

The Steinlite SL-95 Moisture Meter Instruction Manual

The Latest Technology

From the First Name

In Grain Moisture Testing

Introduction

Congratulations on selecting The Steinlite SL95 Moisture Meter. The SL95 is the most advanced, reliable, and user-friendly machine of its kind available today. Steinlite's founder-inventor pioneered the development of modern moisture metering in the 1930s, and we have been leaders in the field ever since.

For the SL95 we have harnessed the latest technology to give you a highly accurate, state-of-the-art moisture tester that is easy to set up and easy to use. No other moisture meter provides faster or more consistently accurate readings — regardless of surface moisture. The SL95 is fully automatic, produces readings in just 10 seconds, and can be connected to computers and printers in your office to further simplify your recordkeeping system. It will give you and your customers years of dependable service. When operated according to the guidelines in this instruction manual, the SL95 can complete three or four readings per minute and should execute 1,000,000 drops before other than routine servicing is required. No other moisture-metering machine matches its performance and durability.

You'll find that operating the SL95 is easy. But before you even plug it in, please read the sections on *Setting Up Your SL95* and *Preparing for Testing*. As with any modern electronic equipment, there are some important things to learn about setting up, operating, and maintaining the SL95. Following the instructions in this manual will help you avoid erroneous readings and possible damage to the unit.

We have tried to make this instruction manual as simple to use as your SL95. But if you've ever tried to explain how a combine works to someone unfamiliar with farming, you know how hard it is to explain a complex machine in simple terms. Sometimes you'll use words the other person hasn't heard before. We have the same problem. So be prepared to read a few unfamiliar words, and don't get frustrated if you don't immediately understand what the manual says. Read it — and reread it — one paragraph at a time. Look at the drawings and at the SL95 as you read. Pour yourself a cup of coffee and take it step by step.

Many of the instructions are just common sense — like making sure your SL95 is level, stable, clean, and connected to a proper power source before turning it on. The initial setup and daily operation are logical and simple. To cut down on what you have to do to get up and running, your SL95 has been fully programmed and precisely calibrated at the factory.

Before calling for technical assistance, try rereading what puzzles you and do a *hands-on trial*. Give it your best shot. It is unlikely that you will damage the ruggedly built SL95 by entering data or trying to operate it in a normal manner. Just do not force anything. Chances are, you'll solve the problem yourself and immediately become an expert in that part of operating your tester. But if you still need help, don't hesitate to call us at 800-462-1835. The knowledge gained by trying on your own will make it much easier for you to explain your problem to the Steinlite technician and for our technician to explain the solution to you.

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Figure 1

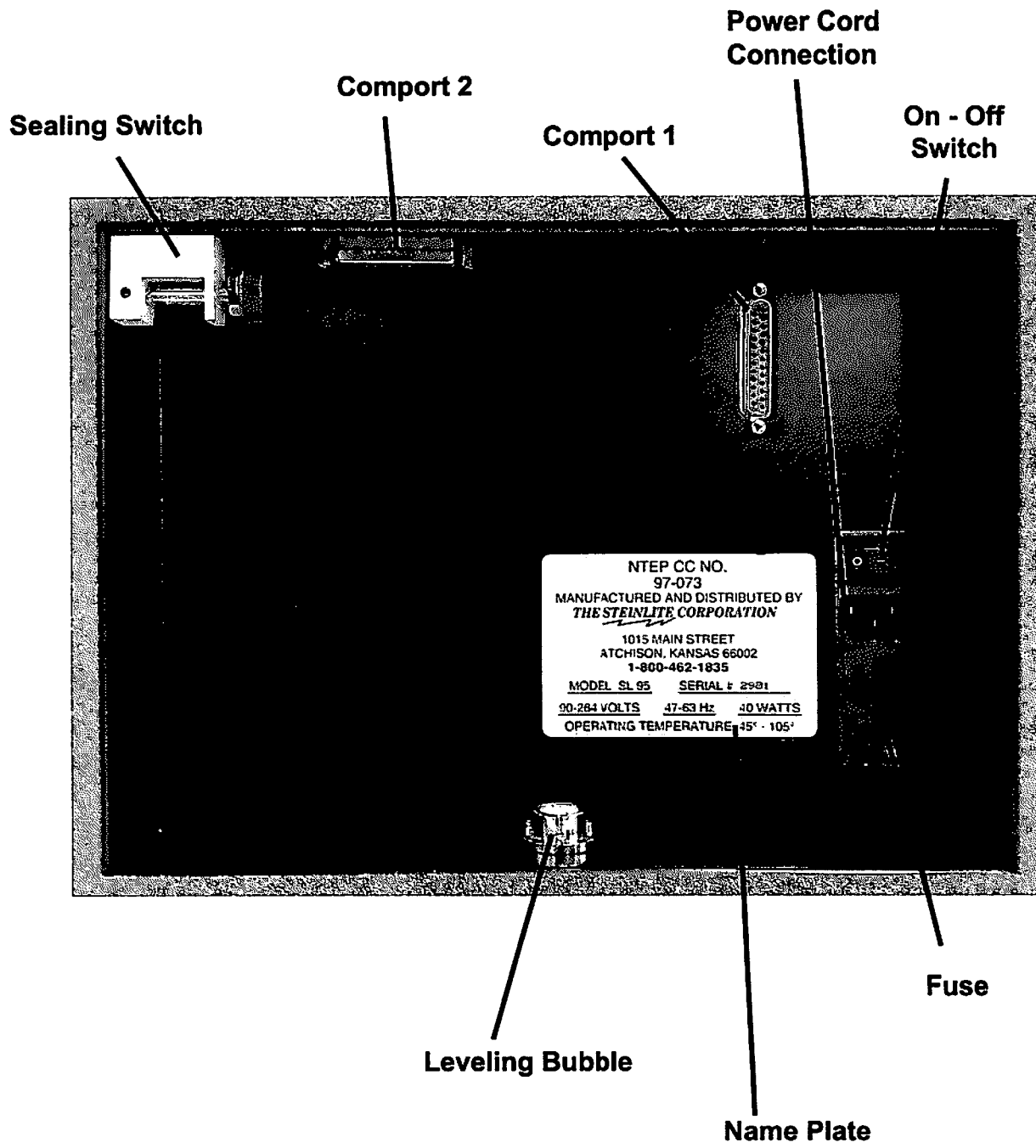


Figure 2

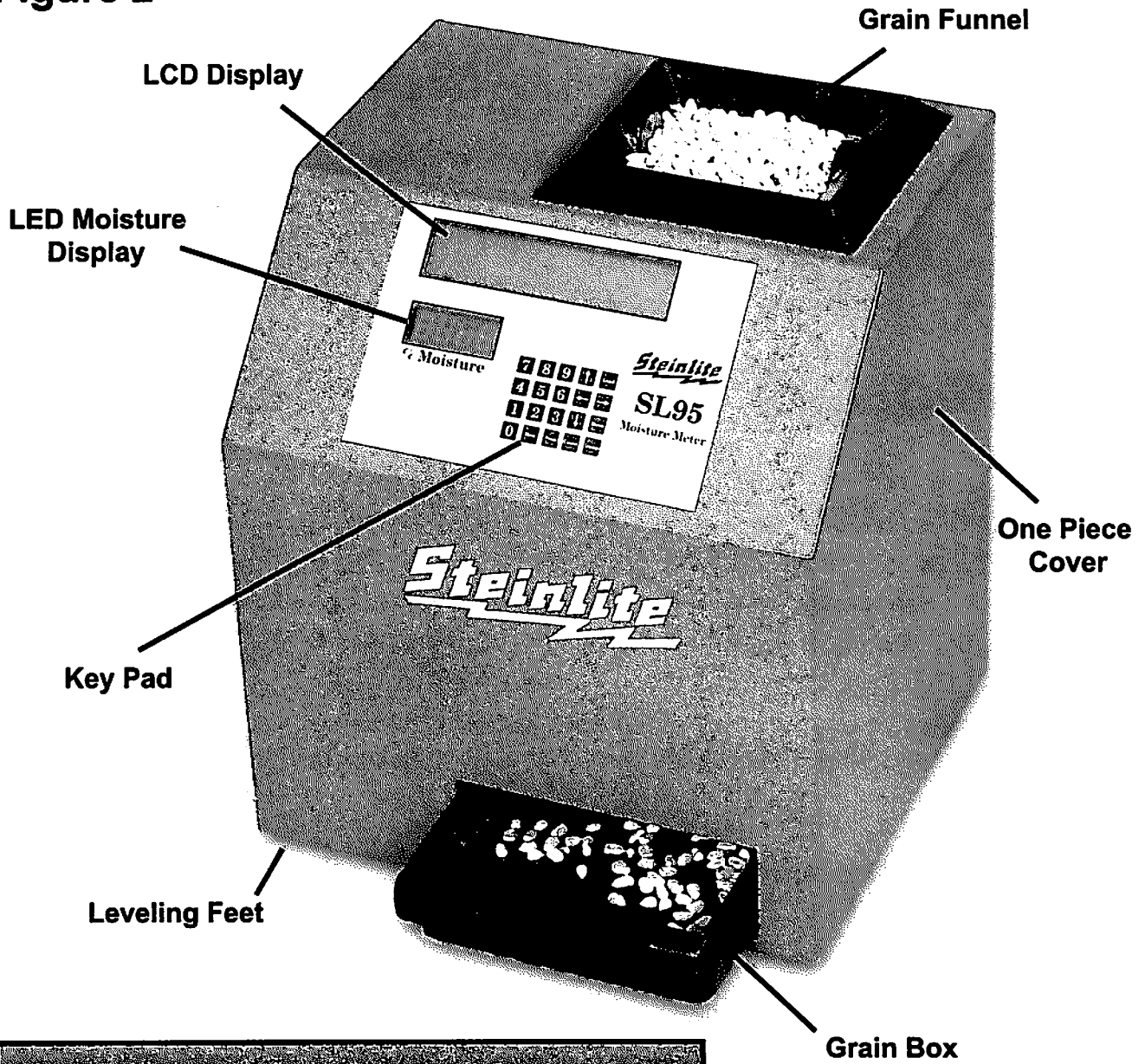


Figure 3

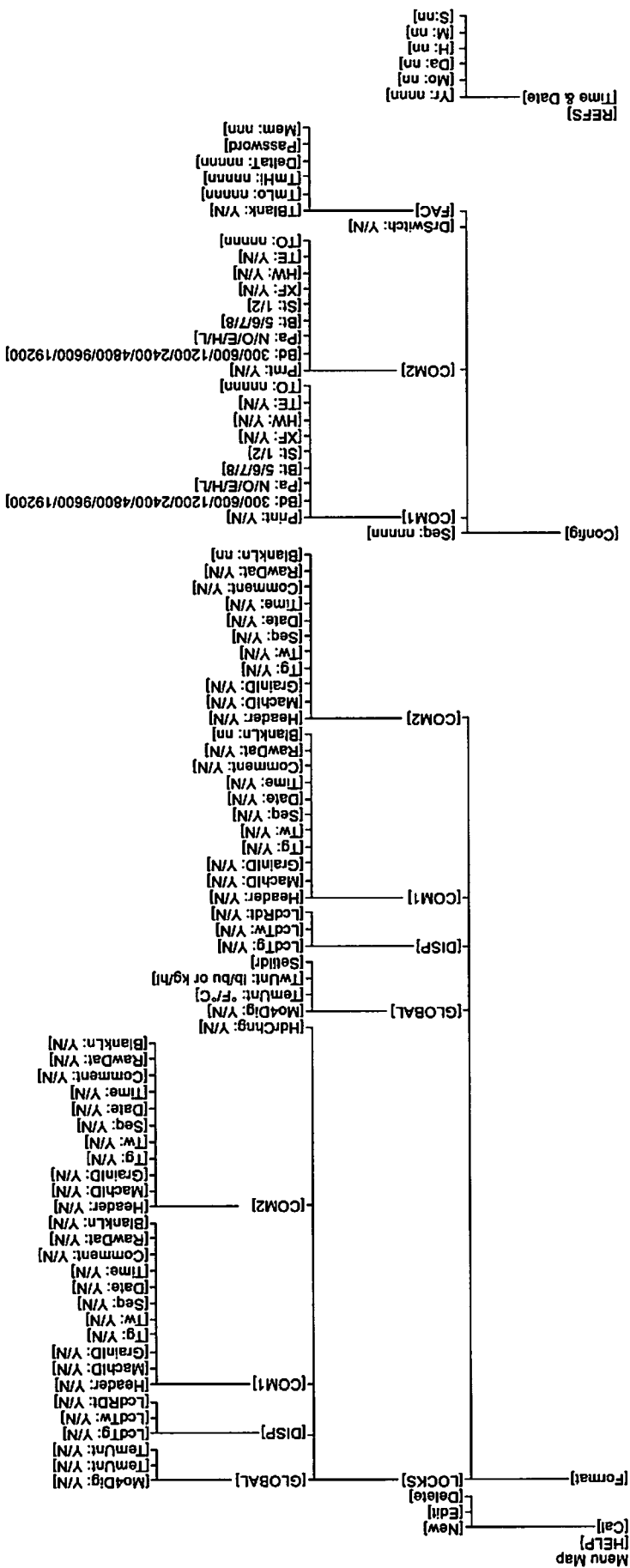


Figure 4

Connections for cable from SL95 to computer for software using RTS/CTS handshaking.

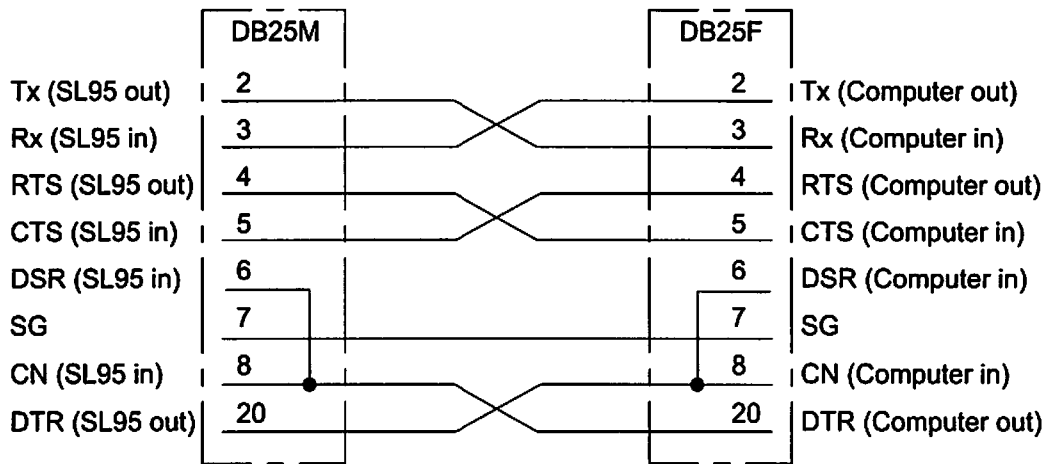


Figure 5

Connections for cable from SL95 to computer for software using DTR/DSR handshaking.

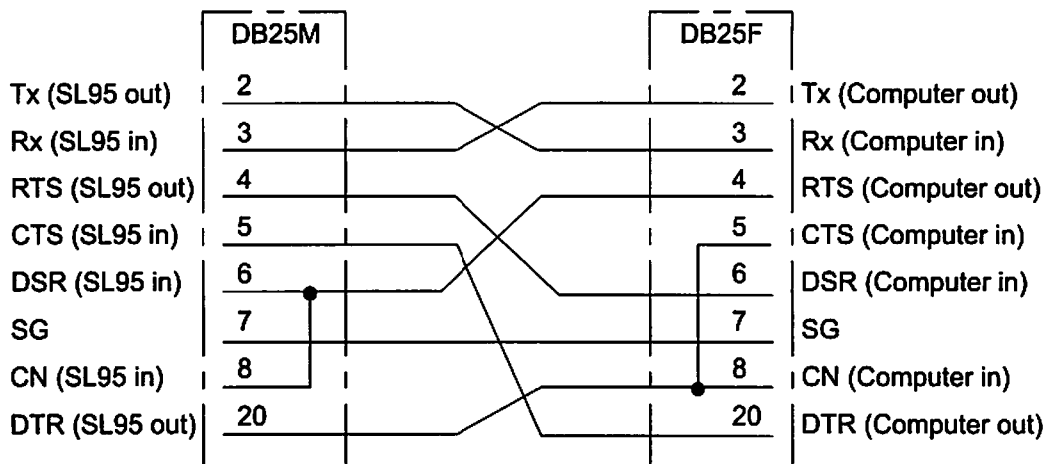
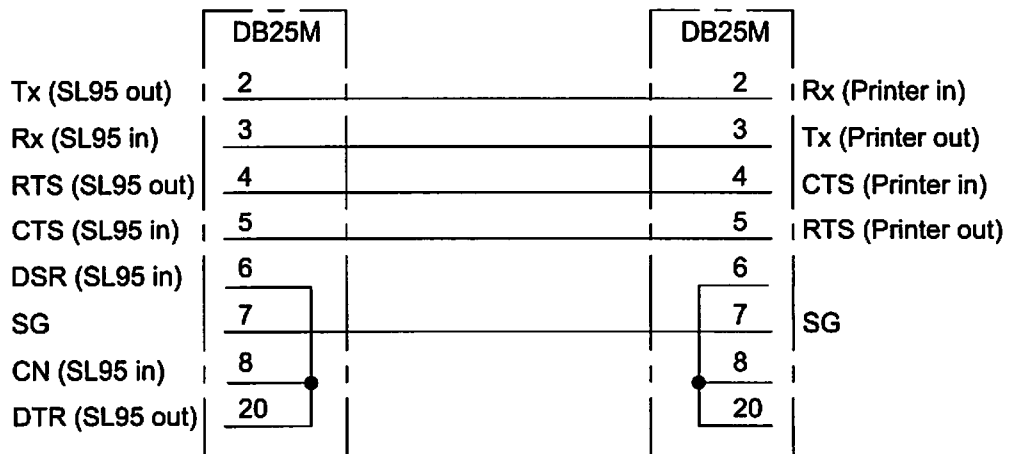


Figure 6

Printer cable (a straight thru cable also works).



Setting Up Your SL95

Locate and Level the Machine

The SL95 should be placed on a sturdy table that is free from vibrations. Because the SL95 has an internal scale, vibrations will interfere with accurate readings. The machine must be leveled before use. There is a bubble level located on the lower left-hand side of the unit at the bottom of the recessed area.

The bubble should be centered within the black circle. Because the apparent location of the bubble depends somewhat on the angle at which it is viewed, you should view the bubble, as nearly as possible, from straight above, sighting over the edge of the cabinet. To bring the machine into level, use the unit's adjustable leveling feet. Either lower the side that the bubble is toward, or raise the opposite side. Once the bubble is centered, make sure that all four feet are firmly touching the table, so that the machine will not rock back and forth.

Maintain Proper Room Temperature

Do not place the SL95 in direct sunlight or where it will be subject to temperature extremes, because room temperature can have an impact on the readings. The specified operating temperature range for the SL95 is 45°F to 105 °F (7°C to 40°C). If you attempt to take readings outside of this range, the SL95 will send an error message to the display and to the serial port output (either MACHINE HOT or MACHINE COLD) and will not give a moisture reading.

Check Your Power Supply

The SL95 must be plugged into a 90-264 Volt, 43-63Hz AC grounded outlet. But there is no need to select 110 or 220 Volt input. Your Steinlite Moisture Meter will automatically select the input voltage. Plug the female end of power cord into the connector on the left side of the unit and the male end into a grounded electrical outlet. Make sure the outlet's circuit is not overloaded. We recommend protecting the SL95 from voltage spikes and power line interference with a UL- approved surge suppressor. We also recommend turning the SL95 off overnight or when not in use and unplugging it when it will not be used for extended periods.

Make the Right Connections

All of the SL95 connection ports are located in the inset panel on the left-hand side of the machine. **Figure 1** shows where these ports are. The power entry module is near the lower right side of the panel. It has a fuse drawer containing the fuse. If the fuse blows, it should be replaced with a fuse of the same rating (1 A, 250V fast acting). The power cord plugs in directly above this, and above the cord is the power switch.

The SL95 has two serial ports that may be used to connect a printer and/or computer. The first one, designated COM1, is on the vertical face of the inset panel. The second one, designated COM2, is on the top face of the inset area. Just to the right of the COM2 connector is a connector for an optional computer-style keyboard. The accessory keyboard is useful if you have the SL95 connected to a remote computer and want to enter letters as well as numbers.

Start the Power Up Sequence

Your SL95 should be allowed to warm up for at least 15 minutes before it is used so that its internal temperature can stabilize. When you turn on the power switch, the machine will display a banner on the green LCD screen that gives the revision number of the system software installed in the machine as well as the serial number of the machine. The smaller, red LED display will show a series of numbers as a check that the display circuits are functioning properly: **First you will see 01.23, then 12.34, then 23.45, etc, until the number 90.12 appears, then 88.88.** Next the top and bottom doors open. Then the LCD display counts down 5,4,3,2,1. The machine is checking internal references to verify that it is correctly calibrated. Finally the SL95 displays the currently selected calibration. If instead of the sequence described, an error message is displayed at some point during the diagnostic process, turn to the section on error messages for an explanation and possible remedial action.

Enter Data on the Keypad

The SL95 is equipped with a keypad on its front panel, **Figure 2**, that allows you to select the grain you want to test; load grain samples for testing, unload them after the test, and otherwise control the machine. This keypad has a 16-character input buffer. So you can hit several keys while the SL95 is busy executing an earlier entry, and it will remember your keystrokes until it is ready to act on them. This allows you to type ahead of the SL95 if you know what comes next. But be careful! You will want to avoid hitting a key, such as the LOAD key, multiple times because you think the machine is not responding immediately to your input or because you forgot having hit it.

Getting Ready for Testing

Before you run a test, there are a few things you should know about **selecting the code** for the test material and about the **limits on temperature, moisture, and test weight** for a particular commodity that guide the operation of your SL95.

Of course, the first thing you must do is plug in the power cord and turn on the power switch at least 15 minutes before testing so that the machine's internal temperature and circuits can stabilize. The next thing is to select the **code** that the SL95 will use to **calibrate** or adjust its circuits for the commodity you will be handling.

Commodity Calibration

A *calibration* consists of the information the SL95 needs to give the correct reading for a particular commodity sample. Each SL95 is *standardized* at the factory so that it will produce accurate results from the data contained in the *calibrations* programmed into it. You must select a calibration to run a test: The calibration appropriate for the commodity that you wish to test must be loaded on the machine and must be selected in order for the SL95 to produce an accurate reading.

When you select a calibration, the SL95 displays information about it on the first two lines of the LCD display. So you can double-check your entry. On the first line you'll see the ID number of the commodity and its name. The second line gives you additional information, such as the revision number, date, and moisture range of the calibration.

Occasionally the USDA changes the guidelines for evaluating various commodities. When this happens, you can enter the new codes, or calibration numbers, for these commodities (1) by using the SL95 keypad and MENU; (2) by connecting the SL95 to a computer and entering the data using a floppy disk or CD that we will provide; or by a direct download from the Steinlite Web site via the Internet and a computer. You'll find more about this in the section on **Managing Calibrations** on page 12.

Grain Temperature

Since the temperature of the grain affects how the grain tests, the SL95 must measure this temperature and compensate for it. The SL95 is able to do this only within a certain range. If the temperature of the grain falls outside of the limits set for it, the SL95 will print an error message (SAMPTEMP HI or SAMPTEMP LO) and will not give a moisture reading. If this happens, let the grain cool down or warm up, and run it again. For most calibrations, the grain temperature limits are 35°F to 110°F (2°C to 43°C).

Moisture and Test Weight Ranges

Each calibration is set to test a certain commodity within a certain range of moisture. If the moisture falls outside this range, the SL95 will display an appropriate error message on the LCD, and the moisture reading on the LED display will flash. On the printout, a printed error message follows the moisture reading. The SL95 will extend beyond the limits of the data upon which the calibration was made, but since data wasn't taken beyond these limits, the readings may not be accurate.

The density, or test weight of some commodities varies over a significant range. Since this density affects how the grain tests, the SL95 measures this density and compensates for it. Each calibration has limits for acceptable test weight. If the test weight falls outside this range, the SL95 will display and print the appropriate error message, and the LED moisture display will flash. The readings may not be accurate.

Important Cautions

1. Do not connect your SL95 to a printer or a computer until you read *Using the SL95 with a Printer or Computer* in a later section of this manual.
2. If your SL95 is connected to a printer and you decide to turn the printer off while the machine is running, you must disconnect the printer cable. If you do not, the SL95 will show its reading but will not dump the grain sample into the grain drawer or complete the metering cycle.
3. If you connect your SL95 to a computer and decide to turn the computer off while the SL95 is running, you might encounter the problem described above: Your machine may show a reading but fail to dump the grain or finish the metering cycle.

Moisture Testing in 5 Easy Steps

When your SL95 is properly set up and running, doing moisture testing is as simple as this!

1. Select the commodity that you want to test.

You must tell the machine what commodity you want to test by selecting the proper calibration. One way to do this is to key in the ID number of the grain you want to test and then hit the **↓** key. You can use the **←** key to back up and correct any mistakes you make while typing in the ID number. The SL95 will display the name of the newly selected calibration, which tells you what commodity that calibration is intended to test. If you don't know the ID number of the commodity that you want to test, use the **←** and **→** keys to move back and forth through the list of commodities that are loaded on the machine. Each time you hit the **←** or **→** keys, the SL95 will display the next calibration, unless it is at the beginning of the list (for the **←** key) or at the end (for the **→** key). When the calibration you want is showing on the display, you are ready to run a sample.

2. Pour the material to be tested into the funnel.

It is important to fill the machine at least up to the bottom of the plastic part of the funnel. This assures that you have loaded enough sample for the test — approximately 450 grams (about 1 pound) of 56-lb/bu test weight material.

3. Hit the **LOAD** key to start the test.

If the selected calibration has been changed since the last sample was run, the SL95 will display the message *Loading Calibration – Please Wait*. This will take about five seconds. Next the SL95 will display the message *Running Grain...* . About 2 seconds later, the door will open, and the grain will drop into the test cell. The SL95 will display a reading 10 seconds after the **LOAD** key has been hit, excluding the time required to load a newly selected calibration. Of course, if the machine is doing something else (such as the **DUMP** function) when the **LOAD** key is hit, the **LOAD** key will not be processed until the SL95 finishes whatever it is doing.

4. Read the moisture reading on the LED display.

You can get additional information from the LCD display, which can be set to show the grain temperature and the approximate test weight. If the printout function is enabled, your test results will also be output to the serial ports and to any printer or computer you have connected to them. If you want an extra copy of the printout, you may hit the **PRINT** key. This will cause the SL95 to send the readings to the serial ports a second time. Setting up the displayed values and printer/computer connections is described in later sections.

4A. Enter your comments.

In addition to the test results, comments can be output to the serial ports. Comments allow you to include additional information about a sample. If you are using our optional computer-style Steinlite keyboard, your comments can include letters as well as numbers. Otherwise you are limited to entering numbers directly from the SL95 keypad. To enter a comment, hit the ↓ key from the regular operating mode (or the ↓ or **ENTER** key on the optional keyboard). Line 3 of the display should now say **Enter Comment** (30 chars max)! Type in up to 30 characters of comment, and then hit the ↓ key (or **ENTER** key) to accept the entry. This comment will show up on all subsequent printouts (provided it is enabled in the format, described later), until it is changed. If there is no grain in the cell and the **PRINT** key is hit, only this comment will print out. There will be no moisture or other readings because these were cleared when the sample was dumped out. To clear out the comment back to a blank, simply hit the ↓ key twice without entering any text in between. When the comment is blank, it will not show up on a moisture ticket, even if printout of the comment is enabled. That is, even the label **Comment:** that precedes a comment will be omitted. However, the **Comment:** label will still be printed when there is no grain in the cell and **PRINT** is pressed.

5. After noting or recording the result, hit the DUMP key.

This will print the message **Emptying the Cell...** and empty the grain from the test cell into the grain drawer. Once the grain is in the drawer, remove the drawer, empty it, and replace it. The drawer can only hold one load of grain. But you may remove the drawer and allow the grain to fall from the bottom of the SL95 into a barrel or other larger receptacle. If you remove the drawer, you will also need to disable the programmed option that stops further testing if the drawer is not in place. The procedure for doing this is described later in the [Config] Menu section. You don't have to wait for the machine to stop showing the **Emptying the Cell...** message before removing the drawer. The **DUMP** function includes a time delay to ensure that the scale has time to settle before the next sample is run. If you are running multiple drops on the same sample, you can usually have the funnel loaded for the next drop by the time the **DUMP** function completes.

Note:

On some early SL95 models, the bottom door of the test cell, which is opened by the **DUMP** key, prevents the grain drawer from being removed while the door is open. This door remains open for about 3 seconds to ensure that all the grain drops from the test cell. So allow for this time and do not force the drawer. If you forget and try to pull the drawer out too soon, simply push the grain drawer closed and wait until the test cell door has completed its cycle.

More About Operating Your SL95

To run the 5-step moisture test described above, you've already been introduced to most of the keys on the keypad. The number keys let you enter commodity ID numbers. The **Left Arrow** key lets you back up to make changes as you key in a number. Together, the **Right and Left Arrow** keys let you search back and forth through the programmed commodity calibrations and other displayed items. The **Up and Down Arrow** keys let you scroll up and down. The **Down Arrow** key can also act like an **ENTER** key. You press the **LOAD** key to start a test and the **DUMP** key to end it. Now let's look at keys and functions that have not been mentioned, the **MENU**, **MEM**, and **CANCEL** keys.

Using the MENU Key for HELP

Hitting the **MENU** key gives you access to many important options – which will be covered in later sections. You can look over these options in **Figure 3**, the **MENU MAP**. For now, we'll limit discussion to the first menu choice on the main menu: the **[HELP]** menu option. This gives you a brief description of the basic operation of the SL95. To get this help, press **MENU**. Then make sure that the **[HELP]** menu appears in the LCD display. Use the ← and → keys to select it if it does not. Then use the ↓ key to enter into the help menu. The → and ↓ keys can be used to move down through the text. The ← and ↑ keys can be used to move back up through the text. Use the **CANCEL** key to exit the **[HELP]** function.

Using the MEM key

The **MEM** key provides short cuts for selecting frequently used calibrations. To swap between the current calibration and the last one you used, hit the **MEM** key then the **0** key. This shortcut saves time when you are alternating between two commodities. It allows you to switch easily between the two calibrations. The **MEM** key also lets you access 9 programmable memory locations, into which you can store calibrations for quick retrieval. To program a particular memory, first select the calibration you want to store. Next hit the **MEM** key, then the **↓** key, then the number (1 through 9), which you would like to assign to that calibration. After that, you can select that calibration simply by hitting the **MEM** key, then the number that you assigned to that calibration. The SL95 will then select that calibration. Finally, the **MEM** key may be used to select the first or the last calibration on the machine. To select the first calibration, hit the **MEM** key, then the **←** key. To select the last calibration, hit the **MEM** key then the **→** key. The **MEM** key also has related uses in the menu system and the calibration entry functions, which are described in later sections.

Using the CANCEL key

Hitting the **CANCEL** key enables you to end an operation or exit from a menu.

How to Use the Menu System

The **MENU** key lets you access important secondary functions of the machine and change various settings. Before covering the functions you can reach through the menu system, let's discuss its general operation.

When you press the **MENU** key, the **SYSTEM MENU** appears on the green LCD screen. The System Menu allows you to choose from among various menu options. **Menu options are enclosed in square brackets [] and listed on the second line of the LCD display. A black flashing square, similar to the cursor on a computer screen, indicates which option is currently selected. Use the ← and → keys to move among the options.**

The third line on the LCD screen gives a description of the currently selected option. As you hit the **←** and **→** keys to move the cursor, this line changes to match the currently selected menu item. When there are more menu options than will fit on the second line of the display, the SL95 displays [→] at the end of the line to indicate that there are more options. Once the cursor has been advanced to the last displayed option in that direction, pressing it again will shift all the options in the opposite direction, to bring the next option into view. At that point, the LCD screen will also show [←] at the beginning of the line to indicate that there are now options available back in that direction. This process of shifting the options right or left is known in computer lingo as scrolling. Use the **←** and **→** keys to scroll through the options to the left or right and select those you want, one at a time. There is also a quick way to get to the first or the last option in the menu. To get to the last option, hit **MEM** and then **→**. To get to the first option, hit **MEM** then the **←** key.

Selecting an option does not actually cause what that option does to be performed. To implement the option, you must first select that option with the cursor and then enter into the option by hitting the ↓ key, which in this case acts like an ENTER key.

Types of Menu Options

There are several different types of options that appear in the menu system.

1. **One type of menu option directly performs a function.** This is the case with the [HELP] option, which is the first one on the system menu. If you activate the [HELP] option, it performs the help function, which shows you help information. Use the arrow keys to move through the help information. To exit the [HELP] option, just hit the **CANCEL** key. The **CANCEL** key will put you back into the normal operating mode.
2. **A second type of menu option moves you into another submenu that gives you another set of choices.** The first line of the display shows which menu you are currently in. Use the **↓** key to enter into the currently selected menu. You can use the **↑** key to back out of the current menu to the menu from which you came. Thus with the four arrow keys you can explore the entire menu system, back and forth and down and up.

3. **A third type of menu option allows you to choose one of several possibilities.** This kind of option shows which of these options is currently set. For example, [Header: Y] means that, yes, the header will be printed out. To change the setting of such an option, select it and hit the ↓ key to enter into that option, then use the arrow keys to select the new setting. Then hit the ↓ key to enter the new setting. The new setting will be entered and you will be put back to that option. Then you can move on to another option. These choices are actually menu options, even though they don't have the square brackets. If you don't want to change the setting, use the ↑ key to back out into the previous menu. The ↓ key always backs you out of the menu system one step at a time except for when you store CAL constants.
4. **A fourth type of menu option, quite similar to the multiple choice menu item, is the numeric value option.** Like the multiple-choice option, it shows its current value. To change its value, enter into that option with the ↓ key, and it will ask you to key in a new value. After you key in the new value, hit the ↓ key to accept the new value. If you don't want to change the value, hit **CANCEL** (or use the ↑ key), and you will be returned to the menu.

The **CANCEL** key lets you exit the menu system. It will not undo changes that have already been made. It will leave without making a change in a multiple-choice option that hasn't been accepted yet with the ↓ key. You may also exit the menu system by using the ↑ key to back out of menus until you back out of the system menu, at which point you will be back to the regular operating mode.

Menu System Map

Figure 3 is a map of the menus available on the SL95. Until you become familiar with the system, you may want to use this map to help you navigate through the menus so that you can find what you want more quickly. In the next several sections, we'll take a get-acquainted tour of the menu system and the flexibility it offers you.

The [Cal] Menu — Managing Calibrations

The SL95 is normally shipped with all the calibrations you are likely to need already installed. However, the federal agency in charge of metering standards updates calibrations from time to time. In addition, you may want to add new calibrations. The [Cal] menu allows you to do this.

As mentioned earlier, we use the word *calibration* to denote the information the machine needs to give the correct reading for a particular commodity. Each SL95 is *standardized* at the factory so that, using the information contained in the *calibration*, it will produce the correct results. The *calibration* appropriate for the commodity that you wish to test must be loaded on the machine and must be selected in order for the SL95 to give an accurate reading.

A *calibration* for the SL95 consists of 128 five-digit numbers. These numbers contain all the information the SL95 needs for a given commodity, including the text required to identify the calibration and commodity on the LCD screen.

Since the calibration requires 128 five-digit numbers, it is tedious to enter them from the SL95 keypad, although it can certainly be done. But you may wish instead to 'download' the calibration from a computer. To do this you must have the proper cable to connect the computer to one of the serial ports on the SL95. You must also have the software on your computer to download the ASCII file containing the numbers. This software must be set up with the right kind of *handshaking* so that the SL95 can tell the computer when to pause to allow it to catch up. If the cable is properly wired, you can use *hardwired handshaking*, otherwise, you may use XON/XOFF handshaking. If handshaking is not set up correctly, the computer will get too far ahead of the SL95, and digits will get dropped. The serial port communication parameters also must be set up properly. **See the section on The Serial Ports for more information on setting up communications between your SL95 and a computer.**

Before any changes can be made to calibrations, the SL95 must be in an *unsealed* state. To unseal your SL95, the sealing switch must be pulled out to its forwardmost position. The sealing switch is located at the upper left corner of the recessed panel on the left side of the machine. To unseal your unit, the black knob on the sealing switch must be pulled all the way forward. The switch must be kept in this extended position while any changes that require the machine to be in an unsealed state are made. [Figure 1]

To seal the unit after changes are made and entered, push the switch all the way to the rear of its travel. At this time a formal lead and wire seal can be installed. A wire can be run through the 1/8-inch hole in the aluminum-mounting block and through the 1/16-inch hole in the switch shaft. You might have to rotate the shaft to line up the two holes. The wire seal may also be looped through the hole on the rear of the shaft, which protrudes through the cover of the machine. Formal sealing helps prevent unauthorized changing of the calibrations.

The [Cal] menu has three options: [New], [Edit], and [Delete].

- **[New]** is used to load a new calibration onto the machine. If the calibration entered has the same ID number as one already on the machine, it will replace the existing calibration. There can only be one calibration with a particular ID number loaded on the machine at a time. Different calibrations with the same ID number occur when there is an updated version of a calibration that supercedes an older one.
- The **[Edit]** option allows you to edit the currently selected calibration. This is an advantage when there are slight changes to be made, as may happen when you update a calibration. When stored, the newly edited version will only replace the original version if the ID numbers match. Otherwise, a new calibration will be created.
- The **[Delete]** option allows you to delete the currently selected calibration. To delete a calibration that you no longer need and free that space up, select that calibration then hit the menu key, then use the ← and → keys to select [Cal], press ↓, select [Delete] and press ↓ key. The SL95 will display the name of the calibration and ask if you really want to delete it. Press ↓ key if you really do want to delete this calibration. Any other key will cancel the operation and take you out of the menu.

Loading a Calibration with the SL95 Keypad

Select [New] or [Edit] from the [Cal] menu. The SL95 will display the first 8 of the calibration constants. These are identified as KA0 through KA7. The calibration constants are organized into 16 pages of 8 constants each. The top line of the display indicates which page (1-16) you are currently on. Each calibration constant is identified by a unique label. All labels start with K. The second letter tells which page the constant belongs to (A, B, CÖ, P), and the third character is a digit 0 through 7 identifying which constant on the page it is. To enter the constants, simply type in the five-digit number corresponding to the currently selected constant (which is the constant where the cursor is), and hit the ↓ key. The number will be entered, and the cursor will automatically advance to the next constant. In this way all 128 constants may be entered. The SL95 will automatically advance to the next page when it's time to. If an error is made, it may be corrected before the ↓ key is hit by using the ← key to back up and by then typing in the correct digits. When the SL95 is not in the process of accepting keyed in digits, the → and ← keys may be used to move the cursor to the next or the previous constant, so that you can go back and re-enter a number that was entered incorrectly. You may also press the **MENU** key and then the ← or → keys to move to the next or the previous page, without having to use the arrow keys 8 times to turn one page. You may also hit the **MEM** key and then the → key to go to the last page or the **MEM** key and then the ← key to go to the first page. Use this shortcut to return to the front of the list of numbers when the SL95 has told you that the numbers aren't valid so that you may begin to recheck the numbers to look for mistakes.

Once the numbers are all entered hit the ↑ key to tell the machine to store the constants. If the constants are invalid because of an error, the SL95 will tell you so, and then it will allow you to go back and fix the numbers (hit the ↓ key). If you want to abandon the attempt (and all that typing), you can hit CANCEL instead.

Loading a Calibration with a Computer

If you are using a computer to download the constants, select [New] or [Edit], just as when loading by hand on the machine's keypad. The SL95 will be waiting for the first number. Then tell your computer to download the ASCII file (such as CORN.LOD). The SL95 display will flash with all the numbers being entered from the computer. When the flurry is over, the cursor should be on the last constant (KP7). If it is not, something has been lost. Find out why and try again. Check to see that the handshaking has been done properly. Once the numbers are transferred correctly, hit the ↑ key as above when doing it by hand. If all goes well, the calibration will be stored and ready to use.

The [Format] Menu — Activating Display/Output Options

The [Format] menu allows you to decide what items will be displayed and printed out when a moisture test is made. These options may also be locked, so that they cannot be changed once the unit is sealed.

The first option in the [Format] menu, the [LOCKS] option, allows each individual option in the [Format] menu to be locked so that it cannot be changed when the unit is sealed. There is a menu option under [LOCKS] that corresponds to each item in the [Format] menu. Take care to keep track of whether you are in the [LOCKS] menu or not. The menu items look much the same as the [Format] options, except the descriptions differ. The lock menu to lock out changes to the header by [Format][GLOBAL][SetHdr] is [Format][LOCKS][HdrChgn: Y/N]. Each option under the [LOCKS] menu has a Y or a N choice. If you choose Y, the [Format] option cannot be changed when the unit is sealed. The unit must be unsealed to change any [LOCKS] option.

The [GLOBAL] option of the [FORMAT] menu contains formatting options that affect both the display and the printout of readings. There are four options in this menu. The first is [Mo4Dig: Y/N], which allows you to choose whether moistures will be printed to the nearest hundredth or to the nearest tenth. In normal operation this option should be set to N, which will show moistures to the nearest tenth. The extra digit is provided for certain laboratory situations where extra resolution helps statistics. The nearest tenth is appropriate for the accuracy of the SL95 — and indeed any other moisture meter. The second menu option is [TemUnt: °F/°C]. This allows you to select whether degrees Fahrenheit or degrees Celcius are used in the display and printout of the grain temperature. The third menu option is [TwUnt: lb/bu or kg/hl] allows you to choose whether test weight (density) will be in pounds per bushel or in kilograms per hectoliter. The fourth option is [SetHdr]. This lets you set the user programmable header that will be shown on the printed tickets (if printout is enabled). This header may consist of as many as 160 characters of information, such as a company name, address, etc. It is somewhat easier if you have the optional computer style keyboard attached, because then you simply type in the information. If you are using only the numeric keypad on the SL95 itself, you must type in the decimal ASCII code of each character of the alphabet that you wish to appear. There is an ASCII table printed in the back of this manual. Look up each letter or symbol that you want and key in the corresponding number from the table. Then hit the ↓ key alone to move to the next line. Use the ← key to back up and correct a mistake (characters will be deleted). The current position where entry will take place is indicated by an underline cursor. Another option for entering the header information is to send it over the serial port from a computer or terminal.

Regardless of whether you are using the optional computer style keyboard or the SL95 keypad, to end the entry of the header information, hit 0 on the SL95 keypad and then hit the ↓ key on the SL95 keypad. This enters a character with an ASCII code of zero, which tells the SL95 that the entry is done. The SL95 will then ask you to hit the ↓ key to store this header, or any other key if you decide you don't want to change it after all. The entry of header information may also be ended by sending a NUL character (decimal code 0) over the serial port, if your computer software can do this.

The [DISP] option of the [Format] menu determines what shows up on the LCD display. The options of the [DISP] menu are [LedTg: Y/N], which allows you to choose whether to display the temperature of the grain; [LcdTw: Y/N], which allows you to choose whether to display the approximate test weight of the grain; and the [LcdRDt: Y/N] option, which allows you to decide whether raw data will be displayed. Raw data consists of five numbers Y1 through Y5. These numbers are the underlying quantities that the SL95 measures in order to produce its readings. They are

used when calibrations are being made and in certain laboratory situations. They are not of interest to the general end user and will normally be disabled.

The **[COM1]** and **[COM2]** options on the **[Format]** menu determine what will print out on the two serial ports. The printout must also be enabled on the **[Config][COM1]** or **[Config][COM2]** menu in order to receive any printout at all. See the section on **The Serial Ports** for more information. The options of the **[Format][COM1]** and **[Format][COM2]** menus are as follows:

[Header: Y/N] enables the printout of the user header, which is intended for such things as your company name and address.

[MachID:Y/N] enables the printout of the model/serial number information that identifies what machine made the readings.

[GrainID: Y/N] enables the printout of the ID and name of the calibration that was used to make the moisture determination.

[Tg: Y/N] enables the printout of the grain temperature.

[Tw: Y/N] enables the printout of the approximate test weight.

[Seq: Y/N] enables the printout of a sequential tag number. This number is automatically increased by one after each test. Its value may be set in the **[Config]Seq: xxxxx** option off the main menu. When the value is set, that is the value that will appear on the next printout. The value is between 0 and 65535, although above 32767, it will show up as a negative number on the **[Config][Seq: xxxxx]** option.

[Date: Y/N] enables the current date from the SL95's real time clock to be printed. Setting the time and date is described in the section **Setting the Time and Date**.

[Time: Y/N] enables the current time from the real time clock to be printed.

[Comment: Y/N] enables the printout of a comment. With just the SL95, the comment can consist only of numbers, but with the optional computer keyboard; the comment can contain letters as well. How you enter a comment is described in the section **Moisture Testing in 5 Easy Steps**. This is done from the normal operating mode.

[RawDat: Y/N] enables the raw data to be printed. See the remarks on **[Format][DISP][LcdRDt: Y/N]** above.

[BlankLn: nn] selects the number of blank lines that will follow the printout (00 through 15).

The order of the various items on the printout is the same as in the menus, except the moisture, which cannot be disabled, follows the GrainID item.

The **[Config]** Menu

The **[Config]** menu contains machine configuration options. Some of these have already been discussed. The first menu item is **[Seq: nnnnn]**. This allows you to set the sequential number that can be printed on the printer tickets. It is mentioned in the **[Format]** Menu section. The value that you set for the Seq number to will be the value printed out on the next ticket. The value is then automatically increased by one. The next items on the **[Config]** menu are the **[COM1]** and **[COM2]** menus, which have the communications parameters for the two serial ports. These are discussed in **Using the SL95 with a Printer or Computer** and **[Format] Menu** sections.

Drawer Switch — Checking for the Drawer

The fourth option on the **[Config]** menu is the **[DrSwitch: Y/N]** option. If this option is set to Y, the SL95 will check the drawer switch to see if the drawer is in place before attempting to load or empty the cell. This can save you the unpleasant experience of accidentally spilling a sample over your table and floor. The SL95 remembers whether there is currently grain in the cell and will automatically dump the grain out of the cell when you hit the LOAD button. If you want to have the grain empty directly out the bottom of the machine into a barrel or other suitable container, you will want to disable this option.

The **[FAC] Options – Do Not Disturb!**

The final item on the **[Config]** menu is the **[FAC]** menu. This menu contains factory-preset options, which should not be altered by the end user.

The [REFS] Menu — Checking Machine Operation

During the power up sequence, the SL95 checks machine readings against built-in references to establish that the machine is working properly. If any one of these reference readings is out of tolerance, it is cause for concern. The [REFS] menu allows you to take these same reference readings while the machine is operating so that you can determine whether or not the machine is performing properly. There are four pages of cell references — plus a scale tare page. After you choose the [REFS] menu, the SL 95 displays the first page of the reference readings but does not take the readings. Use the ← and → keys to move among these pages. When you hit the ↓ key, the SL95 will start taking readings and will continue to do so until the ↓ key is hit again.

The first four pages share the same format. On the second line, the SL95 displays a Cp reading (labeled Cp0 through Cp3, depending on which page you have selected). The next item on this line is the difference between the reading and what it read when the machine was last calibrated (this is labeled Dif). Finally, the tolerance for this reading is displayed (labeled Tol). This tolerance is used to determine if the difference is excessive when the references are checked on power-up. On the third line you'll find the reading, difference, and tolerance for the corresponding Gp value.

The Cp0 and Gp0 readings are subtracted out automatically, so they are less critical than the others. That is why they have looser tolerances. However, if they are out of tolerance, it is an indication of trouble. One possible cause of the Cp0 and Gp0 being out of tolerance could be a dirty test cell. Any other problems will require factory service. If any references are out of tolerance, especially the Cp1 through Cp3 values, this is an indication that the machine is out of calibration and will require factory service — unless cleaning out the test cell can rectify the problem.

The fifth page of the reference readings is the scale tare page. It shows the scale tare readings, the difference from the reference scale tare, and the tolerance. The scale tare is automatically subtracted out of the readings. However, if the scale tare is out of tolerance, it is a sign of trouble. The scale might be out of tolerance because of built up material on the cell. Otherwise there is a problem with the scale, and factory service is required.

The [Time & Date] Menu — Setting Time and Date

The SL95 has a battery-backed clock built into it, so that it can print the current time and date on the ticket. The 9-Volt battery maintains this clock while the machine is off. The last item on the system menu is [Time & Date], which allows you to set the time and the date. If you choose this menu, you will see six menu items: [Time & Date], which is the year; [Mon: nn], the month; [Da: nn], the day of the month; [H: nn], the hour of the day, in 24 hour time; [M: nn], the minutes; and [S: nn], the seconds. Where the n's appear above, you will see the date and time as they are currently set. Notice that the seconds are changing once every second. To change an item, select it, hit the ↓ key, make the change, and hit the ↓ key to accept the new value. When the time and date are set to your satisfaction, CANCEL out of the [Time & Date] menu.

Using the SL95 with a Printer or Computer – Part I

Connecting The Serial Ports

The SL95 is equipped with two RS232 type serial ports. These may be used to connect to printers and computers or other serial devices. These two serial ports are called COM1 and COM2. They are both located on the left-hand side of the machine. COM1 is located on the vertical part of the panel toward the front. COM2 is located on the top of the recessed area toward the rear. These ports have the same pin connections as a typical computer (RS232 DTE connection), except that they are female rather than male. To connect the SL95 to a computer, a cross-wired or *null modem* wired cable is required. To connect the SL95 to a printer, a straight through cable should work. Figures 4, 5, and 6 show wiring diagrams for the required connecting cables.

Setting Up a Serial Port for a Printer from Steinlite

If you have purchased a printer from us, it will come with the proper cable to connect to the SL95. But as with any printer, you will need to set up communications parameters. To do this, choose the [Config] option on the main menu to display the Config menu. Two of the items on this menu are [COM1] and [COM2]. Choose the one that corresponds to the serial port to which you intend to hook the printer. Next use the ← and → keys to review all the port options to make sure they match these.

```
[Prnt: Y][bd: 1200][Pa: N][Bt: 8][St: 1][XF: N][HW: N][TE: N][TO: 00030]
```

If an option does not match the proper setting, first select that option, then enter into the option with the ↓ key, then select the proper value, then hit the ↓ key to accept the new value. For the first option, [Prnt: Y/N], choose Y (so that the menu option will read [Prnt: Y]). With Y activated, the SL95 will print out the ticket to that port. If N is activated, printout will be disabled on that port. This provides a quick way to disable the printer when printout is not required.

Now connect the special printer cable to the serial port you chose, plug in the printer's power cord, and load the printer with paper. You will also want to review the [Format] settings for the serial port you are using to make sure that the items you want will be printed on the ticket. After that, you should be ready to start printing.

Handshaking between Components

The serial ports are bi-directional. Information may be sent from the SL95 to the attached device and from the attached device to the SL95. In order to assure that information is not sent when the receiving end is not yet ready to receive it, the correct *handshaking* mode must be set. There are two types of handshaking that the SL95 supports. **The first type of handshaking is called *hardwired handshaking*.** In this type of handshaking, two of the wires on the serial port cable are used to communicate to the other device that this end is not ready to receive data. Specifically, the SL95 uses pins 4 and 5, called the RTS and CTS signals. If the SL95 wants to send data and hardwired handshaking is enabled, it will wait until CTS (pin 5) is active before doing so. In this way, a slower device, such as a printer, can make the SL95 wait until it is ready for more data. The SL95 has a 256 character receive buffer in which it stores the incoming data from the serial port. If this gets close to full, the SL95 will deactivate the RTS line (pin 4) to inform the attached device that it needs to wait. Once the SL95 has caught up with the data flow, it will reactivate the RTS line to allow more data to be received.

Some devices that you might connect to the SL95, and some communications programs on computers, might expect the DSR and DTR lines to be used for handshaking instead of the RTS and CTS lines. Figure 6 gives the appropriate wiring for a cable in this situation.

The second type of handshaking is called *XON/XOFF handshaking*. In this type of handshaking, the XOFF character is sent to tell the other end to wait, and the XON character is sent to tell the other end that it may resume sending data. As its receive buffer fills up, the SL95 tries the hardwire signal first (when the buffer has 200 characters in it), and if this doesn't work, it will send the XOFF character (when the buffer has 210 characters in it). Thus both types of handshaking are used by the SL95 on received data.

Which type of handshaking, if any, is used for the SL95 transmitted data is controlled by options in the menu system. The COM1 port has a pull-up resistor so that if the CTS signal is left unconnected, it will appear to be ready to the SL95. COM2, however, does not have this pull up, so if CTS is unconnected, or there is no device hooked to COM2, the SL95 could wait a long time for the CTS to become ready and eventually *time out*. To avoid this, hardwire handshaking should be disabled on COM2.

Setting the Communications Parameters for the Serial Ports

In order for communication to occur of the serial ports, not only is a properly wired cable required, but the communications parameters must be set to match the device at the other end. The following paragraphs cover the configuration of the serial ports. If you are using our printer, see the previous section on setting up a serial port for the printer. If you have connected the SL95 to a computer or some other device besides the Steinlite printer, you will need to set the SL95 and/or the other device to compatible settings.

As noted elsewhere, the configuration options for the serial ports are found in the [COM1] and [COM2] menus of the [Config] menu, which you will find in the system menu. The [COM1] menu contains the options for the COM1 port, and the [COM2] menu contains options for the COM2 port.

The first option in the [Config][COMx] menus is the [Prnt: Y/N] option. If this option is set to Y (so that the menu option will read [Prnt: Y]), the SL95 will output (print) the ticket to that port. If it is set to N, then printout will be disabled on that port. This provides a quick way to disable the printer when printout is not required.

The second option is the [Bd: xxxxx] menu. This menu allows you to select the baud rate of the port. You may choose from the following rates: 300, 600, 1200, 2400, 4800, 9600, and 19200. This is a multiple-choice menu: You cannot type in a value using the number keys. The baud rate is the speed at which the serial port operates. It must be set to match the rate of the connected device. If it is possible, you can change the baud rate of the connected device.

Next is the [Pa: N/O/E/H/L] menu. This allows you to choose what type of parity checking is used. Parity checking adds an extra data bit to the transmitted data to help detect when an error has occurred in the transmission of the data. Your choices for this menu are as follows. The first choice is N. This means no parity, which will disable the sending and checking of parity bits. Next is O, for Odd parity. This means that the parity bit will be set so that there is always an odd number of bits that are set to 1. Next is E, which stands for Even parity and sets the parity so that there is an even number of 1 bits. Next is H, which always sets the parity bit High. And finally there is L, which always sets the parity bit Low.

Next is the [Bt: 5/6/7/8] menu, which sets how many data bits are sent. This will almost always be set to 8, although occasionally 7 is used.

Next is the [St: 1 / 2] menu, which selects whether the SL95 will send 1 or 2 stop bits. One stop bit is usually sufficient.

The [XF: Y/N] menu controls whether the SL95 will respond to the XON/XOFF handshaking characters. If you wish to use XON/XOFF handshaking on this line, set this option to Y.

The [HW: Y/N] menu controls whether the SL95 will respond to the handshaking signal lines on the serial port connector. If you are using hardwired handshaking on this port, set this option to Y. If the COM2 port doesn't have the handshaking lines connected, it should be set to N, so that the SL95 won't wait a long time for the port to be ready to receive data.

The [TE: Y/N] menu controls whether the SL95 will print an error message when a transmission error is detected in the received data. Transmission errors include framing errors and parity errors. A framing error occurs when the stop bit is not the value it should be. For example, this can happen if the baud rate isn't correctly set. The parity error occurs when the parity of incoming data is incorrect, according to the setting of the parity option described above. If the [TE:] option is set to Y and an error is detected in the received data, the LCD display will show the appropriate error message.

And finally, the [TO: nnnnn] menu allows you to set the time in seconds that the SL95 will wait for the line to become ready to receive data again. The SL95 does not have to wait until the 256-character transmission buffer is full and the handshaking protocol has blocked transmission. If the time specified with this option expires, the SL95 will print a message and give you the choice of retrying or of giving up. Usually the SL95 has several characters it is trying to print when a time-out occurs, so if you give up, quite probably the port will time out again for the next character. **A value of 30 seconds is usually adequate for this parameter.** For slow devices, a longer time may be in order, to prevent the port from timing out unnecessarily. For a faster device, a shorter time may be desirable, so that the port will time out more quickly if the connected device is unable to receive data. **This option is a numerical option, so to change it, activate it with the ↓ key, type in a new timeout value, and then hit the ↓ key to accept the new value.**

The Purpose of This Software Upgrade

Version 2.6 of the software for the SL95 adds features that are primarily aimed at simplifying the identification of the grain sample being run. This is useful when the SL95 is connected to a computer that is running data collection software for accounting purposes.

The SL95 has always had a sequential number tag available that could be printed on the ticket, but to change the value of the sequence number, it is necessary to go several levels deep into the system. Also, the sequence number will always advance when a sample is run though the SL95. This feature is useful to provide a serial number for the ticket, but is not really aimed at sample identification, because a particular sample could be run more than once (in fact it is a good idea to take multiple readings and average them), and some samples may not be of interest to the data collection and accounting software.

The SL95 has also always had a comment line facility. This was intended to allow easy entry of relevant information about a particular sample. If an optional computer style keyboard is attached to the SL95, the comment also can contain letters as well as numbers. This is a good candidate for sample identification, but it did have a few drawbacks. Although it was easy to change the comment (hit the down arrow, enter the comment, and hit the down arrow again), there was no way to see what the current value of the comment was. Also, whatever comment was entered would remain in effect until it was changed, or the machine was switched off. Finally there was no automatic updating of the comment to any kind of next value. To use this feature, it was necessary to remember to enter a comment for each sample before it was run.

The main operating mode of the SL95 is designed to provide simplicity for grain type selection and basic operation of the machine. Because of this, all the keys on the keypad are already used for something. Providing a quick way to change the sequential number from the main operation mode would have unduly complicated basic operation of the machine. The best solution, therefore, was to provide a software update that added new features to the comment line. This is what has been done in this software revision.

Using the comment line for sample identification has the additional advantage that it allows a partial workaround for the older (side drawer) machines that cannot accommodate this software upgrade on their older model processor (computer) board. In this workaround, the data collection software on the remote computer would enter a comment line into the SL95 after each ticket was received. The value of this comment would be the sample ID of the next sample that the collection software expected. The operator could then override this by simply entering a different comment line. This workaround would not provide a display of the current value of the comment line, nor would it provide a way to require entry of a sample ID for each sample. (These things could be done with the computer remote mode, which is described in the SL95 manual, but this would be somewhat complicated, and the results would probably not be very satisfactory).

The options in the [Menu][Config][Comment] menu described.

The main new features of software version 2.6 of the SL95 are for controlling the comment line. Therefore they are collected under a menu entitled "Comment", which is located in the "Config" menu, (that is, they're in the [Menu][Config][Comment] menu).

The comment line has been made persistent so that when the machine is shut off and turned on again, the comment line will be restored to what it was before power down.

A description of each of the options in the Comment menu follows:

[Menu][Config][Comment][Update:]

This is a multiple choice menu that lets you select how the comment line will be updated after a sample is run. This update occurs at the end of the LOAD cycle after the readings have been placed on the display and printed, although the new value isn't displayed until you hit the dump key. This means that if you manually enter a different value while the sample is still in the cell, the value of the comment line will be the value that you entered, although the value you entered isn't displayed (on line 3 of the LCD) until you empty the cell. The three options are as follows:

[None] : The comment line will not be updated. It will remain whatever it was before the sample was run. This is the behavior of previous software versions.

[Next] : The comment line will have one added to it. Since the comment line can contain letters as well as numbers, this is actually somewhat complicated, but if you just stick to numbers, you'll get a sequential series of numbers. What the SL95 does is to take any ending part of comment that contains numerals, and treat that part as a number. If the comment doesn't end in a numeral, then the numeric value before adding 1 is 0. Since the math is done with a 32 bit unsigned integer (whole number), any value larger than 4,294,967,295 will wrap around to smaller number (So 0 would come after 4,294,967,295). This is mentioned for completeness, since it is not likely to be a concern to anyone. (It would take more than 1800 years to run 4 billion samples through an SL95).

A few examples should help clarify how the SL updates the comment line in this mode. After "A" would come "A1" then "A2". After "A9" would come "A10". After "A9B" would come "A9B1". After "A1." would come "A1.1". After "A1.9" would come "A1.10".

If there isn't room for the part of the comment that the SL95 treats as non-numeric plus the new numeric part, the SL95 will chop off the non-numeric part to make the numeric part fit (since the comment line can be up to 30 characters, this is not likely a restriction in most instances).

[Blank] : During the update, the comment will be replaced with a blank line. This is useful for those who want to require that a sample ID is always entered.

[Menu][Config][Comment][BlankOK:]

This option controls whether the SL95 will allow the comment line to be blank or not. If this option is set to **[Y]**, then the comment may be blank. This is the behavior of previous software versions. If this option is set to **[N]** then the comment line may not be blank. If the operator attempts to run a sample when the comment line is set to blank, the SL95 will require the operator to enter a non-blank comment line.

[Menu][Config][Comment][Show:]

This option controls whether the SL95 will show the comment line on the LCD display or not. If **[N]** is selected, the comment line will not be shown, which is the behavior of previous versions. If **[Y]** is selected, then the comment line will be shown on the third line of the display in the normal operating mode. Note that when there's a grain sample in the test cell, the displayed value is not necessarily the current value. It is simply whatever was on the display before the sample was loaded. If there are any error messages from testing the grain sample, these will overwrite the display of the comment line. When the grain is dumped from the cell, then the displayed value will be updated to reflect the current value.

[Menu][Config][Comment][MustPrt:]

This option controls whether a blank comment line will be printed on the ticket. If **[N]** is selected, the line with the comment will be omitted from the ticket printout if the comment is set to blank. This is the behavior of previous versions. If set to **[Y]** the comment line will always be printed, even when the comment is blank. If a blank comment is printed, nothing will appear between the "Comment: " tag end of the line. Note that the tag includes a space after the colon.

[Menu][Config][Comment][AfterBlink:]

This multiple choice menu affects the operation of the SL only when the comment line update is set to **[Next]**. It controls what comes next after a blank comment has been entered. The three options are as follows:

[One] : The next value after a blank comment will be "1".

[Stay] : After a blank comment is entered, the comment line will remain set to blank until a non-blank comment is entered.

[Resume] : After a blank comment is entered, the next value of the comment line that the SL95 will set will be the previous non-blank value. This allows the user to override the comment line with a blank for a sample that is of no interest to the accounting software, and have the SL95 resume the sequence of Sample ID's where it left off. Note that is the comment line was set to a blank when the SL95 was set to a mode where this option was not in effect, the comment line will remain set to blank until a non-blank comment is set. Also note that if the comment is set to blank while this option is in effect, and then the machine is turned off and then on again, the previous non-blank comment will be restored.

Using the Comment options together: Recommended Settings

The table below outlines some recommended settings for the Comment menu options to obtain particular goals:

<i>Goal</i>	<i>Update</i>	<i>BlankOK</i>	<i>Show</i>	<i>MustPrt</i>	<i>AftrBlink</i>
Compatible with older software.	[None]	[Y]	[N]	[N]	doesn't matter
Comment is a sequential tag, but can easily override for exceptional cases.	[Next]	[Y]	[Y]	[Y]	[Resume]
Operator must enter an ID for every sample.	[Blank]	[N]	[Y]	[Y]	doesn't matter

Other combinations may be useful in particular circumstances, for example it would be possible to have the comment line be blank unless the user optionally entered a non-blank comment (Update = Blank, BlankOK=Y).

The middle scenario in the above table, with automatic updating sequential comments, bears further comment. After setting up this mode, the comment line would be set to match the ID of the first sample to be run. As long as the samples come in with sequential ID's the operator then simply runs the samples. If the samples get out of order, the operator would manually enter ID's by hitting the down arrow key (↓). entering the id, and accepting it with the down arrow key (↓). This would be done until the samples are again in sequential order. If a sample needs to be run that doesn't belong in the accounting database, the operator would enter a blank comment by hitting the down arrow key (↓) twice. The operator would then run the sample, and after this the SL would resume the sequential tags where it left off. The operator would have to intervene for every sample that doesn't belong in the database. This is probably the safest way of doing it, as it doesn't rely on the operator having to remember to set the comment line back to match the computer software's values after an exceptional sample is run. However the other options for [AfterBlink] are provided in case a particular site has a different preference.

For last scenario in the table, where an ID must be entered for each sample. A blank comment cannot be used to identify a sample that is not of interest to the accounting software. Another value should be used. We would recommend using an ID of 0 (zero), for such a sample, but the value used would depend on the collection/accounting software used.

Other new items in version 2.6 of the SL95 software.

Serial Number entry

If the machine's serial number is set to a blank value, the SL95 will ask the operator to enter the proper serial number for the machine when the SL95 is powered up. This is to facilitate the setup of the serial number when a main board has been replaced in the field. Once the serial number has been set, it cannot be altered, so it's important to enter the correct serial number. The SL will ask the operator for the serial number twice, and will not set the serial number until the input values match. The setting of the serial number can be bypassed by hitting only the down arrow key or by hitting the CANCEL key in the response to the requests for the serial number. However, the serial number should be properly set after a main board is replaced.

Functions to read various states of the SL95 over the serial port

Previous versions of the software had no way for a connected computer to find out what sample was selected or what the current value of the comment line or sequence number was. New functions have been added to fill this void. They all begin with the letter G. The commands are two letter, and should *not* be followed by an carriage return. The response from the SL95 is terminated with a carriage return. This is not affected by the setting of the [LineEnd] option in the format menu for the relevant com port. That option is only for ticket printouts initiated by running a sample or by hitting the PRINT key. The new commands are as follows:

GC The SL95 will return the current value of the comment line. This will consist of the comment itself, enclosed in double quotes. There is no "Comment:" tag. The line is terminated in a carriage return (hex 0xd, '\r', decimal 13 or however you wish to refer to it).

GG The SL95 will return the numeric ID of the currently selected calibration. This is the number that the operator keys in to select the grain type. Since it is a number, it is not enclosed in quotes. The line is terminated with a carriage return.

GI The SL95 will return the info line of the currently selected calibration. This is what is shown on the second line of the LCD display when the grain type is shown. The information will be enclosed in double quotes, and followed by a carriage return.

GN The SL95 will return the name of the currently selected calibration. This is the first line of the LCD after the grain id. This grain name will be enclosed in double quotes and followed by a carriage return.

GS The SL95 will return the current value of the "Seq" number. This is numeric, so it is not enclosed in quotes. It is followed by a carriage return.

GU This command will update the comment line according to the current settings and return the result enclosed in double quotes and followed by a carriage return. The new value will also show on the display, if display of the comment line is enabled. This command was for testing purposes, but it was left in, in case someone wants to play with it to see how the SL95 does the [next] update on a particular comment line value without having to do a load/dump cycle.

Entering a comment line from the serial port

The comment line is easily set via the serial port, and this is the case with all version sot the SL95 software.

The carriage return character coming into the SL95 on the serial port acts like the down arrow key on the SL95 keypad. So to enter a comment line, the computer would send a carriage return then the comment line, and then another carriage return. No quotes, unless you actually want quotes in the comment. It is recommended to send a CANCEL character first (ctrl-C or character code 3), in case a stray carriage return was sent or hit from the front panel. If the LS was already trying to accept a comment line and the computer sends on without the CANCEL, it could by interpreted by the SL95 as an attempt to set the gain type instead.

Some thought should be given to when the attempt to set the comment is made, because if the user is in the middle of something (such as in a menu), the attempt may not be correctly interpreted, even with the leading CANCEL. Right after the ticket has been printed is probably a safe time. There is a function to lock out the operator keypad on the SL so that keystrokes will not be interpreted by the SL95, but this is mostly useful in conjunction with the computer remote mode.

Using the SL95 with a Printer or Computer – Part II

As we note elsewhere, the SL 95 prints out tickets to the serial ports. These printouts may be received by a computer and processed or stored. In order to write programs that do this, it is helpful to know more about the format of the printout. Each data item on the printout appears on its own line (or lines). Readings are identified with labels. Note that there are no spaces within the label. The readings are followed by the units that they are in (such as deg F or deg C). If the reading is outside the limits set for it, then the units are followed by an appropriate error message. If a particular quantity, such as temperature or test weight, is disabled and it is outside its limits, a line with an error message (such as TEMPERATURE BELOW LIMIT) will be printed where the reading would have been. If the temperature of the machine itself is outside its limits or if there is too great a difference between the machine and grain temperatures, these error messages follow the grain temperature printout.

It is important to note that each line is terminated with a carriage return (decimal code 13) only. There is no linefeed character at the end of the line. If you are having trouble with the printout coming out all on one line, with each new line of data overwriting the previous one, then you will need to change the way the device, which you have connected, handles the carriage return and line feed characters. The SL95 expects a carriage return to advance to the start of the next line. Some devices merely return to the start of the current line and expect a line feed character to follow, which will advance to the next line. There is often a way to change the behavior of these devices. Most terminals and terminal emulation software provide a way to choose whether lines are terminated with carriage returns or line feed or both. Since the SL 95 only provides the carriage return, that is how the other end should be set up.

Here is a sample printout. It shows both error messages that appear when printout of a particular quantity is enabled and also when it is disabled. Only one style of message will appear on a particular printout. Columns of numbers precede the actual printout in this example to help you determine which column a particular character is in. These do not appear on the actual printout. Nor do the comments in bold to the right of the sample.

000000000111111111122222222233333333334
1234567890123456789012345678901234567890

This is a header. It can have up to
160 characters, and can have multiple
lines. (Only four will show on the LCD
while you are entering it).
Steinlite SL95 SR# 00003
Selected Grain:
00001 CORN
VER 1.0 JAN 1996 8-35%
Moisture: 36.12% ABOVE LIMIT
SampTemp: 084.5 deg F
TEMPERATURE BELOW LIMIT
MACHINE IS TOO HOT
TEMP DIF TOO MUCH
AproxTestWt: 034.3 LB/BU BELOW LIMIT
TESTWEIGHT BELOW LIMIT
SeqNum: 00001
Date: TUE, MAY 7, 2001
Time: 13:26:35
Comment: This is a user comment
Y1: 009.0476
Y2: 00806.40
Y3: 0310.03
Y4: 084.34
Y5: -000.11

Header
Header (continued)
Header (continued)
Header (continued)
Machine ID
Grain ID (line 1)
Grain ID (line 2)
Grain ID (line 3)
Moisture, with error message
Sample Temperature
Error msg when temp disable
Machine temperature error msg
Delta temperature error msg
Test Weight, with error message
Error msg when TW disabled
Sequential Number Tag
Date
Time
Comment
Raw Readings (line 1)
Raw Readings (line 2)
Raw Readings (line 3)
Raw Readings (line 4)
Raw Readings (line 5)
0-15 blank lines

End of Ticket Printout

Since items in the printout may or may not appear, depending on whether or not they are enabled or whether or not an error condition exists, we recommend that a program intended to pull out the numerical values from the printout be written in such a way that it keys off of the labels for the data items. The program should compare the relevant part of the beginning of each line received to see if that line is of interest. If it is, then process the rest of the line according to how it is labeled. Otherwise discard the line.

Using the SL95 in the Computer Remote Mode

The SL95 offers a computer remote mode. This capability provides a convenient way to communicate with a remotely located computer. For example, this mode can be used to access a database of customers. When the SL95 is in the computer remote mode, any data that comes in on the serial port that initiated the computer remote mode will be shown on the LCD display on the second through fourth lines. The first line will always read

****COMPUTER REMOTE MODE****

This first line cannot be written to, and any keys hit on the keypad or on the optional computer-style keyboard will be sent directly to the port that initiated the computer remote mode.

To enter the computer remote mode, send the @ character (decimal code 64) to the SL95 over one of the serial ports. The SL95 will enter the computer remote mode and remain there until it receives an escape character (decimal code 27), or the unit is switched off.

As mentioned earlier, all data received on that serial port will now be sent to the LCD display (instead of being interpreted in the usual manner), and all keypad or optional computer-style keyboard input will be sent out on that serial port. Certain characters will be interpreted in special ways. Here is a list of those special character codes and the functions they perform.

Special Control Codes in Computer Remote Mode

Decimal Code	Computer Remote Function
1	displays ↑
2	displays ↓
4	disable cursor
5	enable underline cursor
6	forward cursor
8	backspace (deleting)
12	clear screen and home (form feed character)
13	carriage return
14	down cursor
15	enable blinking block cursor
16	up cursor
17	XON Character (used with XON/XOFF handshaking)
18	back cursor (non-deleting)
19	XOFF Character (used with XON/XOFF handshaking)
27	leave remote mode (Escape character)
126	displays →
127	displays ←

The following table summarizes the codes that will be sent by the SL95 keypad.

SL95 Keypad Codes

Key on Keypad	Decimal	ASCII
<u>Code</u>		<u>Character</u>
0	48	0
1	49	1
2	50	2
3	51	3
4	52	4
5	53	5
6	54	6
7	55	7
8	56	8
9	57	9
→	6	ACK
←	8	BS (Backspace)
↓	13	CR (Carriage Return)
↑	27	ESC (Escape)
MEM	1	SOH
PRINT2		STX
CANCEL	3	ETX
DUMP	7	BEL
MENU	9	HT (Tab)
LOAD	10	LF (Line Feed)

These same codes can be sent over the serial ports when the SL95 is not in the computer remote mode to control the SL95 as if the equivalent key had been hit on the SL95 keypad (or the optional keyboard). For example, sending a line feed character (decimal code 10 or Control-J) over the serial port will cause the machine to load a sample — just as if the LOAD key had been hit. Of course, in the computer remote mode, it will be sent to the display (it happens to put a ↓ on the LCD) instead of loading a sample.

The codes sent by the optional computer-style keyboard generally correspond to the labels on its keys. Special keys, like the function keys, send a two-byte code. The first is decimal 240, followed by a code that identifies the key. When the SL95 is not in the computer remote mode, the arrow keys act the same as the arrow keys on the SL95 keypad. This means that the ↓ on the optional keyboard is the same as the keypad enter key, and the ↑ key is the same as the ESC key. However, in the computer remote mode, these keys send extended codes. The following is a list of the extended codes for the optional keyboard. **These codes might vary for different models of keyboards, so it may be best to hook up the keyboard to the SL95 and place it in the computer remote mode. Then hit the keys you're interested in and see what codes are sent to the LCD display.**

Extended codes for the optional Computer Style Keyboard

Key	Extended code
F1	240 59
F2	240 60
F3	240 61
F4	240 62
F5	240 63
F6	240 64
F7	240 65
F8	240 66
F9	240 67
F10	240 68
F11	240 217
F12	240218
Print Screen	240 55
Pause	240 69
Insert	240 82
Delete	240 83
Home	240 71
End	240 79
Page Up	240 73
Page Down	240 81
←	240 75
→	240 77
↑	240 72
↓	240 80

Tables of ASCII Codes

For Entering the User Header and General Reference

The SL95 uses ASCII codes to represent letters. ASCII is an industry standard that says what number is used to represent what letter or control function. Nearly all computers use ASCII codes nowadays. When you are entering a header using only the SL95 keypad, you will need to refer to these tables to find out what decimal code to type in for each letter, number, or function. Look up the code for the character or control you want and type in that code (and hit the ↓ key). The character should then appear on the display or the control function be executed.

Important ASCII Control Characters

Decimal Code	ASCII Character	Function
0	NUL	Used to terminate strings (such as in Header Entry function)
8	BS	backspace character
9	HT	horizontal tab character
10	LF	line feed character
12	FF	form feed character
13	CR	carriage return character
17	DC1	XON character
19	DC3	XOFF character
27	ESC	escape character

Printable ASCII Characters

Decimal Code	ASCII Character	Decimal Code	ASCII Character	Decimal Code	ASCII Character
32	SPACE	64	@	96	
33	!	65	A	97	a
34	"	66	B	98	b
35	#	67	C	99	c
36	\$	68	D	100	d
37	%	69	E	101	3
38	&	70	F	102	f
39	'	71	G	103	g
40	(72	H	104	h
41	0	73	I	105	i
42	*	74	J	106	j
43	+	75	K	107	k
44	,	76	L	108	l
45	-	77	M	109	m
46	.	78	N	110	n
47	/	79	O	111	o
48	0	80	P	112	p
49	1	81	Q	113	q
50	2	82	R	114	r
51	3	83	S	115	s
52	4	84	T	116	t
53	5	85	u	117	u
54	6	86	V	118	v
55	7	87	W	119	w
56	8	88	X	120	x
57	9	89	Y	121	y
58	:	90	Z	122	z
59	;	91	[123	{
60	<	92	\	124	
61	=	93]	125	}
62	>	94	^	126	~
63	?	95	_		

The ASCII standard only covers character codes less than 128. Because it uses 8 bits, the SL95 can accommodate codes up to 255. There are no fixed standards for how these codes are used, so how they appear on a particular printer or computer attached to the SL95 may vary. To find out how they will appear, you will either have to experiment or consult the manuals for the device you are using. The LCD display also responds to some codes above 128 when the SL95 is in the computer remote mode. Because many of these characters are Japanese Kana Letters and others are characters designed for displays with more lines of dots, we have elected not to attempt to make a table for them. If you are interested you can experiment by placing the SL95 in the computer remote mode and sending various character codes to it to see what the LCD displays. The codes that the LCD displays above 128 start at 161.

More about the optional computer-style keyboard

The SL95 has a port to connect to a computer style keyboard. This port is for a keyboard of the type that is compatible with IBM AT™ (trademarked by IBM) and compatible computers. However, we cannot guarantee that the SL95 will be software compatible with all of the great variety of keyboards on the market. Keyboards known to work with the SL95 are available from Steinlite. Please contact us for more information.

In the normal operating mode, the SL95 maps the function keys to act like some of the keys on the SL95 keypad. The following is a list of keys on the optional keyboard that have equivalents on the SL95 keypad.

<u>Key</u>	<u>SL95 Keypad Key</u>
F1	LOAD
F2	DUMP
F3	MENU
F4	PRINT
F5	CANCEL
F6	MEM
TAB	MENU
ESC	↑
Enter	↓
↑	↑
↓	↓
←	←
→	→
Backspace key	←

SL95 Screen Messages

For Machine Errors, Status Checks, and Prompts

This section lists all the error messages that the SL95 might display, as well as messages, status checks, and prompts that will help you conduct your moisture tests. The list explains what these messages mean and what action, if any, needs to be taken.

**** COMPUTER REMOTE MODE ****

Indicates that the SL95 has been placed into the computer remote mode. Any keys that you hit will be sent out on one of the serial ports, rather than being interpreted by the SL95. The SL95 will only leave the computer remote mode if an ESC character is received on the serial port that initiated the computer remote mode, or if the SL95 is switched off. See the section on **The Computer Remote Mode** for more information.

WARNING: This wipes out cal EEPROM!!

Hit ↓ on keypad to continue

This warning indicates that you have inadvertently entered a factory test mode that tests the memory that calibrations are stored in. **YOU DO NOT WANT TO RUN THIS TEST!** It will wipe out all of the calibrations that you have stored on your machine. Hit the **CANCEL** key on the SL95 keypad to cancel this test. If you do continue with this test, it gives you one more chance to cancel before it proceeds.

```
*****
* Cp0: Reference is out of tolerance! *
* Hit any key to continue           *
*****
```

```
*****
* Gp0: Reference is out of tolerance! *
* Hit any key to continue           *
*****
```

```
*****
* Cp1: Reference is out of tolerance! *
* Hit any key to continue           *
*****
```

```
*****
* Gp1: Reference is out of tolerance! *
* Hit any key to continue           *
*****
```

```

*****
* Cp2: Reference is out of tolerance! *
* Hit any key to continue           *
*****
*****
* Gp2: Reference is out of tolerance! *
* Hit any key to continue           *
*****
*****
* Cp3: Reference is out of tolerance! *
* Hit any key to continue           *
*****
*****
* Gp3: Reference is out of tolerance! *
* Hit any key to continue           *
*****
*****
* Wgt: Reference is out of tolerance! *
* Hit any key to continue           *
*****

```

One or more of these 9 error messages will appear during power up (right after the 5,4,3,2,1 countdown on the LCD) when one or more of the internal reference values is out of tolerance. The SL95 will display one of the above messages for each reference that is out of tolerance, and for each such message, it will wait for you to hit a key to acknowledge the message. Since these messages indicate that a reference is out of tolerance, if you get one of these messages, your SL95 is probably out of calibration and may require factory service. If you get the wgt reference message, make sure that the machine is properly level and that there is nothing caught in the test cell. If you get the Cp0 or Gp0 message, check that there is nothing caught in the test cell and that there is no debris build up on the cell plates. With any of these messages, you can check the REFS readings (found in the system menu) to assess how significantly the SL95 is out of tolerance. You might also try switching the machine off and back on several times to see if the problem persists. Even if one of these messages appears only occasionally, this is a warning sign that something is wrong, and the machine should be returned to the factory for service and standardization.

****** PLEASE INSERT DRAWER ******

The SL95 displays this message when drawer checking is enabled and the drawer is not in place. The SL95 checks the drawer switch during the LOAD sequence and during the DUMP sequence. As soon as you insert the drawer, the SL95 will continue its operation.

Loading Calibration – Please Wait

The SL95 displays this during the LOAD sequence if this is the first time you have run a sample since you selected the current calibration. The test will take approximately 15 seconds. On subsequent tests, the SL95 will take only 10 seconds to display the result after the LOAD key is hit. When a new calibration is selected or the machine is first switched on, this message will be displayed again.

ERROR: Cannot Run this Calibration

The SL95 displays this message when the calibration format is one that the SL95 system software cannot handle or when the calibration is invalid. This means either that the calibration has been corrupted or that the SL95 system software needs to be updated in order to handle this calibration. If Steinlite needs to come out with a calibration that performs its calculations differently at some time in the future, the older versions of our software will warn you that they are dealing with an unfamiliar calibration format. We do not know at the time this manual is being written when or if such a revision might become necessary.

Cannot Run Blank Calibration

The SL95 displays this message if the current calibration selected is blank and you attempt to LOAD grain. This will generally only occur when there are no calibrations loaded onto the machine.

*MOISTURE LO
*MOISTURE HI
*MACHINE COLD
*MACHINE HOT
*TEMP DIF HI
*SAMPTEMP LO
*SAMPTEMP HI
*TESTWGHT LO
*TESTWGHT HI

These messages appear on the LCD display of the SL95 to indicate that the particular measured quantity is outside the limits set for it. If the message concerns sample temperature, you can allow the sample to reach equilibrium with room temperature (in a sealed container if it is likely to gain or lose moisture), and rerun it. If the message is about machine temperature, make sure that the room temperature is well within the bounds of the machine's operating temperature. If it is not, rectify the situation and rerun the sample. If the message is about moisture or test weight, the sample is outside the range that the calibration was intended to cover. The SL95 will still give a reading, but it may not be completely accurate.

BELOW LIMIT
ABOVE LIMIT

These messages are sent via the serial ports and printed after a measured quantity to indicate that the quantity in question falls outside the limits set for it.

TEMPERATURE BELOW LIMIT
TEMPERATURE ABOVE LIMIT
TESTWEIGHT BELOW LIMIT
TESTWEIGHT ABOVE LIMIT

These messages are sent via the serial ports when the particular quantity is not enabled for printout, and that quantity falls outside the limits set for it.

MACHINE IS TOO COLD
MACHINE IS TOO HOT
TEMP DIF TOO MUCH

These messages follow the temperature printout on the serial ports and indicate that the SL95 is outside its operating range . . . or that there is too big a difference between the machine temperature and the grain temperature.

Unit Must be Unsealed
To Change Header
Hit any key to continue

This message indicates that the machine is sealed and that header changes are locked. You will not be able to change the header unless you unseal the unit. Header changes can be unlocked by going into the **[LOCKS]** menu so that they can be changed with the unit sealed, but to do this the machine must be unsealed.

Enter Decimal ASCII Code:

This message occurs when you are in the header entry routine and a digit key (0-9) is hit on the SL95 keypad. You should enter the decimal code of the character you want to place in the header.

**** Calibration Deletion ****

Calibrations are sealed!
so cannot delete calibration
Hit any key to continue

This message occurs when you attempt to delete a calibration and the unit is sealed. Calibrations cannot be added, modified, or deleted when the unit is sealed. If you really want to delete the calibration, you must first unseal the unit and then delete it following the instructions in the **[Cal]** menu.

REALLY DELETE THIS CALIBRATION??

Hit ↓ to Delete, other keys cancel

This message is displayed during calibration deletion on lines 3 and 4 of the LCD. The first two lines have the name of the calibration that will be deleted. This message provides a safeguard against deleting a calibration that you didn't mean to. If you really want to delete the calibration, hit the ↓ key. Any other key such as ↑ or CANCEL will cancel the attempt to delete the calibration.

ERROR: Write Failed

Hit ↓ to Retry, ↑ to End

The SL95 was attempting to store information in the nonvolatile memory where calibrations are stored and could not do so. You should hit ↓ to retry, but if it fails repeatedly, you will have to end the attempt. If retrying doesn't help, there is something wrong with the machine, and factory service will be required.

Warning: No storage slots free!!

You will be unable to store a new entry

Hit ↓ to continue, ↑ or Cancel to cancel

This message is displayed as you enter the [Cal][New] function when there is not enough room to accommodate a new calibration. If the calibration you will be entering will replace an existing calibration, you can proceed to enter it and store it. Otherwise, you will have to remove another calibration in order to make room for the new one. As this manual is being written, the SL95 has a standard capacity for 63 calibrations. If you really need more than this many calibrations, you should contact us to see about expanding the storage capacity for your machine.

ERROR: No Space to store calibration

Hit a key to end

This message is displayed when the SL95 tries to store the calibration you have just entered but doesn't have sufficient free memory. The [Cal][Edit] function assumes that the calibration you enter will replace an existing one. So this message should only appear with the [Cal][Edit] function when no replacement occurs. In this situation, you will have to delete another calibration if you really want to store a new one. Or contact us about adding expanded memory capacity. Fortunately the [Cal][New] function checks to see if there is room for a new calibration before you enter all the numbers. If there isn't room, [Cal][New] gives you the "Warning: No Calibration Slots Free" message described above.

UNIT IS SEALED CAN'T ALTER NUMBERS

This message is displayed if you attempt to change numbers in the [Cal][New] or [Cal][Edit] functions and the unit is sealed. You must unseal the unit in order to change any calibration or add a new one. When the unit is sealed you can only review the numbers. So, for example, you can check that the numbers are what they should be.

ERROR: Calibration is invalid

Recheck Constants

Hit ↓ to continue, or CANCEL to cancel

This message is displayed when you attempt to store a newly entered or edited calibration and the checksums don't add up. You have probably entered one or more of the numbers incorrectly. Hit ↓ to continue and MEM ← to go back to the first page of the calibration. Check all the numbers and make your corrections. Then try to store the calibration again.

Calibration Slot is Blank

This message is displayed instead of the ID and name of a calibration if the currently selected calibration is blank. This should only occur when there are no calibrations loaded on the machine.

ERROR: Calibration Not Valid!!!

This message is displayed instead of a calibration name when the selected calibration is not valid. This means that the calibration has been corrupted, and it cannot be used. Such a calibration should be replaced with a valid one. If the ID number doesn't match what it should be, delete whatever is incorrect and make necessary changes using [Cal][Edit] or [Cal][New].

ERROR: Unrecognized Cal type!!

This message is displayed when the format version number of a calibration is one that your current SL95 system software does not handle. If this is really a proper calibration, your machine's system software will need to be updated before you can use it.

PLEASE EMPTY THE CELL FIRST

This message is displayed when you attempt to change the selected calibration with grain still in the test cell. You must empty the cell before you can change the selected calibration. Note that the menu system is accessible while the grain is in the cell.

Could not find id # 'nnnnn'

This message is displayed when you have typed in a commodity ID number, and the SL95 cannot find any calibration with that ID. You must either type in a number that the SL95 can find or cancel out and return to what was already selected (by hitting CANCEL or hitting ↑ or hitting ↓ without entering any number).

ERROR: No calibrations available

The SL95 displays this under certain circumstances when no calibrations are loaded on the machine.

```
*****
* ERROR: Answer Will Not Converge!! *
* Hit any key to continue           *
*                                   *
*****
```

The SL95 utilizes a sophisticated procedure for correcting its readings for temperature and test weight. Certain readings outside the normal values for the commodity being tested can keep the SL95 from finding a result. If this happens, hit any key to continue and note the temperature displayed. Then dump the sample out and try it again. If the problem persists, contact us.

```
*****
* Fltg pt instr not implemented    *
* Floating Point Exception         *
*                                   *
*****
```

```
*****
* Memory Allocation Error          *
* Hit a key to continue...         *
*                                   *
*****
```

```
*****
* Memory Deallocation Error       *
* Hit a key to continue...         *
*                                   *
*****
```

```
*****
* Attempt to Call Pure virtual fn *
* Processing Stopped              *
*                                   *
*****
```

These 4 messages should never appear. But if exceptional conditions occur in the SL95 software, they may show up. If they do, take note of the conditions under which they occur as much as possible. These messages could be caused by a defective processor board or by a software bug. If these messages persist, contact us.

```
*****
* Cell Board is Not Responding*
*****
```

```
*****
* Cell Board Check Failed      *
*****
```

```
*****
* Cell Board EEPROM Checksum Error*
* Unit May Not Be Properly Calibrated *
*
*****
```

```
*****
* Cell Board Tx Timeout *
*****
```

These 4 messages indicate a problem with the circuit board that actually takes the measurements used to determine the moisture. If you get these messages, switch the machine off and on again. If the problem persists, the machine requires factory service and should not be used.

```
*****
* Serial Port 'COM1' has timed out! *
* Hit 0 to cancel, 1 to retry *
*****
```

```
*****
* Serial Port 'COM2' has timed out! *
* Hit 0 to cancel, 1 to retry *
*****
```

These messages appear when the SL95 has been waiting too long for the serial port in question to receive data. This is discussed in more detail in **Setting Communication Parameters for the Serial Ports** in the section on **Using the SL95 with Printers or Computers – Part I**.

```
*****
* Serial Port 'COM1': Overrun Error *
* Hit any key to continue *
*****
```

```
*****
* Serial Port 'COM2': Overrun Error *
* Hit any key to continue *
*****
```

These messages occur if the TE (trap error) option is enabled for the particular serial port and a new character arrives before the processor has a chance to read the one already received. This means that some data loss has occurred.

```
*****
* Serial Port 'COM1': Parity Error *
* Hit any key to continue *
*****
```

```
*****
* Serial Port 'COM2': Parity Error *
* Hit any key to continue *
*****
```

These indicate that the SL95 has detected a parity error in the received data. They only appear if parity checking and the TE (trap error) option are enabled.

```
*****
* Serial Port 'COM1': Framing Error *
* Hit any key to continue          *
*****
```

```
*****
* Serial Port 'COM2': Framing Error *
* Hit any key to continue          *
*****
```

These indicate that the SL95 has detected a framing error in the received data. These messages will occur only if the TE (trap error) option is enabled for the particular serial port.

```
*****
* Error Writing to EEPROM Header   *
* Hit ↓ to Retry, ↑ to End        *
*****
```

This message indicates that the SL95 was attempting to store data in the nonvolatile memory and could not do so. Retry the operation a few times, and if it still has trouble, the machine requires factory service.

```
*****
* ROM Failure                      *
*****
```

Indicates that the SL95 system ROMs failed their self-check (checksum test). Try switching the machine off and on again. If this doesn't help, the machine requires factory service.

Troubleshooting Tips

If your SL95 is completely dead — meaning that there are no digits lit on the LED display and no letters on the LCD display and the backlight on the LCD display is not glowing its usual dim green glow — check the following things.

1. Is the power cord plugged into a working 90V-264V, 43-63Hz AC outlet? An obvious problem, but worth checking.
2. Is the power cord fully plugged into the side of the machine? The cord could be partially plugged in and not making firm contact.
3. Is the power switch in the ON position? The switch is marked 0 and (-). The position marked (-) is the on position and is the side toward the front of the machine. To turn the machine on, press in the end of the switch towards the front of the machine.

4. Is the fuse good? To check the fuse, unplug the power cord from the machine. Take a small screwdriver and gently pry out the fuse drawer, which is directly below where the power cord plugs in. Check the fuse. It should have a very fine wire running from one metal cap to the other. If this wire is missing, broken, or loose, the fuse is bad and needs to be replaced. The fuse must be replaced with a fuse of the same rating: 1AMP Fast Acting 250V. Once a good fuse has been placed in the fuse drawer, replace the fuse drawer. Be sure to get it properly oriented. The drawer won't fit in backwards, but if forced in backwards, it could break. The fuse should be to the right of the fuse drawer and should face the front of the machine. Once the fuse drawer is back in place, plug the power cord back into the machine. Be sure it is firmly in place.
5. If you are still having this problem, try switching the machine off and on a few times. If the SL95 still does not work, factory service is required.

If the backlight on the LCD screen is glowing, then the machine has power. If the LCD has no letters at all and lines 1 and 3 are slightly darkened . . . or if the LED display is blank or shows 1 digit only, brighter than normal, or shows several digits brighter than normal with more than one decimal point, the machine is probably having computer problems. You should try turning it off and on a few times to see if that helps. If it does not, the machine will require factory service.

If the power up banner doesn't appear on the LCD screen the way it should and switching the machine off and on doesn't help, service is required. If a series of asterisks is all that appears on the LCD, count how many asterisks. This could be useful information for our service technicians.

If the LED display flashes between what looks like a lower-case c and the mirror image of this, with all decimal points lit, this is an indication that the SL95 has failed the test of its RAM memory. Factory service is required if turning the machine off and on again doesn't help.

If the Machine locks up during normal operation, try turning it off and on again. This could restore operation to the machine. If the problems persist, factory service may be required. One thing that could make the machine appear to lock up is if it is trying to print out to one of the serial ports and handshaking tells it that (1) the line is not ready to receive information, (2) the transmit buffer is full, (3) and the timeout time is very long. The SL95 could be waiting for a chance to finish sending its information for a considerable amount of time and will not process any further input until it gets to send its data. Eventually a timeout message should come up, but long timeout times take several hours to time out.

How to check if the cell is clean

If you need to check if the cell is clean, follow this procedure. **Be sure to be gentle to avoid damaging the machine.** First remove the grain drawer. Next lift up the right-hand side of the machine far enough so that you can see the test cell through the hole in the baseplate of the machine. Be aware that if there is any loose grain, tilting the machine or turning it upside down can cause the grain to go into places it shouldn't be. **Make sure that the cell is empty of grain before tilting the machine:** Stray grain could get lodged in the machine, jam the scale mechanism, and prevent the scale from working correctly. Unlatch the door by swinging the latch toward the front of the machine. The latch is located on the front left side of the test cell. Refer to Figure 8. Then, while holding the latch open, gently pull the bottom door open. It is spring-loaded and will shut if you let go. Once the door is open, you will be able to see inside the cell. Take note of the thermocouple assembly about half way up the cell plates. **This assembly is relatively fragile.** So if you are cleaning around it, be gentle, especially around the thin wire coming out of it on the left side. If the cell plates have residue built up on them, clean it off gently with a damp cloth. When you are done, let the door close, and make sure it closes properly. Since the latch depends on gravity, it won't necessarily latch if the machine is on its side, but it should move freely, and you should be able to move it into the latched position.

How to know when to replace the 9-volt battery

Sometimes the SL95 will display a message about the battery backup having failed. However, this message will not always appear when the battery needs replacement. If the clock fails to keep time properly . . . or if serial port configuration options (under [Config][COM1] or [Config][COM2] or the last selected calibration or the setting for the [Config][DrSwitch] option are being forgotten, then the 9-volt battery probably requires replacement. The 9V battery also maintains the MEM 1 through MEM 9 memories. Have the machine plugged in and turned on when you replace the battery.

Notes on Resolution, Repeatability, and Accuracy

Resolution, repeatability, and accuracy all relate to how reliably a measuring device is performing – in this case, how close its readings are to the actual moisture content. Each word has a slightly different meaning.

Resolution is the minimum difference the machine can register in a reading. The SL95 has a resolution of 0.1% moisture when it is set in the 3-digit mode and 0.01% moisture when it is set in the 4-digit mode.

Repeatability is how consistent the readings are when repeated tests are made on a particular sample. Of course, you must keep in mind that wet samples can lose moisture quite quickly. A part of the repeatability measure is how steady the electrical circuits are that take the readings. But for grain moisture testers, the largest factor by far in repeatability is how the grain packs in the test cell. This variability of packing depends on the mechanical properties of the grain. A commodity such as wheat packs quite consistently in the test cell, and the readings will generally be within a tenth or two of each other. Corn is another matter. Its rough, irregular shape and larger size cause the readings to vary considerably more. Another factor that affects repeatability is the moisture level of the sample. The wetter the sample, the poorer it will repeat. Repeatability is also affected by how “sticky” the surface of the commodity is. Wet grain that has been sealed in a jar or grain that has had significant water added (a tempered sample) could be much stickier than a natural sample that has not been sealed up. Sticky samples flow and pack irregularly. Finally, if the sample temperature is greatly different from the room temperature, this temperature differential will have an adverse effect on repeatability. When repeatability is a problem, you should take more than one reading on a particular sample and average the results to assure that the reading is close to the “real” value. This must be balanced against the fact that wet grain dries out as it is exposed to air, so that many tests will dry out the grain and affect the results, as well.

Accuracy is a measure of how close the average machine reading is to the actual moisture content of any given sample. The first point that bears discussion is that the actual moisture is not unequivocally known. A particular standard procedure for moisture determination is used to determine the moisture content of a sample. This procedure is what the machine is actually calibrated against. There are sources of error in these procedures, too. The usual method against which a moisture tester is calibrated is an oven method. In the oven method, a known weight (or mass) of sample is placed in an oven at a particular temperature for a particular length of time. The sample is then cooled in a desiccated chamber (to prevent the sample from gaining moisture as it cools). The weight (or mass) lost by the sample is then assumed to be water, and the moisture content can be determined. There are several potential sources of error here. First, not all the moisture may be driven off, and moisture may be reabsorbed while the sample is cooling. Second, the sample might contain volatile compounds that are not water. An excellent example of this would be alcohol produced by fermentation. What the oven procedure determines is the percent volatiles, including water, alcohol, and whatever else might evaporate from the sample. Finally, if the temperature is too hot or the time too long, the sample may burn or oxidize, and lose weight that way. The way that the sources of error in the oven procedures has been addressed is that governmental agencies and other standards organizations have defined standard oven procedures for particular commodities. These standards are the primary standards for moisture determination and are chosen to minimize the sources of error. The main point that we want to make in this discussion is that if a different oven procedure is used, the results could well be different. In particular, a calibration made using an old oven procedure will often not match up with one made using a newer oven procedure. Standard oven procedures have on occasion been changed to produce better results according to the current data.

Biological factors also affect the accuracy of moisture tests. We have already mentioned alcohol production. Alcohol also will read on the moisture tester, but not, in general, the same as on the oven method. Thus a significant alcohol content can compromise the accuracy of the readings. Other forms of spoilage might also affect readings.

The chemical composition of the grain can affect the results — in addition to spoilage factors. These would be such things as starch content and protein content, which can be influenced by growing conditions. This requires that the accuracy of calibrations be constantly monitored. It may also mean that a calibration will sometimes need to be updated due to changes in the biological makeup of the grain. Variations in the density of the grain (test weight) also affect the readings. The SL95 is designed to correct for this within limits.

Salt content is another chemical factor: An abnormally high salt content can cause readings to be high. The salt mixed with water causes the grain to conduct more. Since the SL95 uses the capacitance and not the conductance of the grain sample to determine moisture content, it will be somewhat immune to this. But salt will still have an affect.

Dielectric machines such as the SL95 have a proven track record in terms of accuracy and have been used for many years. We have entered into the previous discussion so that you will be aware that there are factors that can affect the accuracy of your results. If you believe that you are having problems with accuracy, by all means contact us! We have many years of experience in this field, and we will help you sort out your problems.

Checking the Accuracy of Your SL95

The SL95 performs certain accuracy checks (reference checks) every time it is turned on. This is your first line of defense against a machine that is not properly standardized. But it isn't an absolute guarantee. A certain amount of vigilance and periodic verification is probably in order. Moisture testers are precision devices that occasionally require recalibration (standardization).

Many states have inspection programs that periodically inspect moisture testers to verify their accuracy. This is often the way that a problem comes to light. Also, in the normal course of business, you have no doubt noticed that there is a lot of comparison to the elevator "down the road."

In addition to the above measures, we can send you a check sample for a nominal fee. A check sample is a sample of the commodity you are concerned about that we have run on our standard machines. We then seal this sample up and send it to you. To check your SL95, you follow our instructions as to what calibration to run it on and how many times. The readings you got are then compared to the readings we got. In this way we can determine if your machine is out of tolerance and requires restandardization. If your machine seems to be accurately standardized but you are still having problems, we will attempt to determine the source of the problem. We will look into such things as whether or not you have the most up-to-date and appropriate calibration for the commodity you are running and whether your point of comparison that leads you to suspect an accuracy problem is appropriate. It may be that you have an unusual sample of grain. In any event, we will do our best to resolve the problem.

If it turns out that your SL95 really appears to be out of calibration, then it will have to be sent to us for repair. Please see the section on returning a machine for repair for more information on how to do this.

The Steinlite Warranty

The Steinlite Corporation, the manufacturer, warrants its products to be free from defects caused by faulty materials or workmanship for a period of one (1) year from the date of shipment. The liability under this warranty is limited to repairing or replacing (F.O.B. Factory) any products that are defective.

This warranty does not extend to any defect caused by fire, flood, disasters, disorders, negligence, misuse, accident, or **unauthorized repair or alteration** after the products leave the factory. Since many factors beyond the control of the manufacturer affect the accuracy of moisture tests, the Steinlite Corporation will not be responsible for any loss due to testing, storage, processing, or conditioning any grain or commodity.

Getting Your SL95 Serviced

If it becomes necessary to return your SL95 for service or repair, it is very helpful if you include a detailed description of the problem you have been experiencing. Also be sure to have your name and address both on and inside the package. You might tape a label with your name and address to the machine itself. It can difficult to determine to whom a machine belongs if it does not have a name on it.

Before sending us your SL95, please call us at 1-800-462-1835 or 1-913-367-3945 to discuss your problem and make arrangements for repair service. Problems can often be solved over the phone. In addition, we can sometimes loan machines to customers while repairs are being made. With enough advance notice, we might be able to provide you with a loaner for the entire time it takes to repair and ship your machine. We will make every effort to service your SL95 and ship it back to you within three weeks of receiving it.

You may ship to us via any major carrier – U.S. Postal Service, UPS, Federal Express, or whatever other carrier is convenient for you.

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