.

Auto Tare (AutoTare): Toggle on or off. When toggled on the controller will prompt you first for cycles per tare. This is the num-

ber of cycles between each auto tare. This can be set from 1 to 255. After inputting the cycles per tare, the tare pause delay time will be prompted. This is adjustable between 0.01 and 2.55 seconds. For the most accurate auto tare it is best to use 2 seconds or more. The purpose of the tare pause delay is to allow the system to settle before the auto tare.

Settle Time (Settle): Unit of measure: time (in seconds). The settle time serves two purposes. First, it is the amount of time the Controller evaluates the final weight. It is also the minimum amount of time that the controller is in the dribble part of the cycle. See “Tips from the Expert’s” section for more detail.

Machine software selection (Machine): This option selects which machine parameters your Logical Controller II is setup to use. This should be set to S-7. If this changes press **5** to select this setting, **7** to select S-7 and press **ENTER** to confirm.

Dribble Gate Enable (DribGate): Toggle on/off. This option enables and disables the Dribble Gate for machines equipped with a Dribble Gate. With the Dribble Gate off, the Dribble Gate will stay open (if equipped). With the Dribble Gate enabled the Dribble Gate will open before the bulk portion of the cycle and close before the dribble portion. Enabling the Dribble Gate activates the dribble delay (option 0 in Edit this job) as described above.

Bagger enable (Bagger): Toggle on/off. This option turns on the output signal for a bagging machine, and changes the way the footswitch signal is handled by the controller. If you are integrating your machine with a bagging machine or conveyor, please contact Logical Machines directly for more information.

Synchronous Dump: Toggle on/off. This option sets the machine so both of the Weigh Hoppers dump at the same time. This option is useful if you are mixing two different products into one container. Or if you are filling larger weights. Only the Master controller needs to be toggled on for Synchronous Dump to function. Once on there will be an “S” in the upper right hand corner of the screen signifying that Synchronous Dump is turned on.

Load Job: This allows you to load either a previously saved job or load an unused job to create a new job. On this screen you will input the job number you want to load and press **ENTER** to confirm that number and load the job. You must load a new job before setting up a new job. If you accidentally make changes to an existing job and save the job you will lose your old settings.

Save This Job: Selecting Save This Job will save the current job parameters as the current job number. There is no “save as” option with the Logical Controller II.

Utilities Menu: This menu contains functions that the operator might find useful when setting up and running the machine.

Calibrate: This allows the operator to calibrate the machine. See page 4 for further information.

Empty Hopper: This function opens the Weigh Hopper Drop Gates, if

equipped the Dribble Gate will open and runs the vibrating feeder at full power. To stop this function hit the footswitch or any button on the keypad.

Learn: This function must be turned on for the initial cycle when using Auto Mode. This is explained in more detail on page 10 in the Automatic Mode section.

Manual dump: This function opens the Weigh Hopper door to dump the product in the Weigh Hopper. The Controller closes the door after the dump is complete.

Other features within the controller:

Pause: While a cycle is running the footswitch or any key on the controller (except for the **HOME** button) can be pressed to pause or subsequently resume the cycle. Pressing the **HOME** button during the cycle will bring the controller back to the home screen.

Bump: The Controller will “bump” when the weight in the Weigh Hopper is above the Dribble Cutoff weight but below the target weight. The purpose of the bump is to feed the last little bit of product into the Weigh Hopper for the cycle to reach the target weight. Ideally your job should be set up so this happens at most once every 10 cycles.

Tips from the Experts

Here are a few tips that will help as you set up your S-7 and begin to understand how all the parameters work together:

- **Only adjust one setting at a time.** This will allow you to see how the machine responds to a change in a specific parameter. Each time a setting is changed, especially Bulk and Dribble Speeds, run a couple cycles to allow the machine to respond to the change.
- **Your machine only weighs product that is in the weigh hopper.** When the Controller instructs the vibrator to stop feeding product, the weight will increase a little because the product that has left the end of the feed pan has not hit the surface of the product in the Weigh Hopper.
- **Setup one lane at a time.** When initially setting up a job, you can operate the machine one lane at a time. To do so, only power on one controller at a time. The Foot Switch will need to be plugged into whichever controller you are setting up. After setting up the machine, the footswitch will need to be reinstalled in the Master Controller for the machine to operate properly.
- **When setting up your job, especially when first learning the machine, it is important to start low and slow.** This means to start with lower cutoff weights and motor speeds. Because of this, your first cycle might take 30 seconds to fill a pound of coffee. The first thing to focus on with your job is to hit your target weight. Adjust the Dribble Cutoff a little below the target weight to accommodate for the small amount of product that has left the feed pan but has not been weighed. This is a balance between the Dribble Cutoff and Dribble Speed.

If you find that the machine “bumps” (a quick, short vibration of the feed pan) every cycle, that suggests that your Dribble Cutoff weight is too low. The Controller is bumping because the current weight in the Weigh Hopper is below the target weight but above the Dribble Cutoff weight. The Controller will bump to move a small amount of product into the Weigh Hopper and then evaluate the final weight. It will repeat this process until the machine reaches the target weight. For best efficiency you want the job set up so that it does not bump.

- **If you find that the machine is overshooting every cycle and the Controller is in the dribble part of the cycle for at least 2 seconds, then most likely your Dribble Cutoff is too high.** If lowering the Dribble Cutoff weight does not help the overshooting then it is most likely that your bulk settings are too aggressive.

Settle Time explained:

Settle Time has two functions inside the Logical Controller II. First, it is the amount of time that the Controller takes to evaluate the final weight at the end of the cycle. This allows the product to settle for a brief period before the final weight is determined. 1.0 seconds is typically a good Settle Time. It also sets the minimum amount of time the machine is in the dribble part of the cycle. Here's why: With some speeds and products there may be residual vibration in

the machine during the transition from bulk to dribble. This vibration can cause a very brief spike in the weight read by the Controller. In very specific instances, this can cause the weight the Controller observes to be above the Dribble Cutoff even though there is not that weight of product in the Weigh Hopper. By forcing the machine to dribble for 1.0 seconds, the effects of a spike in weight are mitigated for the duration of the Settle Time.

If you have your settle time set high—for example 2.5 seconds—you can force the machine to overshoot. This is because the machine waits for the 2.5 second timer to expire before the Controller recognizes that it has passed not only the dribble cutoff weight, but also the target weight. For most weights and products a settle time of 1.0 seconds is appropriate.

Miscellaneous Tips:

- **Is the drop gate not opening on your S-7?** If so, you may have accidentally switched the Controller over to software for another machine. The first thing to check is to see if your Drop Open Delay and Drop Close Delay are still visible in the ‘Edit this Job’ menu. These are options 8 and 9 in this menu. If these items are set to zero, the drop gate will not open. If these items are missing you can go to the Setup Menu and then the Edit Modes menu. Arrow down to option number 5 (machine type). Confirm that this says “S7”. If it does not, press **5** to select the Machine Type, then press **7** to select S7. Press **ENTER** to confirm. This will return you to the Edit Modes menu.
- **Decrease your cycle time by adjusting the Drop Open and Drop Close times.** Once you have become comfortable operating the machine and feel your cycle is set up properly you can make a couple more fine adjustments to cut down on your cycle time. The Drop Open time is how long the door on the bottom of the Weigh Hopper is open to dump your product. The door only needs to be open long enough for your product to dump into the Discharge Funnel or Chute. Meaning, if your Drop Open is set at 1.0 second, but it only takes half a second for all of your product to leave the Weigh Hopper, your cycle time is roughly half a second longer than it needs to be. The Drop close time can also be adjusted, this is how long between when the controller signals the Weigh Hopper to close and when the feed resumes. You can adjust this time to remove any delay between when the Weigh Hopper door is fully closed and when the feed resumes. Adjusting these parameters can significantly increase productivity over the course of a day. Like with the other parameters it may take some fine tuning to get the times dialed in.

- **At any point in time the HOME button can be pressed to bring the Controller back to the Home Screen.** This is helpful if you get lost in a menu or the machine is running a cycle and you want to get back to the Home Screen. Pressing the HOME button will stop the machine.

- **Is your machine not reading the proper weight? Does the weight not tare to zero? There are a few things that could cause this:**

1. Travel locks (C-clamps) may not have been removed. These connect the Weigh Hoppers and Discharge Funnel/Chute. These are installed to secure the Weigh Hoppers during shipping.
2. The quick release cam levers for the Discharge Funnel/Discharge Chute must not be pointed upward as it may interfere with the Weigh Hopper which will cause inaccurate weights. The lever must be pointed downward to prevent any interference with the Weigh Hopper.
3. The Load Cell could be damaged. The Load Cell is the aluminum block with a dog-bone shape cut out of the center. There is a Load Cell between each of the Weigh Hoppers and the Load Cell brackets. There are two ways to check this. To test for electrical damage, tare the Controller, shut the Controller off and then turn it back on. If the Controller reads a number like -6.191 or -3.714 or some other negative number this suggests that the Load Cell is damaged. To test for mechanical damage, take a penny and put it underneath the end of the Load Cell (the end where the Weigh Hopper mounts). The penny should have a snug fit. If it either doesn't fit or it has a lot of wiggle room, the Load Cell may be damaged.
4. The screws that fasten either the Load Cell to the chassis or that attach the Weigh Hopper to the Load Cell may have loosened. If the Load Cell is loose it cannot work properly. The screws for the Load Cell can be tightened using a 10mm socket. Torque should not exceed 6 ft-lbs.

- **Extending the length of your AutoDump cycle:** If you want to run your machine with AutoDump enabled but your cycle is running too quickly you can add time to your cycle with the Drop Close delay setting. This is option 9 in the 'Edit This Job' menu. Increasing the Drop Close delay time will add a time delay between the Weigh Hopper door closing and the vibratory feed resuming. It may sound counterintuitive to increase the cycle time on a semi-automatic weigh fill machine, but it can be helpful when the operator needs additional time to prep a new container to fill.

- **A quick way to empty your weigh hopper without running a cycle:** You can empty the Weigh Hopper without running a cycle or going to the Utilities menu. Follow the small air lines that attach to the weigh hopper to the solenoid underneath the vibrating feeder. On the bottom of the solenoids there is a small red button. Pressing this button will manually actuate the solenoid and open the Weigh Hopper Drop Gate. For machines equipped with a Dribble Gate, the solenoid to actuate is the one closest to the regulator.