Model 6150 **CSC600 Moisture Analyzer**

OPERATOR MANUAL

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INTRODUCTION

Thank you for purchasing the Model 6150 CSC600 Moisture Analyzer. This electronic moisture balance is engineered to measure 0 - 100% moisture or solid content of materials that maintain their chemical structure while drying under infrared heat. Since drying and weighing are simultaneous, this instrument is especially useful in measuring the moisture content of substances that quickly reabsorb moisture.

This state-of-the-art moisture balance has been designed to make testing as easy and convenient as possible. It can be operated in three different drying modes -- automatic, timed, and manual -- to enable you to tailor the instrument to your particular application and needs. It also offers built-in RS-232 interface capability for automatically recording your data.

The instruction manual has been written to assist you in all aspects of the proper operation of the moisture balance. If CSC Scientific Company can be of further assistance to you, please call us at 1-800-458-2558 or fax us at 703-280-5142 or email us at info@cscscientific.com.

Before installing your moisture balance, check your shipping carton for the following:

- CSC600 Moisture Balance
- Pan Support
- Retainer Pan
- Disposable Sample Pans (1 box)
- Power Cord
- Fuses (2)
- Balance Check Weight
- Instruction Manual
- Warranty Card

PREPARATION

Select a suitable work area.

- Work area should be relatively free from air drafts and vibrations.
- Work surface should be level and rigid.
- Power line voltage to your instrument should be constant and free from fluctuations. It is not advisable to use an outlet that is shared with fluorescent fixtures or other electrical equipment that draws voltage in an inconsistent manner. *Be aware that an improper power supply can cause erroneous readings.* If necessary use a line conditioner.
- Do not locate near magnetic materials or equipment/instruments which incorporate magnets in their design.
- Avoid areas which have variations in room temperature or have excessive room temperature. Room temperature above 105F/40C or below 60F/15C could affect the operation and accuracy of your moisture balance.

INSTALLATION

Set up your moisture balance by following these steps:

- Remove moisture balance and all accessories from the carton. We recommend saving the specially designed packaging for future transport or storage.
- Insert pan support into pan support receptacle, making sure it does not touch pan stem. Gently set retainer pan on pan stem. Be aware that the pan stem is connected to the most delicate part of the instrument so treat with care.
- Insert power cord into the receptacle located on the rear panel of the moisture balance. Firmly push in the plug. Ensure that the voltage selector adjacent to the power cord receptacle is set to the correct operating voltage for your location (100 – 230 Volts)

- Turn power switch to the ON position. Switch is located on rear panel above power cord. *Allow the moisture balance to warm up for 20 minutes before beginning operation.* To avoid this required warm up period, we recommend that you leave the power switch in the ON position at all times

  On switching on your Moisture Analyzer the following will appear on the display.

  Instrument Model Number
  Contact Information for HELP
  Catalogue Number
  Serial Number & Software Version

  Please wait.....

- Perform balance check (see *Balance Check page 6*)

- Complete and return the enclosed warranty card to validate your warranty. Record warranty information in the space provided on the inside cover of this manual for your convenience.

SAFETY PRECAUTIONS

We at CSC have made every attempt to make your new Model 6150 Moisture Analyzer safe and easy to use. However, please try to follow these simple safety steps to help you avoid burns and possible exposure to harmful fumes from the materials you are testing.

1. Do NOT touch the aluminum disposable pans or their contents while hot, especially during a test.

2. Know the materials that you are testing. Some materials may present a fire hazard if the materials are heated. Some materials may cause dangerous or noxious fumes when heated. The Model 6150 Moisture Analyzer may be used in a fume hood if the fumes are too strong.

3. Know where your fire extinguishers are located. Use only certified and tested fire extinguishers rated for electrical fires.

4. Keep the instrument clean. Let the Model 6150 Moisture Balance cool for at least 15 minutes before cleaning the instrument.

5. Keep the instrument in a well ventilated area. Air coming out of the instrument can be hot.
   Do NOT block the instrument with papers or other combustible items.

BALANCE CHECK

All units are calibrated and checked for accuracy at the factory prior to shipment. However, you should check the operation of your unit before using it for the first time, and you should periodically check the balance to ensure that it has not been damaged. The Balance Check procedure is an indication of whether or not the internal scale has been damaged.

1. Lift up the hood of your unit

2. Press the TARE key.

3. Press the AUTO CAL key.

4. Place the Calibration Weight provided on the retainer pan and press Enter

5. The display reads

6. Press the TARE key to return the unit to normal operation after the check procedure is finished.

7. Remove the Calibration Weight. The display returns to zero.

DISPLAY SHOWS

Moisture Auto 0.00 g

USE 100.000 G ISO G WT. ONLY LOAD 100.00G WT. PRESS ENTER

CALIBRATING 100.00G

Moisture Auto 0.00 g

Note: If display reads: Balance Check - Error at this point refer to Trouble Shooting Section.

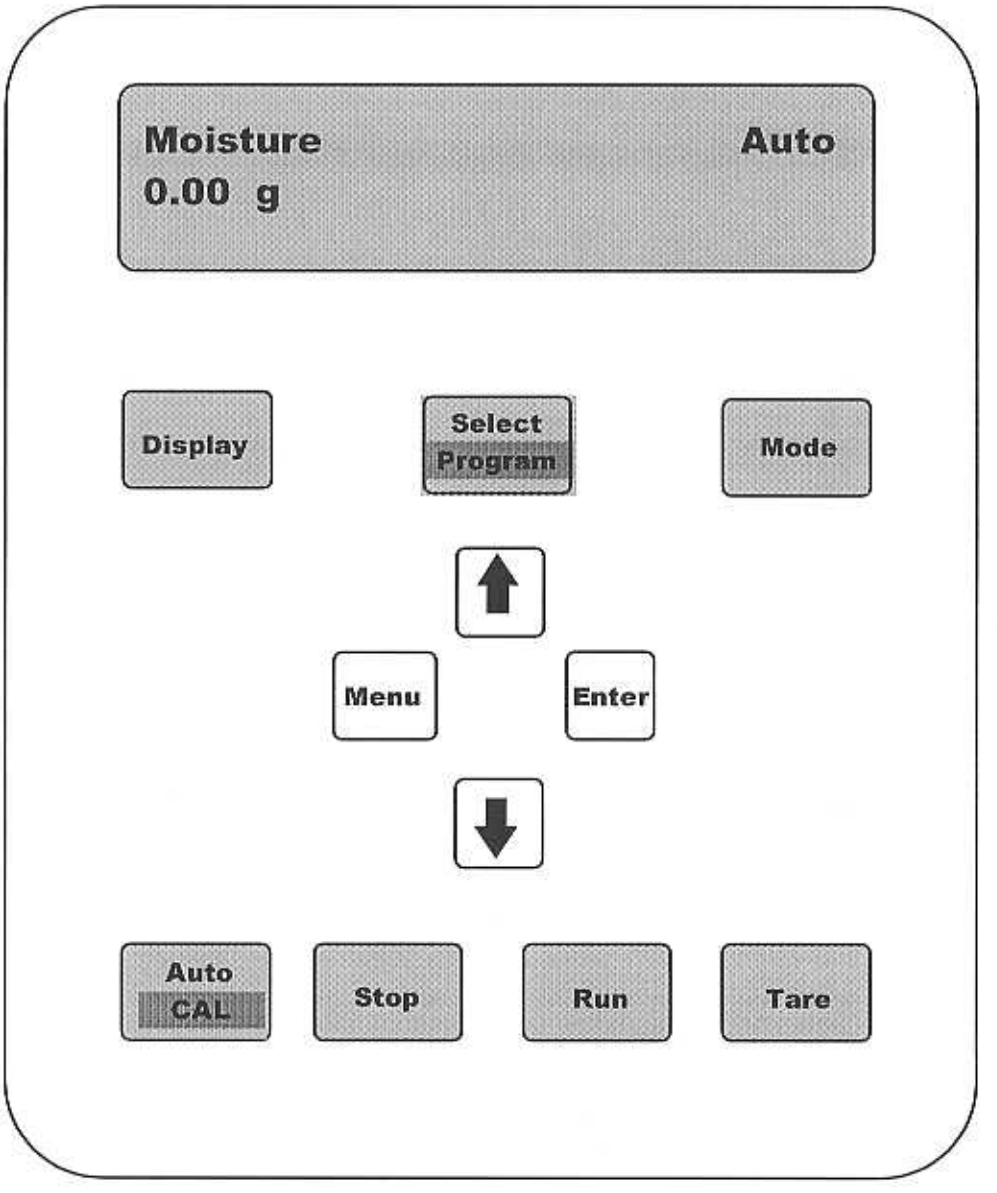


Figure 2: Keypad

KEYPAD

(See Figure 2 on page 7)

Note: Power - on/off (located on back of the instrument) supplies power to the unit. Power may remain on at all times to eliminate any warm up period.

Key Functions:

Display

Use to set the units in which you require the test results to be displayed. Sequentially depressing the key will scroll through the options.

Results displayed as percent MOISTURE (0-100%).

Results displayed as WEIGHT loss in grams.

Results displayed as percent SOLIDS (0-100%).
*Note: 100% solids is equal to 0% moisture

Select Program

On Start up shows STANDARD MODE / No Programs since information is required to be entered appropriate fields.

Press

Enter

to return to main screen on display.

Mode

Changes the operating method of the instrument and defines how the instrument ends a test.

Auto

Automatically ends the procedure dependant on the programmed parameters.

In **Auto** MODE, the unit runs until the % weight value changes less than "x" grams for "y" amount of time. Factory set parameters are .01g - 2 min. delay. Parameters may be changed *(see Test Parameters – page 12)*

Time

The unit runs for a predetermined period of time as defined by the operator. The clock counts down from the set time in minutes and seconds to zero and shuts off.

Man

The instrument runs continuously until the

Stop

key is depressed by the operator. This mode is useful in establishing your testing standards.

Note: Test Mode CANNOT be changed whilst a test is in progress.

Auto CAL

Automatic weight calibration of the balance assembly. Requires 100 grams I.S.O. certified weight.

Stop **Run** **Tare**

Stops the test / Begins a test /Tares weight added to the balance pan

Menu

Use to select the drop down menu, depressing will display two options on the display.

The  and  keys enable scrolling through the menu options.

The < indicates which menu is activated when depressing

Enter

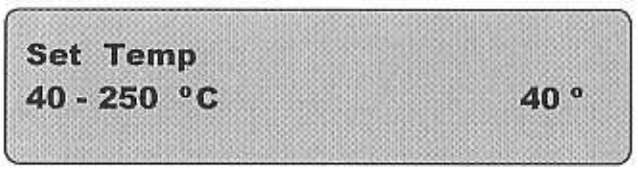
Menu options are:

Temperature Selection
Test Parameters
Batch Reset
Clock Setup
Service Menu

Temperature Selection <

Press

The Display shows:



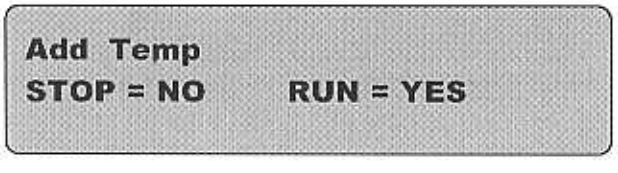
The temperature can be selected within the range of 40 – 250 degrees Centigrade. The selected temperature being displayed on the right hand side of the screen.

Temperature selection is achieved by use of the  and  keys.

Hold down the key for rapid adjustment; depress repeatably for fine adjustment.

Press

to accept the selected value. The display automatically displays the following screen.



If you do not require a second temperature, press **STOP**. The screen will return to the default menu.

However, if you wish to add a second temperature, press **RUN**. The display will now show

This is because you are required to enter a time to program the instrument how long it should remain at temperature number 1 before ramping up to temperature 2.

To set the time use the  to adjust the first two digits (minutes) and press **Enter** to accept.

Repeat the procedure to adjust the second set of digits (seconds) and press **Enter**

The **Set Temperature 2** screen will now be displayed and you should repeat the procedure as per setting Temperature 1.

The same procedure is repeated should a third and final temperature by required. To return to the main Menu Press **Stop**

Test Parameters. <

Press

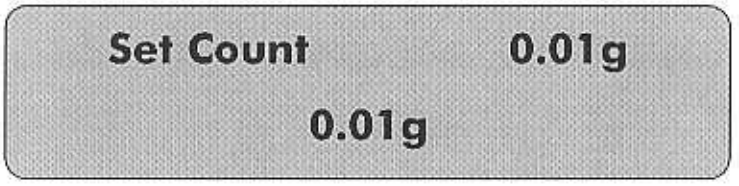
The Display shows :

(For a full explanation of the Auto Mode Please read sectionon page 22 & 23)

Press

Enter

The Display will show as follows:



The set count value can be increased in increments of 0.01 g by depressing the key.

(The value selected is the maximum loss of weight in a given time as determined in the **Set Time Frame** *menu)*

On selecting the require value.
Press

Enter

The Display shows:

To set the time use the to adjust the first two digits (minutes) and press **Enter** to accept.

Repeat the procedure to adjust the second set of digits (seconds) and press **Enter**

On selecting the require time.
Press

The Display shows :

To set the time use the  to adjust the first two digits (minutes) and press Enter to accept.

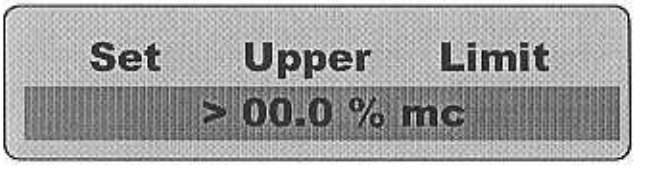
Repeat the procedure to adjust the second set of digits (seconds) and press Enter
On selecting the require time delay.

Press

The Display shows:

Press **STOP** if you do not require to add an **Alarm**. The screen will return to the default menu.

If you wish to add an **Alarm** condition, press **RUN**. The display will show as follows



To set the % mc use the  to adjust the first two digits and press **Enter** to accept.

Repeat the procedure to adjust the 0.1decimal place digit and press **Enter**.
The **Set Lower Limit** screen will be displayed and the same procedure should be followed for selecting the lower moisture alarm set point.

Batch Reset <
Press

Display shows:

Select **MENU** to switch **OFF** Batch Counter
Select **ENTER** to switch **ON** Batch Counter

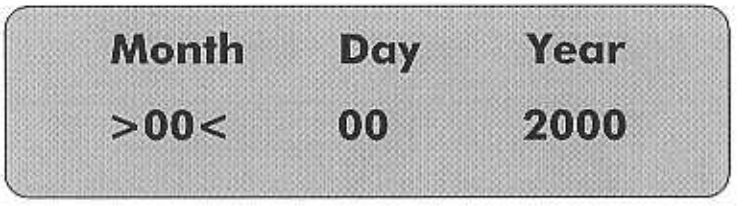
When the Batch Counter is switched **ON** the number will sequentially increase every time a Test run is performed.

Clock Set Up <
Press

Display shows:

To set the hours use the  to adjust the first two digits and press **Enter** to accept.

Repeat the procedure to adjust the minutes and press **Enter**

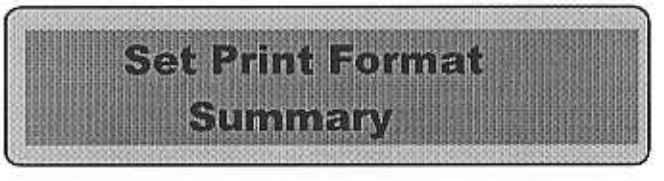


Similarly the procedure is repeated to adjust the Month, Day, Year and press Enter

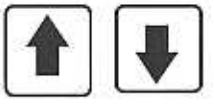
Output Format <

Press

Display shows:



This menu enables selection of the print output format.
Two options are available; Continuous output or Summary.

Depressing the  keys enables the operator to toggle between the two options.

Press

To accept the preferred option.

Display shows:

Again two options are available; **Printer** or **Computer**. As with the Print format the operator can choose between these using the appropriate keys.

Press

to return to the main menu.

Service Menu <

Please Note: This menu option is protected by a user password and should only be used by a qualified operator.
Please refer to the SERVICE MANUAL before proceeding.

RS-232 SUPPORT FOR THE Model 6150 MOISTURE ANALYZER

The data sent to the RS-232 port is intended primarily to go directly to an attached printer, but it can easily be captured and logged to a disk file by commercially available comm software or software of your own devising.

The correct communication parameters are as follows:

Baud 300
Parity ..... Even
Data Bits 7
Stop Bits 1

You may connect your Model 6150 Moisture Analyzer to a printer of your own choosing if that printer supports a serial data interface. A RS-232 serial printer cable is available at any retail computer store. The Digital Moisture Balance does not support a parallel data interface.

CSC Scientific does provide a custom printer and cable package. Please contact us at 1-800-458-2258.

Connect the Digital Moisture Balance to a PC either with a NULL modem cable *OR* a regular RS-232 serial printer cable and a NULL adapter, also available at any retail computer store.

The data should appear on the printer as:

MM/DD/YY	18:19
Batch No	xx
Start Weight	+x.xxx
End Weight	+x.xxx
Test Time	xx:xx
% Solid	xx.x
% Moisture	xx.x

All of the data is outputed as ASCII characters intended for a printer. There is no comma or " " delimiting. You may consider the fields in the above output example to be space delimited. Each line of data is terminated by a CR (carriage return, hex OD) followed by a LF (line feed, hex OA). Printers with custom cables are available through CSI.

(See Output Format for determining mode of output for RS 232 – page 16)

ESTABLISHING TEST STANDARDS

The Model 6150 Moisture Analyzer is weight loss technology and uses a high intensity halogen light source to dry liquid or solid samples while constantly calculating weight change on an interior electronic balance. The determination or percent solids or moisture is calculated by the difference between the initial weight and the final weight, divided by the initial weight.

$$\frac{\text{Initial Weight - Final Weight}}{\text{Initial Weight}} = \%\text{Moisture or }\%\text{Solids}$$

This is done either after a predetermined time period (**TIME MODE**) or by drying a sample to equilibrium or a constant weight specification (**AUTO MODE**).

Since the instrument uses the same methodology as the standard oven, it is designed to match oven standards. To achieve this, it is important to understand both your sample and the capabilities of the Model 6150 Moisture Analyzer.

Preparation of a drying curve consists of drying a sample mass and recording the % of moisture loss at intervals. When these values are plotted, you will be able to see a moisture profile of your sample. The curve will reach a high point and then level off, indicating that evaporation is complete.

Determination of the optimum temperature for the drying of a sample is a trial and error process. For the greatest accuracy, drying curves should be run at several different heat settings from high to low. The higher the heat, the faster the test. The objective is to find the optimum amount of heat for your sample in order to evaporate moisture, but **NO**T burn off any of the solids. Once you have determined the maximum acceptable heat, the next step is to run a series of **AUTO MODE** tests at that heat setting to test the repeatability of this heat selection.

Once you have determined the desired temperature setting, you may look to the test parameters to fine tune your testing to meet your particular testing objectives.

FINDING THE CORRECT TEST TEMPERATURE

The first objective is to find the correct temperature for the test routine. This is achieved by breaking the test-routine down to the basics and then building upon firm foundations. Start by testing using the TIME setting. An ideal test time to start with would is ten minutes. A good starting temperature depends on the nature of the product itself, but maybe 60`C or 70`C would work initially.

When testing using the above settings, the unit will test for ten minutes constantly at this pre-set temperature. Good, repeatable results and a test routine that does not obviously damage the sample is the target. If the sample is damaged or charred then lower the test temperature and repeat. Be careful not to step the temperature down too much at one time – 5C steps would be perfect. If the sample is not damaged but results are inconsistent, raise the temperature slightly OR increase the test time to twelve minutes from ten. Be sure to ONLY change one test parameter at a time. Changing more than one parameter would make it difficult to know what has solved the problem when good, repeatable results (without charring) occur. Using these guidelines a suitable test temperature will be discovered for your application.

DEVELOPING AN AUTO-TEST RUN

Once a successful test temperature has been established for the application, the AUTO settings can then be set-up. The AUTO settings allow the user to program the unit to automatically turn off at the correct end-point. Switch the unit to AUTO and enter the known temperature and time for test routine, this has been developed in the previous section. The user is prompted to program three pieces of data: test DELAY, time COUNTS and time FRAME. These can be described as thus:

Test Delay:

Here the user sets a minimum period of time that the test runs for. From previous work developing the ideal test temperature for the application in hand, the user already have a good understanding of how long it takes to drive out the majority of the moisture from the product being tested. A glance at the moisture content of the product on the display of the Model 6150 Moisture Analyzer as you are performing a test run displays how the moisture is quickly removed from the product at the beginning of the test cycle.

The time DELAY needs to be set to the period of time when the drying curve starts to flatten – i.e. to the period of time when most of the moisture has already been driven out of the product. On most products, this period of time will be 2 – 3 minutes.

Weight Counts:

This is the maximum amount of change allowable (in grams) over a given period of time (see Time Frame below for a description of this period of time). If this weight is equal to or falls below the set weight, the test will shut down once the time frame has been fulfilled.

Time Frame: The instrument analyzes the weight loss of the product that is currently being tested; it does this every six seconds. Once the test delay has been fulfilled, the time frame and time counts become relevant. The instrument views the current weight of the product (every six seconds) and then compares it back to the corresponding six second interval, depending on the time frame that has been set by the user. For example, if a time frame of two minutes is being used (which would be quite standard) the unit monitors the weight of the product, and then looks back two minutes to the same six-second interval and measures the difference between the two weights. If the weights are the same (this is where the unit uses the Weight Count), i.e. if the drying curve has flattened out, then after this two minute 'frame' the unit will automatically shut down. In other words, if the drying curve is flat for two minutes (i.e. if weight loss stops) then the unit automatically will shut down, since it deems that all moisture has been eradicated from the product. It will only shut down however if the test delay has been fulfilled.

Start the programming of your AUTO routine with this standard setup:

- an appropriate time frame (this you will get to know by monitoring the nature of the drying curve)
- a weight count of 0.1g
- a time frame of 2 minutes

If the end result is over / undershooting against results obtained from your reference method, the user may wish to alter the COUNTS or FRAME to stop the unit quicker OR to let it test slightly longer – i.e. to decrease / increase the final test result. Results may even be immediately acceptable, if a good test temperature for the test routine has already been found.

Remember: All products are different and that sometimes a longer test cycle – i.e. longer delay, longer frame and as low a count as possible, may be required to achieve good, repeatable results. Once good results are achieved, test parameters can then be tweaked and modified as necessary to cut down test time.

*(See **Test Parameters** on pages 12,13 &14 for Programming of Data)*

Running a Test without using a Program.

1. Press

2. Use the  select **"Standard Mode NO PROGRAMS".**

3. Press ENTER

4. Place an empty disposable sample pan on the retainer pan. Press the TARE key to zero out the weight of the sample pan.

5. Load sample to desired weight (for best results 5 grams is recommended). Close the lamp housing.

6. To run a test using the factory default settings, press the MODE key until "AUTO" is displayed in the top right corner of the display. Press the RUN key, to start the test.

7. The test will end automatically, however be sure to check the sample to avoid burning.

Setting Temperatures and Test Parameters without using a Program.
Temperature Selection.

8. Follow Step 1, to select "Standard Mode".

9. Press the MENU key, select menu option 'Temp Selection'.

   Use the  to set a temperature between 40 and 250 Celsius. Press **ENTER**.

10. To use this temperature for the entire test press **STOP**, and skip to step 12

11. To change temperatures during a test press **RUN**, and continue. Set the length of time you want to hold this temperature. Use the **ARROW** keys to set the minutes, press **ENTER**, use the **ARROW** keys to set the seconds, and press **ENTER**.

12. If desired, repeat Step 10 for a maximum of 3 temperatures.

13. Press **MENU** to go back to the ready screen.

Test Parameters.

14. Follow Step1, to select "**Standard Mode**". Press the **MENU** key, select menu option "**Test Parameters**".

15. Use the  to select the test mode and to change an individual parameter then, press **ENTER**, to continue to the next Parameter.

16. The Range Alarm can be used to audibly and visually alert the operator to a sample that has tested out of acceptable ranges. Use the **ARROW** keys to set the Lower Limit, press **ENTER**, then repeat for the upper limit.

Entering/Editing a Program.

17. Follow Step 1, to select a **Program** number 1 through 5.

18. Press the **MENU** key, select menu option **'Edit Program'**. Use the **ARROW** keys to set the password, **(12)**, Press **ENTER**.

18. Use the **ARROW** keys to select the program to edit, press **ENTER**.

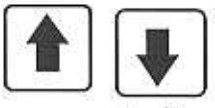
19. Enter a program name. Use the **ARROW** keys, to choose a letter, (capital letters and a space characters are available), press **ENTER** to move to the right, press **MENU** to move to the left, press **STOP** when the name is complete.

20. Enter the temperature as in Steps 8 - 11.

21. Enter the test parameters as in Steps 14 and 15.

Running a Program.

22. Press

Use the  select the program you wish to run. Press **ENTER**.

23. Place an empty disposable sample pan on the retainer pan. Press the **TARE** key to zero out the weight of the sample pan. Load sample. Close the lamp housing. Press the **RUN** key, to start the test.

During a test

23. Press the **DISPLAY** key to cycle between, % Solid, % Moisture, or Weight of the current test.

24. Press the **RUN** key, to display the current program name and the settings used for that program. The display will revert to the testing screen after 3 or 4 seconds.

After a test

25. Use **ARROW** keys to cycle between, %Solid, %Moisture, Initial Weight, and Final Weight. Press the **DISPLAY** key to activate the balance without clearing the above values.

26. Press **TARE**, to clear results and return to ready mode.

Notes:

27. When entering Temperatures or Test Parameters, to proceed through without changing any values press the **ENTER** key.

    For example, When asked "**Add Temp 2 Stop=No Run=Yes**", Press **ENTER**, and the program will take you to the next step. If there was a second temperature previously stored the program will behave as if you had pressed RUN. If there was no second temperature previously stored, the program will behave as if you had pressed **STOP**.

28. Values are only stored when EXITING the menu, or any time the display reads "Storing Data Please Wait..."

RESET TO FACTORY DEFAULTS

Should your Model 6150 Moisture Analyzer need to be reset after experiencing a power surge, power outage, or calibration error, simply follow these steps to reset your instrument.

Menu

Press

Use to select the drop down menu, depressing will display two options on the display.

Use the  key to select.

Service Menu <

Press

Enter

Please Note: This menu option is protected by a user password and should only be used by a qualified operator.
Please refer to the **SERVICE MANUAL** before proceeding.

CARE AND MAINTENANCE

In order to keep your Model 6150 Moisture Analyzer operating properly, it is important to follow a few preventative maintenance techniques:

- Before any cleaning procedure, *UNPLUG* the moisture balance.
- Housing and all removable pans should be kept clean and dry. A dry paintbrush is handy for brushing away sample residue.
- Keep area around the pan stem free from sample residue. Periodically, remove all pans, carefully unscrew pan stem *(counter clockwise)*. Brush or use compressed air to clean away any foreign material collected around pan stem. Replace pan stems and pans.

> Should the retainer pan stick to the pan stem for any reason, *DO NOT* try to dislodge it while it is installed. This could result in damage to the balance. Instead, unscrew the pan stem *with* the retainer pan attached. After it is free from the instrument, then dislodge the retainer pan, clean thoroughly and replace.

- Use disposable pans for testing. Remove only the disposable pan at the conclusion of the test. Do Not remove retainer pan frequently, as it may cause damage to the pan stem.
- DO NOT USE CHEMICALS TO CLEAN THE INSTRUMENT. Use *ONLY* a damp cloth with a mild, non-abrasive soap detergent. Do not allow any liquids to flow inside the balance. Moisture will cause damage to the electronic boards.
- For further routine maintenance, call CSC Scientific at 1-800-458-2558.

> Be aware that removing the bottom panel of your instrument will result in voiding your warranty on your CSC Model 6150 Moisture Analyzer.

TROUBLE SHOOTING

Symptom	*Possible Cause*	*What to do*
Display does not light up	1) Power cord not connected.	1) Check power cord. Disconnect and reconnect the cord. Wait 10 seconds before reconnecting.
	2) Power switch in off position.	2) Be sure power switch is in ON position.
	3) Fuse blown.	3) Check fuse and change if necessary.
Bulb does not come on	1) Temperature setting is zero.	1) Reset temp to desired setting.
	2) Bulb blown.	2) Replace bulb.
	3) Line voltage incorrect..	3) Check line voltage, use line conditioner if necessary.
Tests results not repeatable	1) Sample size may be too small.	1) Increase sample size to 5 grams or more. Low moisture sample perform better at larger sample sizes.
	2) Sample may not be uniform.	2) Try grinding your sample.
	3) Instrument may be in unstable	3) Check for vibrations, drafts and environment, line voltage to unit. These may have an affect on the instruments performance.
	4) Instrument out of calibration.	4) Do calibration procedure. Do reset procedure and do temp calibration procedure.

Symptom	*Possible Cause*	*What to do*
Instrument will not Auto Calibrate	1) Calibration weight added too soon.	1) Place 100g weight on ONLY after display prompt, "Load 100.00g Weight" appears. *(See Balance Check.)*
Balance Check Error	1) Forgot to press "TARE" before	1) Do procedure again, following loading 100g weight. Instructions step by step.
	2) Weight or pans are touching sides.	2) Check to make sure all pans are installed properly. Balance off center.
	3) Internal scale may be damaged.	3) Call CSC Scientific for Service at 1-800-458-2558.

PARTS AND ACCESSORIES

Description	Part Number
ACCESSORIES	
Printer with custom cable for hard copy of test data	19009200
Lab grinder for sample preparation	19009201
Power conditioner for electrical power protection	19006202
PARTS	
Calibration weight - 100 gram	19009203
Disposable pans, solids - pkg50	26678050
Fiberglass filter pad - pkg400	19009204
Fuse, 5x20mm 4A SLOW-BLOW - pkg2	19009205
Halogen bulb -	19009206
Instruction Manual	19009207
Pan stem	19009208
Pan support tray	19009209
Power cord	19009210
Printer paper rolls	19009211
Printer ribbon	19009212
Red window replacement	19009213
Retainer pan	26677000
Vibration damping pads	19009214

Ask about our case price discounts on bulbs, filter pads and disposable pans.