

GAC[®] 2100 G/GI



OPERATOR'S MANUAL



DICKEY-john[®]
CORPORATION

Revolutionizing Electronics



Safety Notices	1
Introduction	3
Sample Testing	3
Printer Connection (Optional)	4
Computer Interface	4
Features	4
GAC® 2100 G/GI Specifications	5
Installation and Setup	7
Unit Positioning	7
Disengaging Shipping Brace	8
Connecting AC Power	9
Removing Drawer Bottom (Optional)	9
Using Language Modes	10
Changing Access Codes	10
Using the Communication Ports	10
Start-Up & Familiarization	11
Startup Procedure	11
Display Screen	12
Adjusting Screen Contrast	12
Defining Keyboard Key Functions	12
Menu Screens	15
Alarm	15
Measuring Moisture	17
Preparing to Test Moisture	17
Measuring Moisture (Basic Method)	18
Using Grain Sample ID Numbers	20
Entering Numbers & Alpha Characters	20
Using ID Options	21
Viewing the Next Page	22
Grain Selection	23
Using Select Grain Menu	23
Calibrating Procedures	24
Viewing Calibration Data (1 Key)	24
Entering/Changing Calibration Values (2 Key)	26
Printing Calibration Grain List (3 Key)	28
Obtaining Basic Calibration Data (4 Key)	28
Establishing Parameters	31
Clearing the Cycle Counter (1 Key)	31
Choosing ID Options (2 Key)	32
Configuring Output Options (3 Key)	33
Changing the Access Code (4 Key)	36
Changing Date, Time and Date Format (5 Key)	37
Changing the Labels (6 Key)	39
Setting Communications Port Parameters (7 Key)	40
Using the Service Menu (8 Key)	47



Testing Unit Performance	49
Nonactive Keys	49
Viewing COM1 Port (2 Key)	50
Viewing Com2 Transmit Port (3 Key)	50
Viewing Display Characters (5 Key)	51
Viewing Diagnostic Mode (6 Key)	52
Using Test Network Mode (7 Key)	54
Viewing/Printing Parameters (8 key)	56
Operator Maintenance	59
Cell Cleaning - Daily	59
Fuse Replacement	59
Error Codes	61
Appendix A - Communication Ports	65
COM1 Port Options	65
COM1 Pin Assignment Details	65
COM2 Port Options	67
COM2 Pin Assignment Details	67



Safety Notices	1
Introduction	3
Sample Testing	3
Printer Connection (Optional)	4
Computer Interface	4
Features	4
GAC® 2100 G/GI Specifications	5
Installation and Setup	7
Unit Positioning	7
Disengaging Shipping Brace	8
Connecting AC Power	9
Removing Drawer Bottom (Optional)	9
Using Language Modes	10
Changing Access Codes	10
Using the Communication Ports	10
Start-Up & Familiarization	11
Startup Procedure	11
Display Screen	12
Adjusting Screen Contrast	12
Defining Keyboard Key Functions	12
Menu Screens	15
Alarm	15
Measuring Moisture	17
Preparing to Test Moisture	17
Measuring Moisture (Basic Method)	18
Using Grain Sample ID Numbers	20
Entering Numbers & Alpha Characters	20
Using ID Options	21
Viewing the Next Page	22
Grain Selection	23
Using Select Grain Menu	23
Calibrating Procedures	24
Viewing Calibration Data (1 Key)	24
Entering/Changing Calibration Values (2 Key)	26
Printing Calibration Grain List (3 Key)	28
Obtaining Basic Calibration Data (4 Key)	28
Establishing Parameters	31
Clearing the Cycle Counter (1 Key)	31
Choosing ID Options (2 Key)	32
Configuring Output Options (3 Key)	33
Changing the Access Code (4 Key)	36
Changing Date, Time and Date Format (5 Key)	37
Changing the Labels (6 Key)	39
Setting Communications Port Parameters (7 Key)	40
Using the Service Menu (8 Key)	47



Testing Unit Performance	49
Nonactive Keys	49
Viewing COM1 Port (2 Key)	50
Viewing Com2 Transmit Port (3 Key)	50
Viewing Display Characters (5 Key)	51
Viewing Diagnostic Mode (6 Key)	52
Using Test Network Mode (7 Key)	54
Viewing/Printing Parameters (8 key)	56
Operator Maintenance	59
Cell Cleaning - Daily	59
Fuse Replacement	59
Error Codes	61
Appendix A - Communication Ports	65
COM1 Port Options	65
COM1 Pin Assignment Details	65
COM2 Port Options	67
COM2 Pin Assignment Details	67



SAFETY NOTICES

Safety notices are one of the primary ways to call attention to potential hazards.



This Safety Alert Symbol identifies important safety messages in this manual. When you see this symbol, carefully read the message that follows. Be alert to the possibility of personal injury or death.

⚠ WARNING

Use of the word **WARNING** indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION

Use of the word **CAUTION** with the Safety Alert Symbol indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

CAUTION

Use of the word **CAUTION** without the safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in equipment damage.

OPERATOR'S MANUAL





INTRODUCTION

The DICKEY-john Grain Analysis Computer GAC[®] 2100 G/GI quickly tests grain samples for moisture content and other profile information. The unit loads a sample, weighs and checks temperature, runs test, displays results, and unloads the sample. The test results calculate automatically to display the moisture content and, if enabled, the temperature and approximate test weight (density) of the grain sample. Also, the product name, grain calibration date and sample ID number display for identification. An additional screen of information includes readings for the conductance (D1), capacitance (D2), weight (D3) and temperature (D4) values along with the currently set date and time.

Figure 1

GAC[®] 2100 G/GI Unit



SAMPLE TESTING

Performing a grain sample analysis consists of six basic steps;

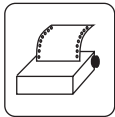
1. Select a grain for testing through keyboard entries. Up to 16 grain choices are available on two pages.
2. Pour grain sample into the hopper (top of the unit) and enter a sample ID (optional) number.
3. Depress the LOAD key. The sample automatically loads (drops) the grain into the test cell and a strike-off arm levels and removes the excess.



4. Wait briefly for the test results to process. The moisture reading and grain temperature display.
5. Print out a hard copy of the test results. With an optional printer connected, the date and time with sample identification number and all test information prints out. By depressing the PRINT key, additional copies can be printed.
6. Press the **Unload** key to empty the test cell contents. The test cell rotates 180° (inverts) to dump the grain into a sample drawer or into a larger container below the counter top. After the cell returns to the upright position, the unit is ready for the next test sample.



Unload key



Print key

PRINTER CONNECTION (OPTIONAL)

An optional printer connects to the GAC[®] 2100 G/GI to print out test data results. The printout may include the facility name and address, current date and time, sample ID number, product name, grain calibration date, percent moisture, grain temperature, unit serial number and the D1 through D4 values. The data can automatically print at the end of each measurement cycle or be manually initiated by pressing the **Print** key.

COMPUTER INTERFACE

The GAC[®] 2100 G/GI can output to a personal computer (PC) using the COM1 or COM2 ports. When using the COM2 port, a null cable or null adaptor must be used. A null adaptor is available from DICKEY-john.

FEATURES

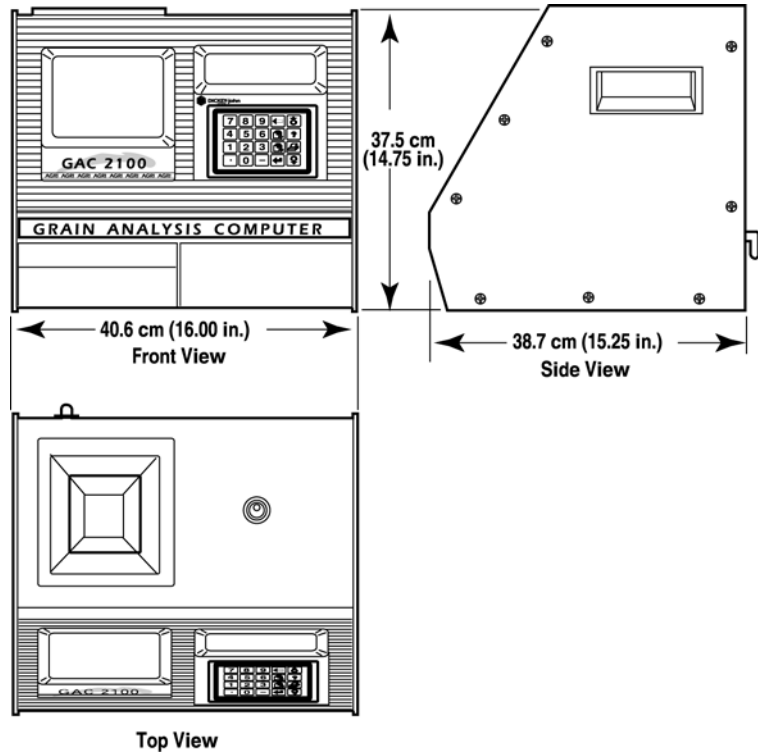
Features of the GAC[®] 2100 G/GI include:

- Memory for up to 16 different grain calibrations.
- Keyboard entry for updating grain calibrations as revisions become necessary.
- Alpha/numeric sample identification numbers with automatic sequential numbering for record keeping purposes.
- Automatic ranging by switching to predetermined calibrations when moisture is above or below normal limits.
- Two serial output ports available for printer and/or external computer.
- Self-check mode to assure proper continual operation.
- Error messages display when out-of-limits moisture, grain weight or grain temperature occur.
- Help screens to assist operator's questions.



Figure 2

GAC[®] 2100 G/GI Dimensions



GAC[®] 2100 G/GI SPECIFICATIONS

- **Supply Voltage and Frequency Limits:** 85 Vac to 264 Vac 48-440 Hz at 1 Amp Max.
- **Operating Temperature Range:** 5° C (41° F) to 45° C (113° F). If the unit temperature range is exceeded, an ERROR message displays.
- **Grain Temperature Range:** 0° C (32° F) to 50° C (122° F). If the grain temperature range is exceeded, an ERROR message displays.
- **Unit Temperature and Grain Temperature Difference Limit:** The maximum allowable temperature differential between empty cell and grain under test is 20° C (36° F). If exceeded, an ERROR message displays.
- **Classes/Types of Grain or Seed:** Refer to the latest Calibration Bulletin.
- **Weight:** 11.8 kg (26 lbs) – Shipping Weight: 15.0 kg (33 lbs)

OPERATOR'S MANUAL





INSTALLATION AND SETUP

Before shipping, the GAC[®] 2100 G/GI is inspected and tested for mechanical and electrical defects. After unpacking, visually inspect for damage occurring during transit. Save all packing materials until inspection is complete. If damage is found, file a claim with the carrier immediately, and notify your DICKEY-john sales representative.

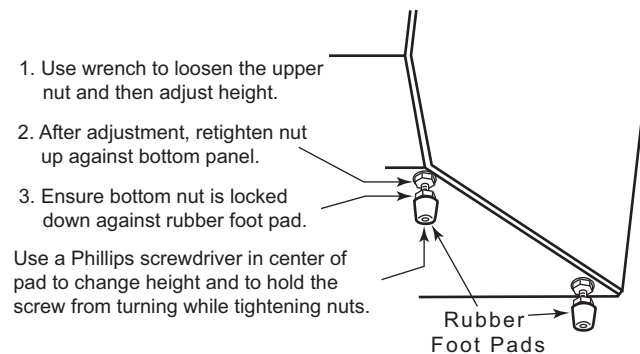
UNIT POSITIONING

Choose a clean environment for the GAC[®] 2100 G/GI that is protected from rapid changes in ambient temperature. Avoid a hazardous (classified) location as defined in Article 500 of the NFPA Handbook of the National Electrical Code.

Use the self-contained level on the panel top to position the GAC[®] 2100 G/GI on a flat level or nearly level surface (See Figure 2). Adjust the four rubber foot pads to level and stabilize the unit (See Figure 3). When moving the unit to a different location, re-leveling may be necessary. After adjustment is complete, all four leveling foot pads should be set to the lowest level possible with one pad fully seated against the bottom panel. This assures minimum height above the counter top.

Figure 3

Leveling Unit with Rubber Foot Pads



To adjust a foot pad height, use a flat wrench to unlock the upper nut from the bottom panel of the selected foot pad. Then, adjust the height as required.

After adjusting, use a Phillips screwdriver in the center of the footpad to hold the screw from turning and tighten the upper nut against the bottom panel of the unit. Ensure the lower nut remains tight against the footpad.



DISENGAGING SHIPPING BRACE

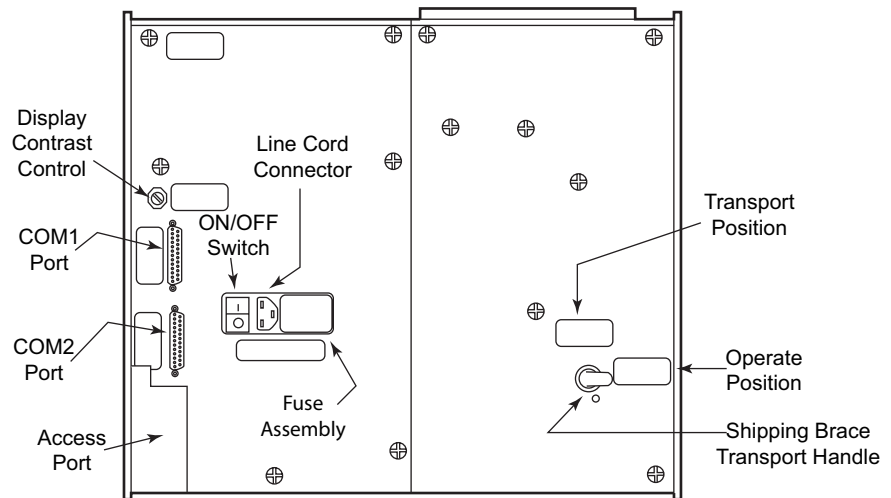
CAUTION

The shipping brace must be moved to the operate position before applying power. Since the grain test cell cycles through an unload sequence during power up, damage may occur with the shipping brace in the transport position.

The GAC[®] 2100 G/GI is shipped with the grain test cell supported by an internal shipping/transport brace. This brace is to support the test cell whenever the unit is transported. The position of the brace is controlled by a handle, located on the rear panel behind the grain test cell (refer to Figure 4). A small spool is placed over the handle during shipping to prevent possible bumping and releasing of the handle. Remove this spool and store as part of shipping materials. Push the handle in to unlock and rotate counterclockwise to the locked operate position as indicated on the back panel. The movement of the brace is viewable through the front window of the unit.

Figure 4

Viewing Unit from Rear



CAUTION

Rotate the brace back into supporting position before moving or shipping the unit. If the cell is not adequately supported, operating performance can be adversely effected due to cell bouncing. Some effort is required to bring the brace back into position. It may be helpful to reach inside the drawer front and lift up on the cell while attempting to lock the brace into the transport position. Place the spool over the handle to prevent the accidental release of the shipping brace.



CONNECTING AC POWER

Verify that the ON/OFF (I/O) switch is in the OFF (O) position and that the shipping brace is in the OPERATE position. Plug the line cord into the connector on the rear panel next to the ON/OFF switch. Plug the male end into an appropriate 3-wire (grounded) outlet.

⚠ CAUTION

The grounding pin on the line cord connects directly to the GAC[®] 2100 G/GI frame. When using an adapter, make sure the grounding wire is connected properly to a good earth ground to prevent a shock hazard.

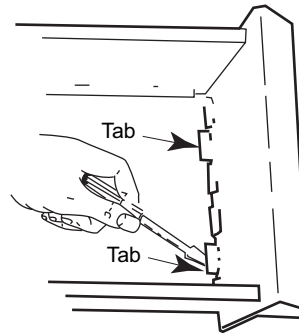
REMOVING DRAWER BOTTOM (OPTIONAL)

Normal use of the sample drawer can be bypassed by removing the drawer bottom and cutting a hole into the work counter to allow the tested grain samples to fall through to a larger container below. The size of the hole must be at least equal to the drawer dimension and located directly beneath the grain sample drawer.

Remove the bottom of the grain sample drawer by carefully lifting the two plastic tabs at the front of the drawer (refer to Figure 5). Using a small screwdriver, gently pry up on each tab and slide the bottom panel out the rear of the drawer. Be careful not to break the tabs.

Figure 5

Removing Drawer Bottom



When finished, slide the grain drawer back into position. This prevents grain from spilling onto the work surface in front of the unit.

If replacing the drawer bottom later, slide the bottom toward the drawer front until it latches under the two plastic tabs.



CHANGING ACCESS CODES

An access code is necessary to use certain screens. Whenever the code is required, a screen appears stating ENTER ACCESS CODE. The factory preset access code is set to "0". To change the access code for security reasons, refer to CHANGING THE ACCESS CODE in the SETTING UP PARAMETERS section.

USING THE COMMUNICATION PORTS

Two communication ports are located on the rear of the unit transfer data. These are: (a) Printer Output Port (COM1) and (b) Computer Output Port (COM2). Each must be properly configured to communicate with external devices. Port configuration is described in ESTABLISHING PARAMETERS.



START-UP & FAMILIARIZATION

This section defines the keyboard layout, display messages, and other operator controls.

START-UP PROCEDURE

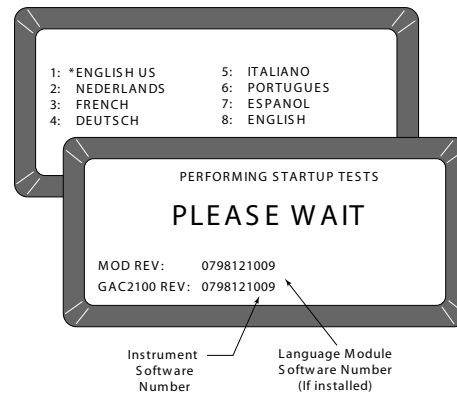
The unit performs a series of self checks every time the unit is powered on to determine the status of the (1) load/strike-off mechanism, (2) unload function, (3) empty test cell weight, and (4) conductance/capacitance measurement circuitry. The self-checks begin when the hopper doors open, the strike-off arm swings across the cell and back again, and the cell dumps. When the cycle ends (about 15 seconds), the MAIN menu displays.



Before starting the procedure below, ensure the ON/OFF (I/O) switch is in the OFF (O) position and that the shipping brace is in the OPERATE position. These are both located on the rear of the unit (refer to Figure 4).

1. Turn the power switch ON. Initially, a language screen appears showing eight choices as shown in Figure 6.

Figure 6
Start-up Screens



2. Multiple languages are pre-programmed into the unit. There are 8 choices available on the start-up screen. Select a language by pressing the key number as indicated next to the language. This screen only remains available for approximately eight seconds. Once language is selected, an asterisk appears and remains in front of the selection until changed in another start-up cycle.



3. Wait for the remaining portion of the cycle to finish. A second screen will appear and display PLEASE WAIT while performing self checks. Software revision numbers will display on bottom two lines of screen (refer to Figure 6).
4. After the MAIN menu displays, proceed with the following paragraphs to preview general operating features.

DISPLAY SCREEN

The display screen is a graphics Liquid Crystal Display (LCD) and is backlit for low light level viewing.

ADJUSTING SCREEN CONTRAST

The Display Contrast Control is on the rear panel above the COM1 and COM2 ports (refer to Figure 4). Contrast Control changes the contrast between the displayed characters and the background. Adjust the control using a flat blade screwdriver as necessary for a comfortable contrast level in varying light conditions.

DEFINING KEYBOARD KEY FUNCTIONS

All Operator Controls are on the front panel except the Power ON/OFF switch and Contrast Control which are located on the rear panel (refer to Figure 4).

The sealed membrane keyboard contains 20 pressure sensitive keys requiring light finger pressure for key actuation. Valid key closures result in short tone bursts while invalid keystrokes generate longer tone bursts. Each key function or key group is defined as follows and illustrated in Figure 7.

Numbers (1 through 0)

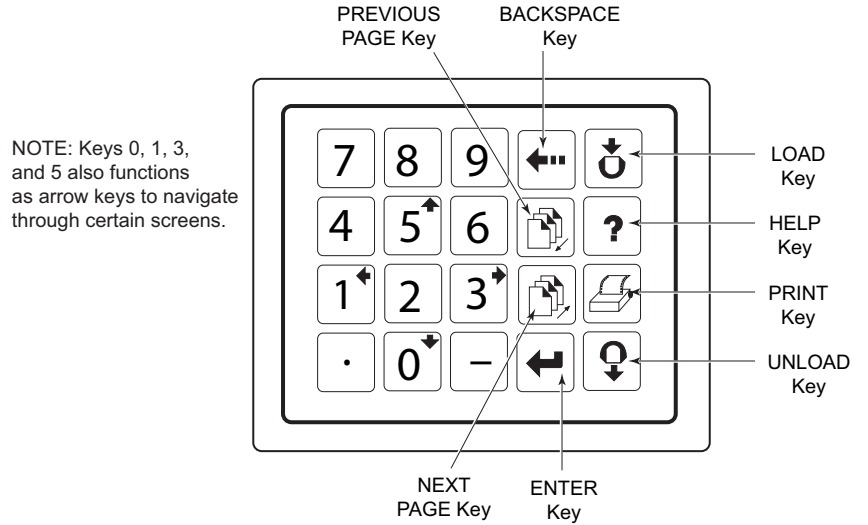
Decimal point (.)

Minus (-) Keys

All numeric keys perform dual functions: (1) make MENU selections and (2) enter numeric values. The four numeric keys with small arrows have the additional function of screen navigation. When making a numeric entry, a prompt on the display identifies the value entered and a cursor shows the destination of each entry. The minus (-) sign is accepted at any point in the entry and displays at the front of the entered string.



Figure 7
Keyboard Layout

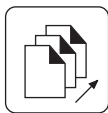


Each entry immediately displays as the cursor moves to the right in preparation for the next entry. Only the first entry of the decimal point is acknowledged.



Backspace key

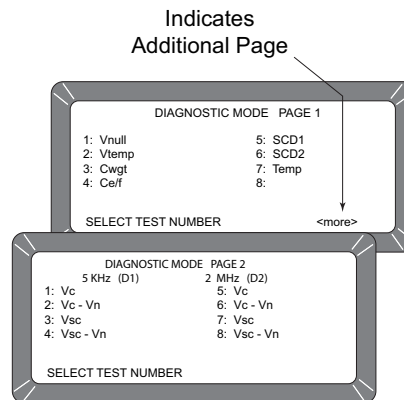
The **Backspace** key moves the cursor to the left to delete the last keystroke or to clear an entire entry field.

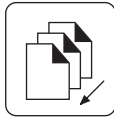


Next Page key

The **Next Page** key advances to the next page when the <more> prompt appears in the lower right corner of the display as shown in Figure 8. The NEXT PAGE key sequences the display forward to additional pages of information.

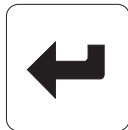
Figure 8
Additional Pages Screen





Previous Page key

The **Previous Page** key sequences backward through previously displayed pages. Neither the Previous Page or Next Page keys roll-over the pages to the beginning or end.



Enter key

The **Enter** key accepts the character string after an entry is complete.



Load key

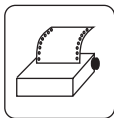
The **Load** key initiates a grain cell loading sequence to begin a test cycle.

The **Help** key provides context sensitive help screens. If the <more> message appears at the lower right of the screen, additional pages are accessible with the Next Page key. To use the HELP INDEX in the HELP screen, press the 0 key and then select the desired topic. To resume normal operation, press the Help key a second time.



Help key

The **Print** key initiates a printout of current information on the screen (i.e. grain moisture analysis or calibrations data). If the automatic printout option is selected, the Print key only initiates duplicate copies. Help information does not print. COM SETUP options allows the Print key to transmit to either the printer port or the communications/modem port. For example, the system may be configured to automatically print results through the printer port while the Print key transfers results to the computer port.



Print key

Pressing the **Unload** key instructs the test cell to dump its contents after a grain test is finished.



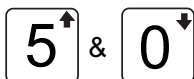
Unload key

The **Left and Right** Keys move the cursor horizontally during alpha entries and certain functions during the SETUP mode.



Left and Right keys

The **Up and Down** Keys move the cursor vertically during alpha entries and certain functions in the SETUP mode.



Up and Down keys



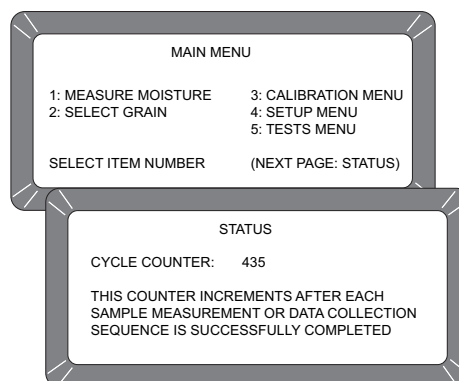
MENU SCREENS

The MAIN menu appears immediately after all start-up checks successfully end. The MAIN menu is the home screen that all other screens are accessed. The MAIN menu displays five major selections or categories (refer to Figure 9).

A number will appear next to each MAIN menu selection and the message SELECT ITEM NUMBER will appear at display bottom. Select the desired number to access the appropriate menu. Additional menu levels will be available for some selections. Refer to Figure 10 for a general configuration of the Menu Tree layout.

Figure 9

MAIN menu Selections



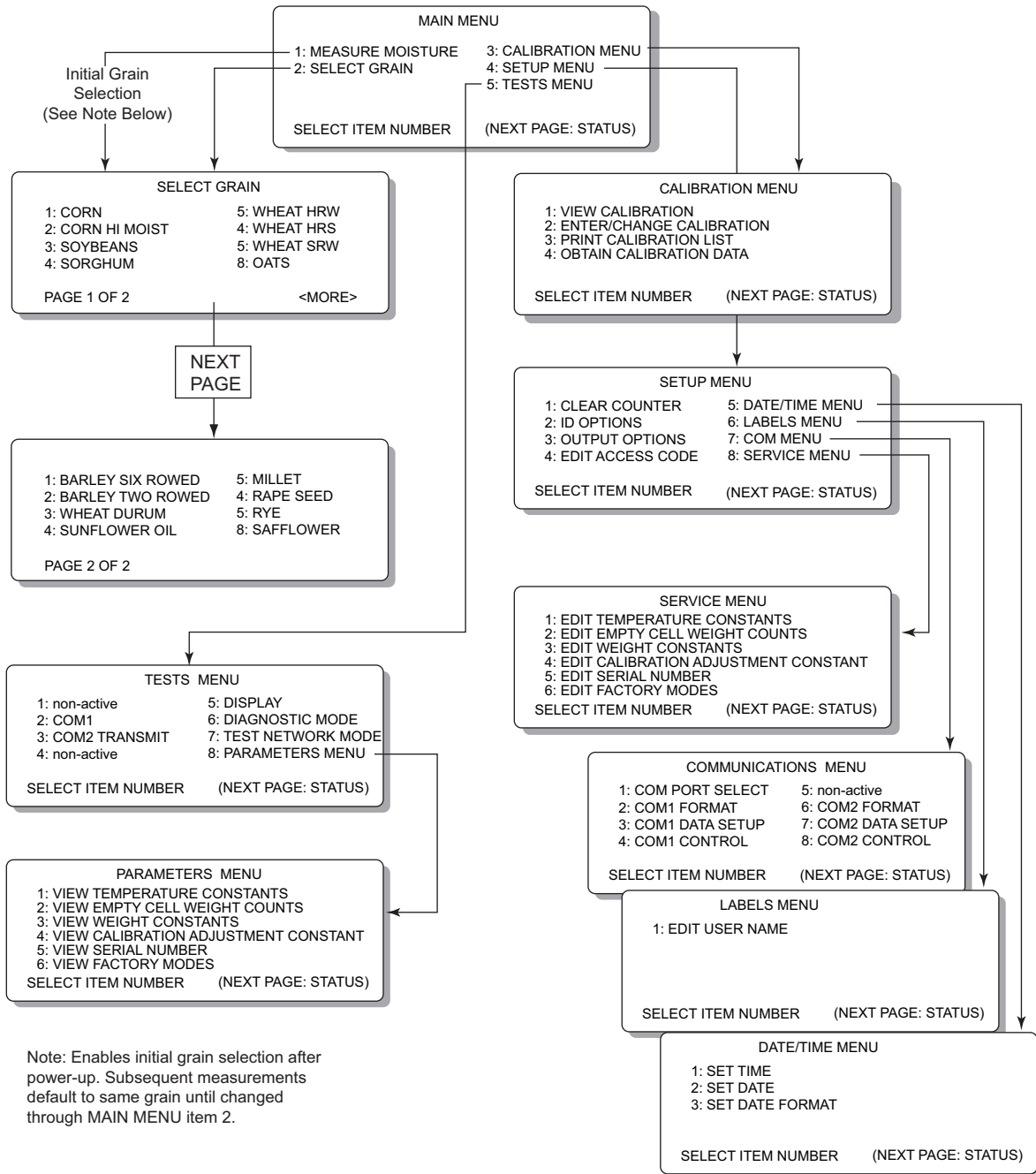
ALARM

An audible alarm is enabled for 0.5 seconds at the end of each grain analysis or for an error condition. A shorter beep of 0.1 second sounds for each valid key stroke.

OPERATOR'S MANUAL



Figure 10
Menu Tree





MEASURING MOISTURE

The MAIN menu appears immediately after all start-up checks have successfully concluded (refer to START-UP & FAMILIARIZATION). The MAIN menu displays five major selections or categories. This section describes the MEASURE MOISTURE procedure.

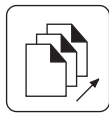
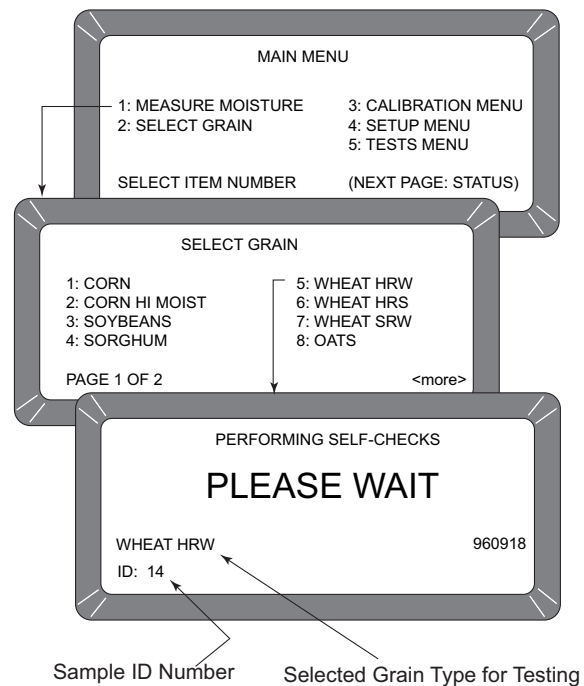
PREPARING TO TEST MOISTURE

To measure moisture:

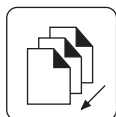
1. Choose MEASURE MOISTURE (1 Key) from the MAIN menu to display page one of the SELECT GRAIN menu as shown in Figure 11.

Figure 11

Moisture Testing Preparation



Next Page key



Previous Page key

2. Locate the grain type for testing and select the corresponding number to the left. Press the **Next Page** key if desired grain is not shown on first screen. After selecting a grain, the unit cycles through self-check tests to ensure that the program memory and calibrations are valid. Subsequent moisture measurements default to the previouslyMAIN menu selected grain. If a different grain is desired, press the **Previous Page** key to return to the MAIN menu. Press the 2 key, SELECT GRAIN, and make a new selection (refer to SELECTING GRAINS for additional information). NOTE: Pressing "NEXT PAGE" displays the



second set of eight grains that can be tested with the factory calibration setup.

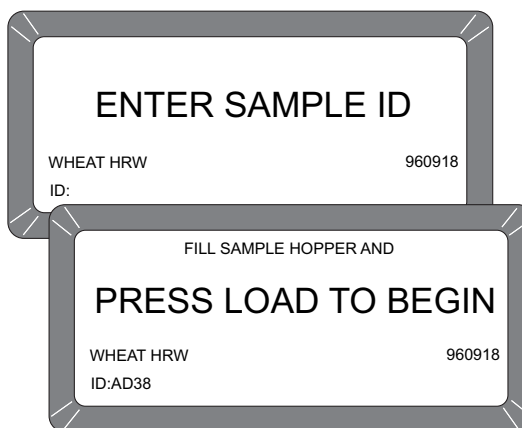
3. Enter a sample ID number. This number identifies the sample tested on the paper printout. If the ENTER REQUIRED FOR ID is turned on (refer to CHOOSING ID OPTIONS in the ESTABLISHING PARAMETERS section), the ENTER SAMPLE ID screen displays and an ID number is required (refer to Figure 12). Other ID numbering options skip this screen. For now, enter any number and press the ENTER key (i.e. Press 1). Further explanation on using ID numbers are described later in this section.



Enter key

Figure 12

Screen Sequence Using Enter Required for ID



MEASURING MOISTURE (BASIC METHOD)

After all selected grain calibration self-checks are finished (approximately 10 seconds), the message FILL SAMPLE HOPPER, ENTER ID NO. THEN...PRESS LOAD TO BEGIN will display (refer to Figure 13).

To measure moisture:

1. Pour grain into the sample hopper. Fill the hopper until the grain is at least 1.25 cm (1/2 inch) above the separation line between the hopper top and hopper compartment (heap grain slightly). The exact volume is unimportant except enough grain must be present to overfill the cell (approx .5 liter or 2 cups). Excess grain spills over the cell top and falls into the grain drawer below.
2. If an ID number has not already been entered, enter a number or skip to step 3.
3. Press the **Load** key on the keyboard to start the test cycle. After pressing the Load key, the hopper doors open to drop the grain into the test cell. The cell fills and the striker arm swings across the top of the test cell to wipe away excess grain.



Load key



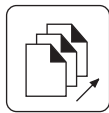
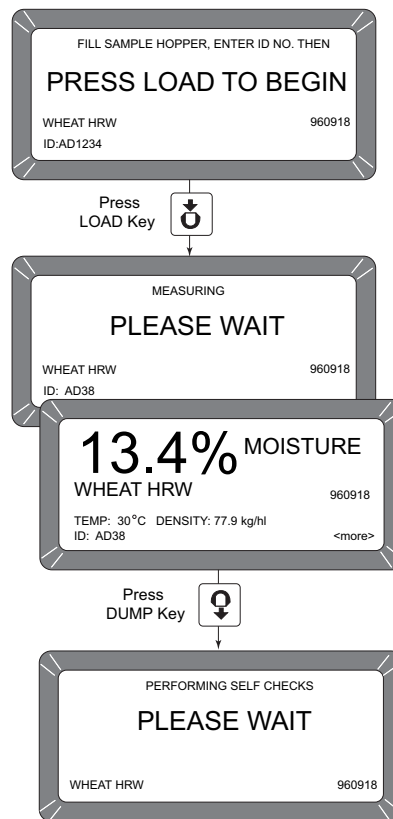
⚠ CAUTION

Do not insert fingers or other foreign objects into the opened hopper doors.

- Wait approximately 15 seconds for moisture test to complete as shown in Figure 13. A screen appears with message, MEASURING - PLEASE WAIT.

Figure 13

Basic Moisture Measuring Cycle



Next Page key



Unload key

- The grain name and percent moisture will appear on the display along with the sample temperature in degrees Centigrade (Fahrenheit), Density, Sample ID, and Grain Calibration issue date.
- The option <more> is displayed in the lower right corner of the screen. Press the **Next Page** key to view additional pages. In this case, the D1 through D4 values display along with the present date (lower left corner) and time (lower right corner). Details of this screen are described later.
- When measurement is complete, press the **Unload** key. The test cell inverts, dumping the grain and then returns to the upright position ready for the next measurement cycle.



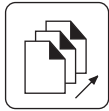
8. Start a new moisture measurement for the same grain type. The GAC[®] 2100 G/GI remembers the grain type until changed or power is turned off. The SELECT GRAIN menu does not appear again until selected.

USING GRAIN SAMPLE ID NUMBERS

Grain samples can be identified with three optional ID numbers:

1. Automatic number sequencing (i.e. 1, 2, 3...)
2. Manual entry (numbers can be manually entered or skipped)
3. ENTER REQUIRED FOR ID (produces an extra screen, ENTER SAMPLE ID) which prompts a required entry before proceeding (See Figure 12). The ID field can be either numeric or alphanumeric. If numeric only, the digits 0-9, the decimal point and the minus sign are entered with those keys on the keyboard. Other characters are entered from an alpha screen.

ENTERING NUMBERS & ALPHA CHARACTERS



Next Page key

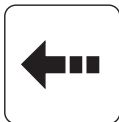
Entering alpha characters (letters) into certain screens, such as an ENTER SAMPLE ID number, is accomplished through a special alpha screen. Press the NEXT PAGE key to access the alpha screen from the ENTER SAMPLE ID screen. The **Next Page** key only functions if an alpha entry is possible.



Enter key

To view and/or use the alpha screen:

1. Prepare for a moisture test. When the PRESS LOAD TO BEGIN message appears, observe the ID field in the lower left corner below the grain type. A small cursor is blinking requesting either a number or letter. Numbers are entered directly from the key pad and completed by pressing the **Enter** key .
2. To enter letters, press the **Next Page** key to access the alpha screen. The alpha screen shows the alphabet and special characters. In the lower left corner, the word TEXT is displayed. (refer to Figure 14).



Backspace key

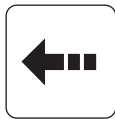


Figure 14

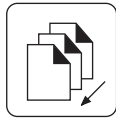
Alpha Screen



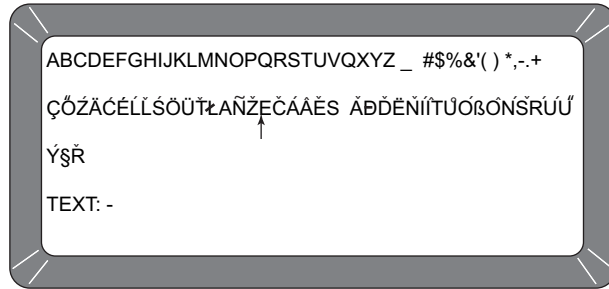
Enter key



Backspace key



Previous Page key



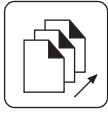
3. Move the vertical pointer (center of screen) to the first letter. The small vertical pointer identifies the selected character. The pointer is moved about the screen using the four arrow keys (left/right and up/down).
4. After selecting a letter, press the **Enter** key. The letter appears next to the word TEXT on the lower corner. Repeat the process until the phrase is complete. If an error is made, press the **Backspace** key and re-enter the corrected character.
5. After completing the text string, press **Previous Page** key. The text string now becomes part of the ID field on the PRESS LOAD TO BEGIN screen. Additional numbers may be inserted after the text string. Deleting is accomplished by entering the alpha screen again and using the **Backspace** key to delete letters.

USING ID OPTIONS

ID numbers are typically used to identify grain samples. The numbers can be a simple number (i.e. 1, 2, 3, etc.), a combination of letters and numbers (i.e. operator's initials plus sample number) or perhaps the customer's name (i.e. BROWN). The ID field may contain up to 16 alpha numeric characters.

The ID option is selected through the SETUP MENU, ID OPTIONS (refer to SETTING UP PARAMETERS). ID numbers are added to each tested sample using one of three methods:

1. **Inserted manually** - Any ID field, including none at all, can be assigned to grain samples before each test. This flexibility allows users to develop individualized numbering schemes.
2. **Automatic Sequencing** - Numbers can be sequentially assigned automatically to each moisture test. For example, 1, 2, 3, etc. or specific letters (i.e. initials) can be placed in front of the numbers (i.e. JW12). Only the numbers at the end of the field change automatically.
3. **Entry required for ID** - An ID field is required before each moisture test can proceed. This method ensures each sample is properly identified usually for printer output. A screen appears before a moisture test begins asking the user to ENTER SAMPLE ID. Alpha characters can be used if desired.



Next Page key

VIEWING THE NEXT PAGE

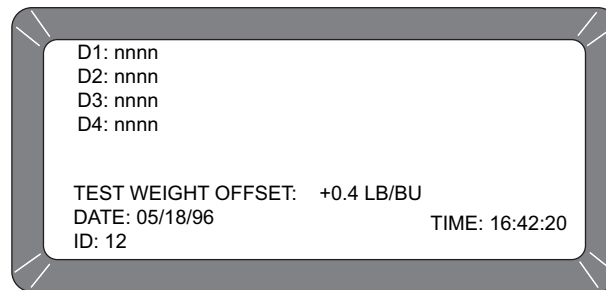
After the grain analysis finishes and the moisture content displays, the <more> appears in the lower right corner of the screen indicating another page is available. Press the **Next Page** key to view the calculated values (D1, D2, D3 and D4) determined from the grain measurement (refer to Figure 15). These values are relatively unimportant to the operator but are important to service personnel.

A general definition of each value is as follows;

- D1** - Conductance measurement to indicate grain surface moisture.
- D2** - Capacitance measurement to indicate internal grain moisture.
- D3** - Weight measurement to indicate grain weight.
- D4** - Temperature to indicate grain temperature.

Figure 15

Next Page Typical Calculated D-Values





GRAIN SELECTION

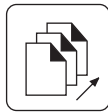
The second item on the MAIN menu is the SELECT GRAIN menu used to select specific grain types for testing. The SELECT GRAIN menu automatically appears for the first moisture test each time power is applied or can be selected anytime a different grain type is to be tested. After the first test, the SELECT GRAIN menu must be selected manually.

USING SELECT GRAIN MENU

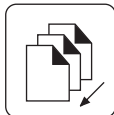
The GAC[®] 2100 G/GI stores up to 16 different grain calibrations.

To select a grain for testing:

1. Choose the SELECT GRAIN menu from the MAIN menu by pressing the 2 key. Page 1 of the SELECT GRAIN menu shows the first eight grain calibrations available. The lower left corner of the the screen displays the page number and the lower right indicates more pages (refer to Figure 16).
2. Press the **Next Page** key to advance to the next page. The next eight grain calibration names appear. The <MORE> prompt disappears.
3. Press the PREVIOUS PAGE key to move backward. The **Previous Page** key is the counterpart to the **Next Page** key.
4. Press the number key corresponding to the number adjacent to the desired grain. After selecting the grain, the GAC[®] 2100 G/GI automatically enters the MEASURE MOISTURE mode and retains this grain selection until a new grain is selected again or the power is turned off.



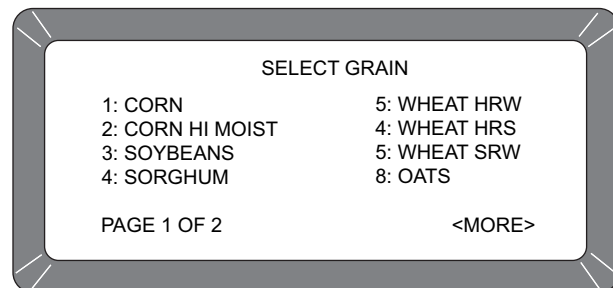
Next Page key



Previous Page key

Figure 16

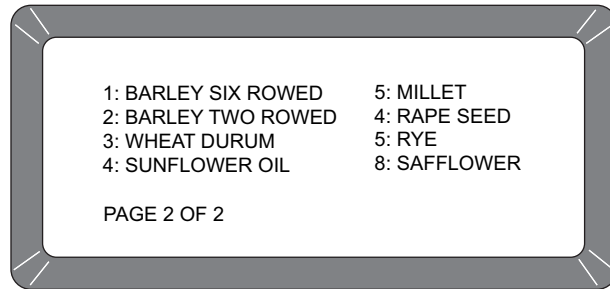
Select Grain Menus Page 1



5. Press the **Next Page** key to view the second page of eight grains as shown in Figure 17.



Figure 17
Select Grain Menus Page 2



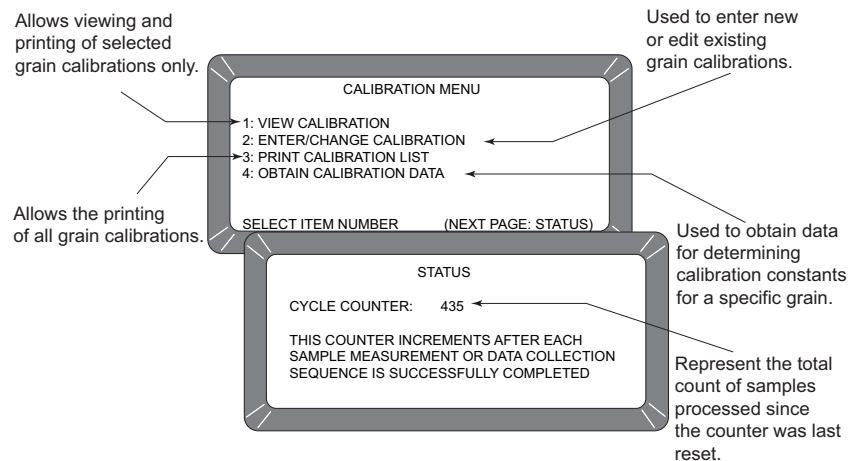
CALIBRATING PROCEDURES

The CALIBRATION MENU allows the operator or authorized personnel to:

- view the calibration constants of selected grains
- enter new or change existing calibrations
- print the entire list of stored grain calibrations
- obtain calibration data necessary to generate new calibrations.

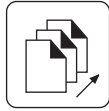
Selecting a function is achieved by pressing the number key corresponding to the desired function as shown in Figure 18.

Figure 18
Calibration Menu with Status Page

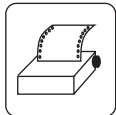


VIEWING CALIBRATION DATA (1 KEY)

The VIEW CALIBRATION menu allows viewing and printing of a selected grain calibration. (refer to Figure 19). Editing cannot be performed in this function.



Next Page key



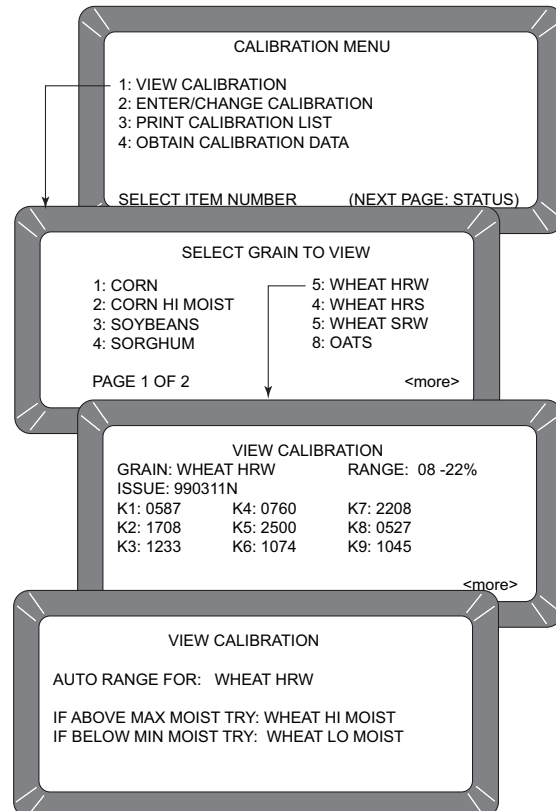
Print key

To View Grain Calibrations:

1. From the CALIBRATION MENU, choose VIEW CALIBRATION by pressing the 1 key. Page 1 of 2 pages of grains will be displayed.
2. Choose a grain calibration to view from the grain list and select the corresponding number key. Use the **Next Page** key to view page 2 of the grain listings.
3. The VIEW CALIBRATION screen shows the Grain Name, Moisture Range, Calibration Issue Date and the nine Calibration K values.
4. If a printer is connected, press the **Print** key to print out a copy of this screen. If AUTO RANGE is specified in the calibration, this information is also printed. The lower right corner of the VIEW CALIBRATION screen indicates <more> meaning another page is available.
5. Press the **Next Page** key to display the AUTO RANGE screen. The AUTO RANGE screen shows the grain name and calibrations automatically used to extend the moisture range if the normal maximum and minimum limits are exceeded. Separate grain calibrations or grains can be referenced for each limit.

Figure 19

View Calibration Menu Showing Wheat HRW





ENTERING/CHANGING CALIBRATION VALUES (2 KEY)

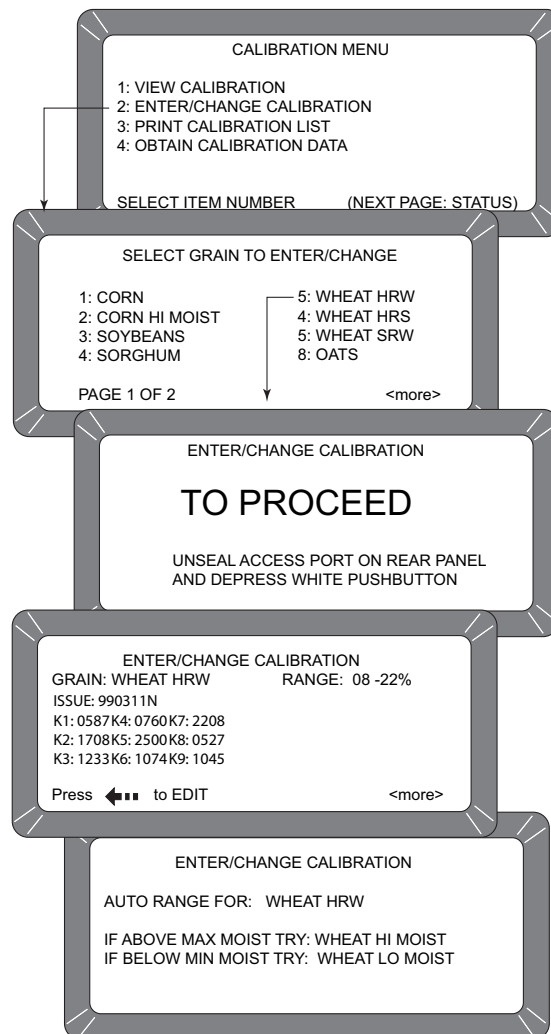
To Enter/Change Calibration Values:

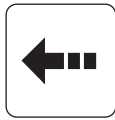
1. From the Calibration menu, press the 2 key to access the Enter/Change Calibration screen.
2. Select the grain to be altered or locate any empty position to enter a new calibration. Select the appropriate key corresponding to the listing. A screen will appear displaying TO PROCEED, UNSEAL ACCESS PORT ON REAR PANEL AND PRESS WHITE PUSHBUTTON. Refer to Figure 20 for additional information.

IMPORTANT: Do not perform this action unless you are authorized

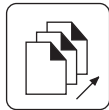
Figure 20

Changing Calibrations





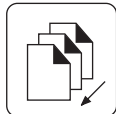
Backspace key



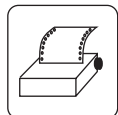
Next Page key



Enter key



Previous Page key



Print key

3. If selecting an existing calibration, a large flashing block will appear on the grain selection. The screen will display the current K values for that grain. The large flashing block signifies that alpha characters may be entered from the alpha screen. Pressing the **Backspace** key, as prompted on the bottom of the screen, causes the bottom prompt to disappear and the large flashing block to change to a cursor (flashing line). When the cursor appears, the alpha screen may be accessed by pressing the **Next Page** key. If numeric entries are desired, those values are made directly with the number keys.
4. Use the Alpha screen to enter a grain name (up to 16 characters). Press the **Enter** key after each character selection to place the character on the text line.
5. Press the **Previous Page** key to return to the Enter/Change Calibration screen. The new grain title is now in place.
6. Press the **Enter** key to accept the new grain title. The cursor will advance to the next position (Issue Date).
7. Enter the Calibration Issue Date (up to 8 characters) and press the **Enter** key. The cursor will return to a flashing block in the ISSUE position. The block signifies the date may include alpha characters (i.e. 15May06), but normally is entered as numbers in a format such as YYMMDD (i.e. 060515). Pressing the **Backspace** key will cause the flashing block to disappear, allowing the **Next Page** key to be used for selecting the Alpha screen.
8. Press the **Enter** key to accept the date. The cursor will appear as a line (flashing) under the first digit of K1 (constant). The flashing cursor (line) signifies this entry accepts only numbers.
9. Enter the K1 constant. When entering the first digit the remaining spaces are blank. All four digits of the constant must be entered when making a change. If more than four digits of the constant must be entered, a long beep will indicate an illegal entry.
10. When finished, press the **Enter** key to accept the constant and to advance to the next position. If the screen is accidentally advances before finishing, press the **Enter** key as many times as necessary to cycle through all menu items.
11. Enter K2 through K9 constants in the same manner as K1. Press the **Enter** key after entering each constant (4 digits).
12. Press the **Print** key to print the calibration. The present screen values will print.
13. Press the **Next Page** key to enter the Auto Range calibration selection. The Auto Range screen allows entry for grains using higher or lower moisture levels than the current calibration. These values are automatically selected if the grain moisture is outside the standard setting.
14. Press the **Backspace** key and choose a grain calibration to be used if the sample moisture is above the upper limit. After selecting a grain, the display will return to the Auto Range screen. Repeat this procedure again for the lower limit grain calibration.
15. Press the 0 (zero) key to delete either auto range calibration. Press the **Previous Page** key to return to the Grain Calibration screen.



PRINTING CALIBRATION GRAIN LIST (3 KEY)

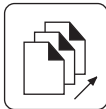
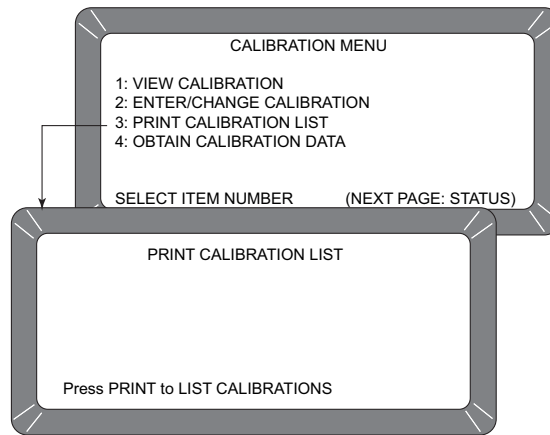
A printout of all grain calibrations stored in memory can be obtained by pressing the **Print** key (See Figure 21).

To Print a Calibration List:

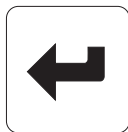
1. Press the 3 key from the CALIBRATION MENU. The PRINT CALIBRATION LIST screen will appear.
2. Press the **Print** key. The list of all grain calibrations will print.

Figure 21

Printing Calibration Lists



Next Page key



Enter key



Load key

OBTAINING BASIC CALIBRATION DATA (4 KEY)

This mode allows the user to generate data for developing grain calibrations. The samples used for calibration should span the desired moisture range.

In order to obtain good calibration data, the samples must be as evenly distributed throughout the moisture range as possible. The grain samples should extend at least 2% past each end of the desired moisture range, should contain no spoilage or condensation, and be free of broken pieces or foreign matter. The GAC[®] 2100 G/GI readings obtained may be sent to DICKEY-john to derive the calibration constants for the new grain.

To Obtain Accurate Calibration Constants:

1. Turn the GAC[®] 2100 G/GI power switch On and allow approximately thirty minutes to warm up before taking sample readings. Turn the printer On and confirm that the GAC[®] 2100 G/GI is setup and functioning properly.
2. From the MAIN menu, select the CALIBRATION MENU by pressing the 3 key. Then select OBTAIN CALIBRATION DATA by pressing the 4 key.
3. Enter a Sample Identification Number so the sample can be properly identified. Key in a sample ID number (use **Next Page** key if alpha ID desired). Press the **Enter** key.
4. Pour the sample into the hopper and press the **Load** key.



NOTE: The Facility Name and Location, Date/Time, GAC[®] 2100 G/GI Serial Number and CALIBRATION DATA only print when the first sample is run in this mode. Refer to Figure 23).

5. After the measurement cycle is complete, the screen displays four D values (refer to Figure 22). If using a printer, a printout automatically results. If a printer is not being used, record the D-values and sample ID.
6. Write the grain type under the CALIBRATION DATA. Write the actual moisture percentage of each sample (obtained by an accurate approved means) next to STD MOIST. Run additional samples.
7. Run as many samples as possible, making sure to write in the actual moisture percentage for each sample. After running each sample, press the UNLOAD key.

Figure 22
Obtaining Calibration Data

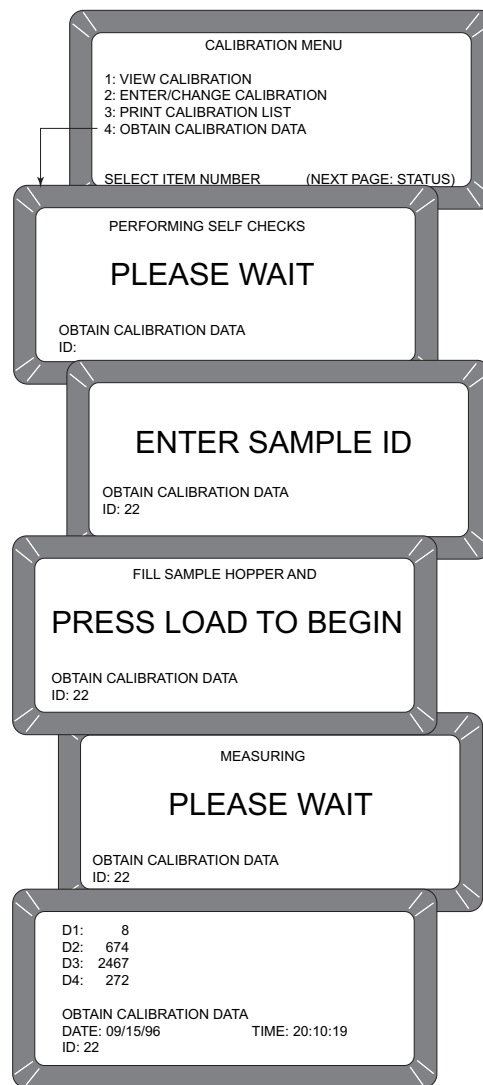




Figure 23
Calibration Data Printout

```
DICKEY-JOHN
10653

04/21/98 06:42:33

S/N: 1640-10653

CALIBRATION DATA

=====

ID:      1

STD. MOIST:

      D1:    0
      D2:   14
      D3:    2
      D4:  179

=====
```



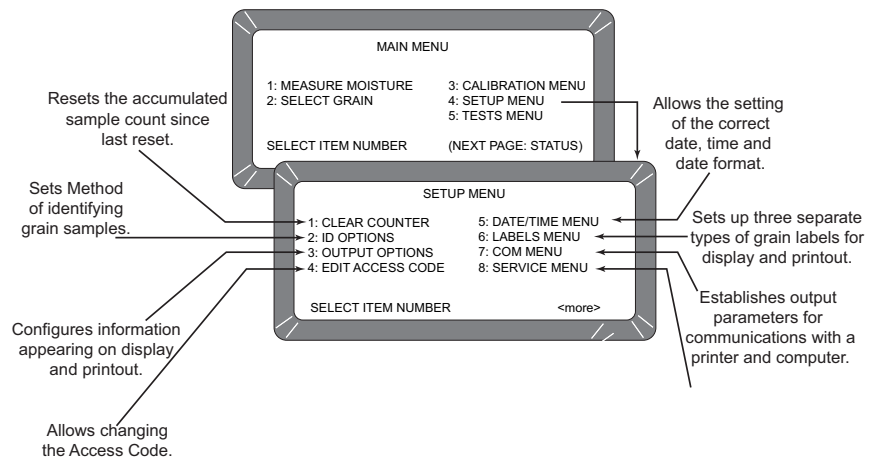
ESTABLISHING PARAMETERS

The SETUP MENU establishes basic operating parameters for the unit. These include resetting the cycle counter, ID options, output options, setting the access code, setting date and time, entering labels, and configuring communication ports.

From the MAIN menu, the SETUP MENU is accessed by pressing the 4 key (refer to Figure 24). From the SETUP MENU, eight sub-menus will appear. Most functions require the access code before changes can be made. If the access code has not been changed, the factory installed temporary code is set at 0 (zero).

Figure 24

Setup Menu Choices



Enter key

CLEARING THE CYCLE COUNTER (1 KEY)

The Cycle Counter increments once each time a moisture measurement or data collection sequence is successful. This screen displays the total counts accumulated since the last reset.

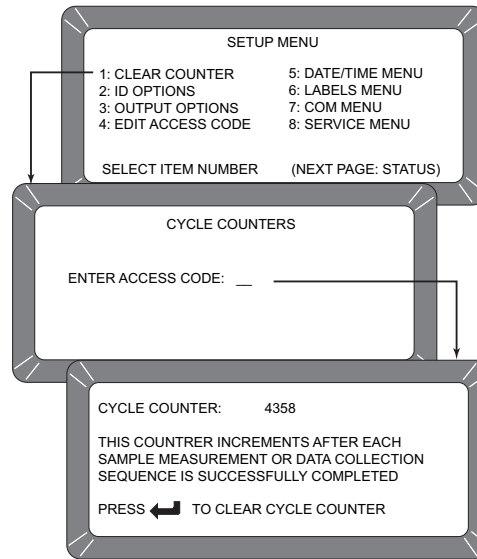
To reset the Cycle Counter:

1. From the SETUP MENU, press the 1 key as shown in Figure 25. A screen will appear displaying ENTER ACCESS CODE.
2. Enter the current personal access code (or 0) and press the **Enter** key. Enter 0, if the code has not been changed from the factory setting.
3. Press Enter again to reset the number (count) to zero. The counter will return to zero.

NOTE: The date, time, and cycle counter values are automatically sent to the COM1 and COM2 ports each time the counter is cleared, resulting in a printout of the most recently cleared counter contents. The printout should be retained for records.



Figure 25
Clearing the Cycle Counter



CHOOSING ID OPTIONS (2 KEY)

ID OPTIONS determine how each moisture measurement sample is identified on the output data. ID numbers appear in the lower left corner of each test result-screen. All sample ID numbers may contain up to 16 alphanumeric characters. Three methods of sample identification are available for display:

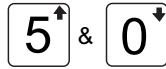
- **AUTOMATIC SEQUENTIAL ID** - Automatically increments once for each measurement cycle but resets each time power is turned off.
- **ENTER REQUIRED FOR ID** – With each measurement, a screen appears prompting ENTER SAMPLE ID before the grain sample can be measured. This option ensures the operator assigns a grain sample identification number/label for each test printout.
- **OPTIONAL ENTRY ID** – If both the above selections are checked NO, the ID number can be added to each measurement manually or not at all. Manually added ID numbers do not require any specific format or sequencing.

To configure ID Options:

1. From the SETUP MENU, press the 2 key to select the ID OPTIONS screen (refer to Figure 26). A screen will appear displaying ENTER ACCESS CODE.
2. Enter your personal access code (or 0) and press **Enter**. The ID OPTION screen displays only two lines but allows three choices – The AUTOMATIC SEQUENTIAL ID and ENTER REQUIRED FOR ID functions cannot both be enabled (YES) at the same time.



Enter key



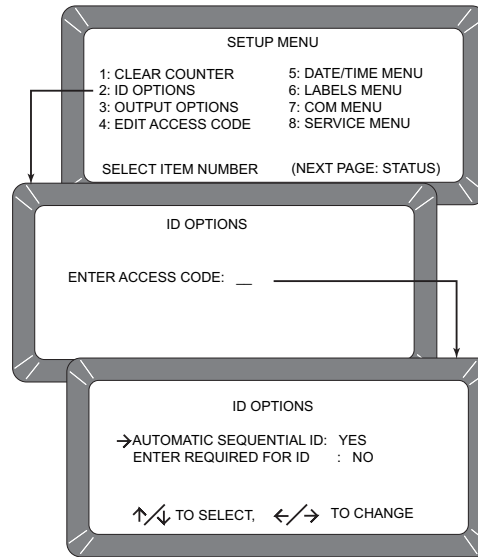
Up and Down keys



Left and Right keys

3. Select the desired function. Use the **Up/Down Arrow** keys (0 and 5 keys) to select and the **Left/Right Arrow keys** (1 and 3 key) to set the desired value. If both selections are set to NO, grain sample ID is optional by the operator for each test.

Figure 26
Selecting ID Options



CONFIGURING OUTPUT OPTIONS (3 KEY)

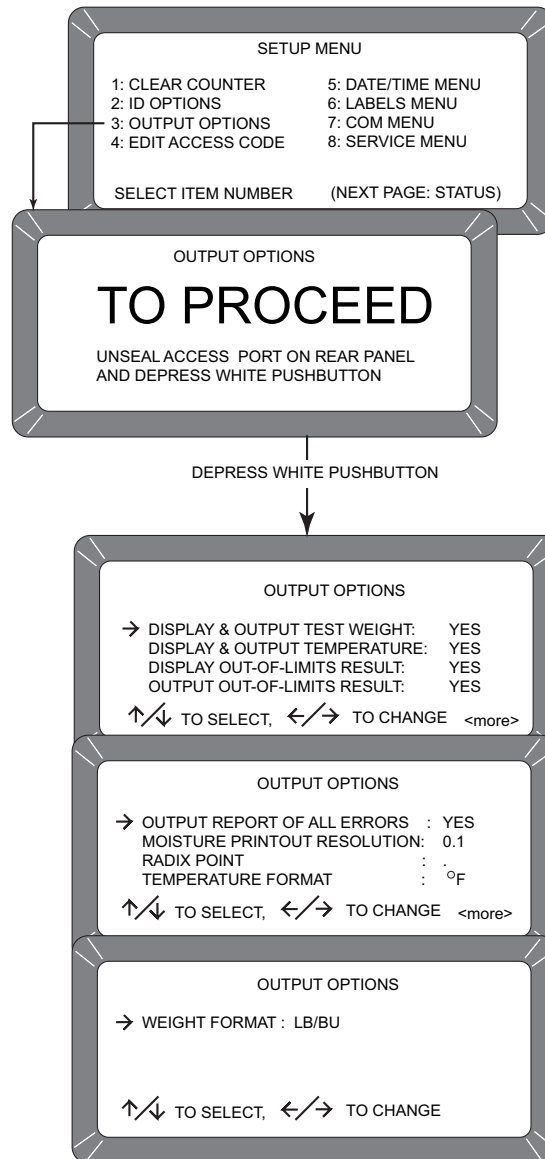
OUTPUT OPTIONS configure information appearing on the display/printer for the measured test results (refer to Figure 27). These selections are typically made once and not changed again but can be altered as necessary. These selections are only available to authorized personnel as outlined below.

To Change the Output Options:

1. From the SETUP MENU, select the OUTPUT OPTIONS (3 key). A screen will appear displaying instructions on how to proceed.
2. If access is authorized, locate and press the small white pushbutton under the sealed access panel at the rear of the unit. The panel is located in the lower left rear corner (viewed from rear) of the unit. The pushbutton is on the circuit board assembly inside the cavity.
3. Verify each option and set as necessary. Three pages must be verified as shown in Figure 27. Use **Up/Down Arrow** keys (0 or 5) to select functions and **Left/Right Arrow** keys (1 or 3) to set each function to the appropriate setting.



Figure 27
Setting Output Options



Options include:

- **DISPLAY & OUTPUT TEST WEIGHT:** Enables/disables (YES/NO) approximate grain test weight to display and print.
- **DISPLAY & OUTPUT TEMPERATURE:** Enables/disables (YES/NO) grain temperature to display and print.



- **DISPLAY OUT-OF-LIMITS RESULT:** Error messages flash on the display each time tested grain parameters exceed the normal range of that particular grain. If enabled, three standard parameters are displayed – moisture, grain temperature and approximate grain test weight. Each measured parameter value appears next to its respective legend on the display. The display out-of-limit options selected below establish whether or not the enabled values appear on the display. Eight separate settings are available for suppressing the enabled grain parameters.
 1. **YES** - Enabled readings display for all out-of-limit conditions.
 2. **NO** - Enabled readings do not display for any out-of-limit condition.
 3. **M** - Enabled readings display if moisture is out-of-limits but do not display if either weight and/or temperature is out-of-limits.
 4. **W** - Enabled readings display if weight is out-of-limits but do not display if either moisture and/or temperature is out-of-limits.
 5. **T** - Enabled readings display if temperature is out-of-limits but do not display if either weight and/or moisture is out-of-limits.
 6. **MW** - Enabled readings display if moisture and/or weight is out-of-limits but do not display if temperature is out of limits.
 7. **MT** - Enabled readings display if moisture and/or temperature is out-of-limits but do not display if weight is out-of-limits.
 8. **WT** - Enabled readings display if weight and/or temperature is out-of-limits but do not display if moisture is out-of-limits.
- **OUTPUT OUT-OF-LIMITS RESULT:** If enabled, three standard parameters are printed – moisture, grain temperature and approximate grain test weight. Each measured parameter value appears next to its respective legend on the printout. The output out-of-limit options selected establish whether or not the enabled values print. These choices are identical to the display out-of-limits conditions above and are selected in a similar fashion.
- **OUTPUT REPORT OF ALL ERRORS:** Enables all internal checked errors to print.
- **MOISTURE PRINTOUT RESOLUTION:** Selects the resolution to either one tenth (0.1) percent or one hundredth (0.01) percent for moisture printout.
- **RADIX POINT:** Selects a decimal point (.) or comma (,) to display and printout.
- **TEMPERATURE FORMAT:** Selects either degrees C (°C) or degrees F (°F) to display and print out for temperature.
- **WEIGHT FORMAT:** Selects either pounds per bushel (lb/bu) or kilograms per hectoliter (kg/hl) to display and printout.



NOTE: The access code is set to 0 when shipped from the factory. After selecting a different code, record the new number, and store for safekeeping. DO NOT lose the new code.



Enter key

CHANGING THE ACCESS CODE (4 KEY)

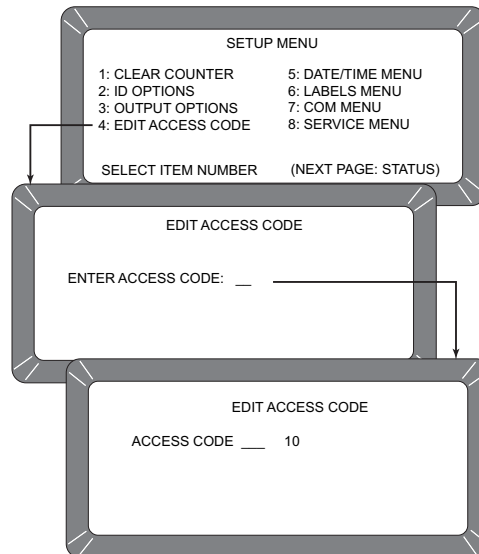
The Access Code establishes a security level for nearly all Setup Menu functions.

To change the access code:

1. From the SETUP MENU, select the EDIT ACCESS CODE (4 key). The screen will appear displaying ENTER ACCESS CODE.
2. Enter the present code (or 0 if still set for factory code) and press the **Enter** key. The EDIT ACCESS CODE screen will display a blank (to be filled in) and the present Access Code displays at right (refer to Figure 28).
3. Enter the new Access Code. Choose any numeric code up to 4-digits. Enter a number and press **Enter**. The new number must be used from this point forward to enter the access code level secured screens.

Figure 28

Changing the Access Code





CHANGING DATE, TIME AND DATE FORMAT (5 KEY)

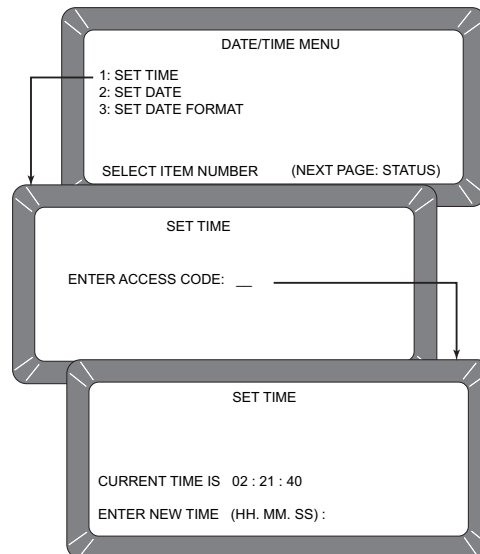
This function establishes correct date and time for display and print out with each grain moisture measurement.

To Set the Time:

1. From the SETUP MENU, select DATE/TIME MENU (5 key). Three options are available as shown in Figure 29:
 - SET TIME
 - SET DATE
 - SET DATE FORMAT

Figure 29

Setting Time



2. From the DATE/TIME MENU, select SET TIME using the 1 key. The SET TIME screen will appear and display ENTER ACCESS CODE.
3. Enter Access Code to gain access and press **Enter**. The time displays based upon a 24 hour clock.
4. Change the time by entering new numbers from the keyboard. The time format is in hours, minutes, seconds (HH.MM.SS). Each unit is two digits and separated by a decimal point. For example, to enter 3:32:59 P.M., enter 15.32.59. To separate use the decimal point. For accuracy, set the time slightly ahead and wait. At the exact time, press the **Enter** key to start the clock.



To change the date:

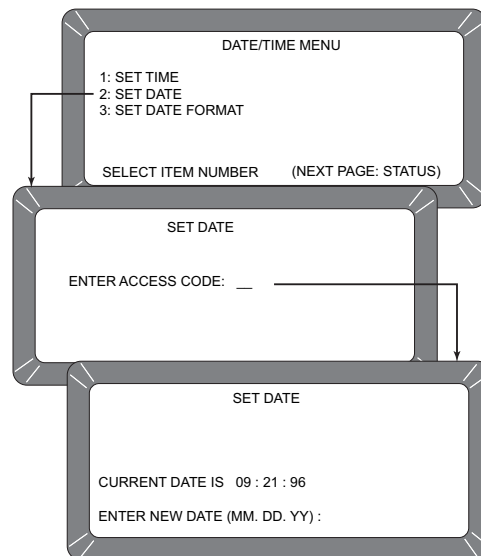


Enter key

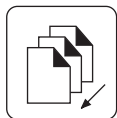
1. From the DATE/TIME MENU, select SET DATE by pressing the 2 key as shown in Figure 30. The SET DATE screen will display ENTER ACCESS CODE.
2. Enter the access code to gain access to the SET DATE menu and press the Enter key. Enter numbers in the format shown at the bottom of the display; Month.Day.Year. Each date component is two digits in length and separated by a decimal point (i.e. to enter 5/15/06, enter 05.15.06). The number will appear on the bottom left of screen. Press the **Enter** key to accept the corrected date.

Figure 30

Setting Date



Left and Right keys



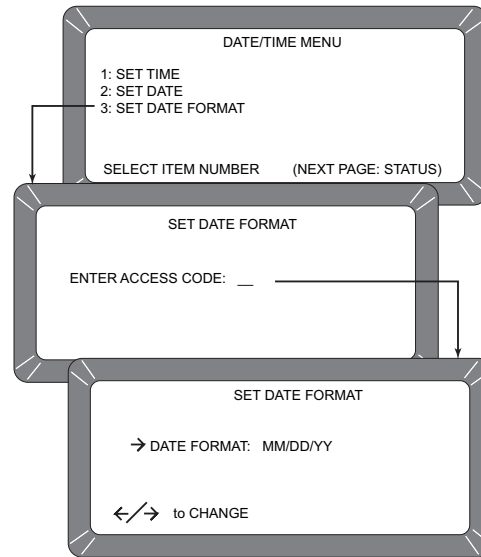
Previous page key

To Change the Date Format:

1. From the DATE/TIME MENU, select SET DATE FORMAT by pressing the 3 key (refer to Figure 31). The screen will display ENTER ACCESS CODE.
2. Enter Your Access Code to gain access to the SET DATE menu, then press the Enter key. Enter numbers in the format shown at the bottom of the display; Month.Day.Year. Each date component is two digits in length and separated by a decimal point (i.e. to enter 5/15/06, enter 05.15.06). The number appears on the bottom left of screen. Press the Enter key to accept the corrected date.
3. Press the left or right arrow keys (1 or 3) to select one of three formats. When finished, press the **Previous Page** key to accept the new format and return to DATE/TIME MENU. Press the **Previous Page** key once more to return to the SETUP MENU.



Figure 31
Setting Date Format



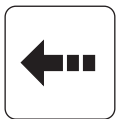
CHANGING THE LABELS (6 KEY)

The LABELS MENU allows editing of User Name and attaches to the grain moisture measurements. The basic procedure is outlined in the following five steps. Specific details and illustrations for each label follow the basic outline (refer to Figure 31).

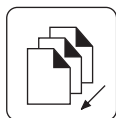
- **USER NAME** – appears on each measurement printout (not the display) and may be the organization's name. The User Name may be two lines and up to 16 characters each.



Enter key



Backspace key



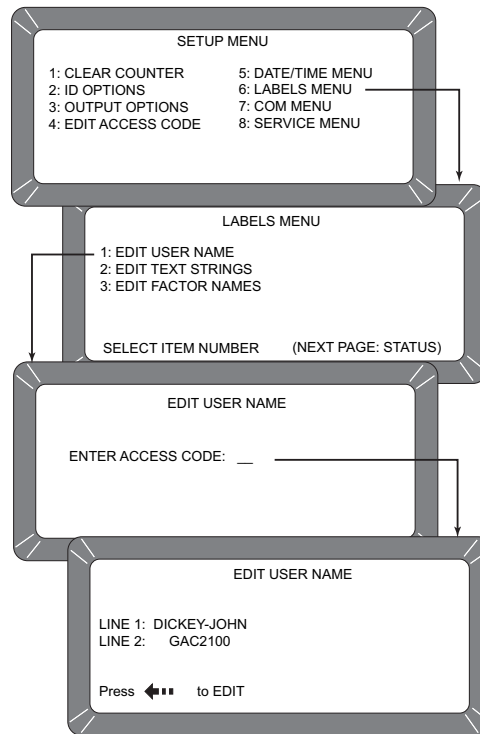
Previous Page key

To Create Labels:

1. From the SETUP MENU, select the LABELS MENU (6 key).
2. Select the desired label by pressing the key number next to the label type. The ENTER ACCESS CODE screen will appear on display.
3. Enter the access code and press the **Enter** key. For the User Name screen (refer to Figure 32), a large flashing block highlights the first character to be edited. Press the **Backspace** key as prompted in the lower bottom corner of the display. The prompt disappears and is replaced with a cursor (underline) beneath the first character of the first line.
4. Enter the selected characters/numbers to reflect the label. Numbers and letters may be mixed by using the alpha screen.
5. When completed, press the **Previous Page** key and return to the LABELS MENU.



Figure 32
Editing User Name

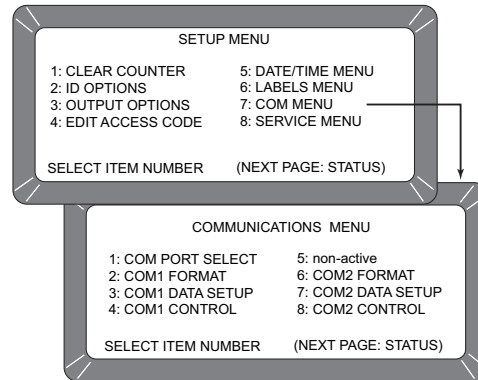


SETTING COMMUNICATIONS PORT PARAMETERS (7 KEY)

Selection of the COM (Communications) MENU is accessed through the SETUP MENU by pressing the 7 key. From this menu, the operator selects output parameters for communicating with external devices such as a PC computer and/or a printer. Two port connectors appear on the rear of the unit directly above the sealed access cover. The COM1 (Data Communications Equipment) port connector is above the COM2 (Data Terminal Equipment) port connector. The COM MENU contains eight items with number 5 nonactive (refer to Figure 33). Selections 2, 3 and 4 configure the COM1 port while 6, 7 and 8 configure the COM2 port. Each of the COM MENU items is edited in a similar fashion.

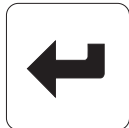


Figure 33
Accessing the COM Menu



To Configure the Communications Ports

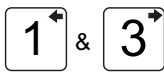
(Basic entry procedure – Follow-up to specific subject for finishing details):



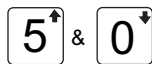
Enter key

1. From the MAIN menu, press the 4 key (SETUP MENU) followed by the 7 key (COM MENU). The COMMUNICATIONS MENU will appear with seven active choices and one nonactive selection.
2. Choose the desired function by pressing the key number next to the choice. The ENTER ACCESS CODE screen will appear.
3. Enter the access code and press the **Enter** key. The selected COM screen will appear for editing.
4. Proceed with the necessary editing. The selections are:
 - COM PORT SELECT
 - COM1 or COM2 FORMAT
 - COM1 or COM2 SERIAL DATA SETUP
 - COM1 or COM2 CONTROL LEAD SETUP

To Configure COM PORT SELECT press the 1 key from the COMMUNICATIONS MENU.



Left & Right keys



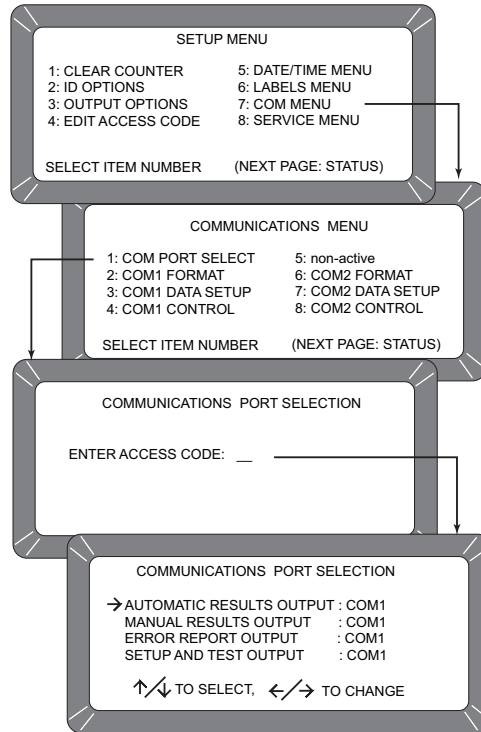
Up & Down keys

1. After completing Steps 1 through 4 from the basic entry procedure, edit the configuration. Four items appear on the menu for editing and configuring output information of both ports (COM1 and COM2). Each item can be set to NONE, COM1, COM2 or COM1/COM2 (both ports) using the **Left/Right Arrow** keys to cycle through the choices. The pointer in front of each item can be moved with the **Up/Down Arrow** keys.



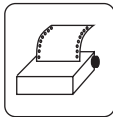
Figure 34

Accessing COM PORT SELECT

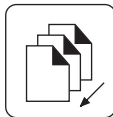


The four outputs are defined as follows (refer to Figure 34):

- **AUTOMATIC RESULTS OUTPUT** - the configured port produces an output to automatically printout the moisture results.
- **MANUAL RESULTS OUTPUT** - produces a printout for the configured port of the results by pressing the **Print** key. Repeatedly pressing the PRINT key results in duplicate copies.
- **ERROR REPORT OUTPUT** - the configured port produces a printout of errors occurring during internal self checks. Out-of-limit errors of measured results do not print.
- **SETUP AND TEST OUTPUT** - the configured port produces a printout of Setup and Test data by pressing the **Print** key.



Print key

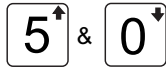


Previous Page key

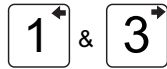
2. Once editing is complete, press the **Previous Page** key to return to the COMMUNICATIONS MENU and for the next selection.

To Configure COM1 or COM2 FORMAT press 2 or 6 key from the COMMUNICATIONS MENU):

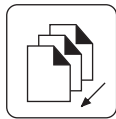
1. After completing Steps 1 through 4 from the Basic Entry Procedure above, edit the configuration. Both the COM1 FORMAT and COM2 FORMAT selections are similar and are described together. The COM FORMAT SELECTION Menu displays two lines each containing several choices as shown in Figure 35.



Up & Down Arrow keys



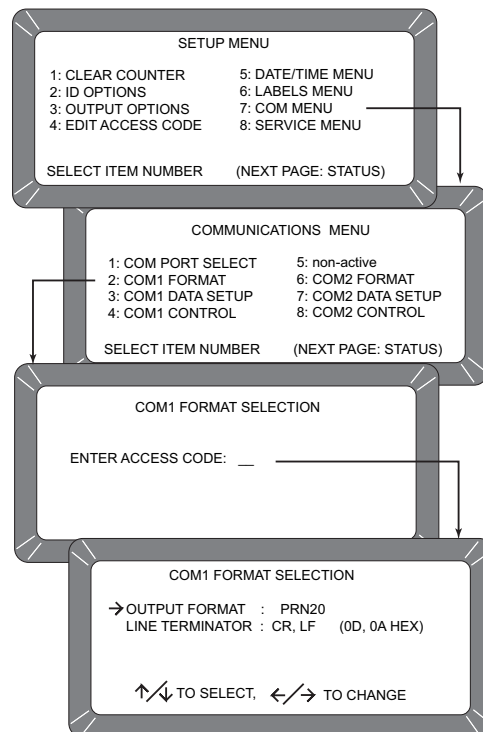
Left & Right Arrow keys



Previous Page key

2. Select the OUTPUT FORMAT using the pointer (refer to Figure 35). Place the pointer in front of the correct line with the **Up/Down Arrow** keys.
3. Edit the line by using the left/right arrow keys to cycle through six variations. Select the appropriate format from the following six choices.
 - PRN20 - Standard 20 column printer output.
 - PRN80 - Standard 80 column printer output.
 - ST20 - 20 column test output of printer parameters.
 - PRN81 - Standard 80 column printer output (2 lines).
 - CSV01 - Comma separated variables.
 - PRN21 - Special 20 column printer output. PRN 20 format with the Grain Calibration Date Code, Instrument Serial Number and D-values removed.
4. Select the LINE TERMINATOR with the pointer. An RS-232 line of input data must be terminated with one of the following characters or character pairs.
 - LF (Line Feed) 0A Hex
 - CR (Carriage Return) 0D Hex
 - LF + CR 0A, 0D Hex
 - CR + LF 0D, 0A Hex

Figure 35
Setting Output Format

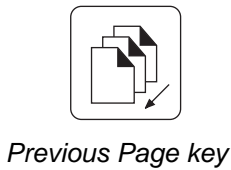
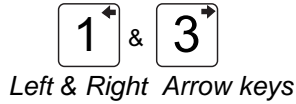


5. After editing is complete, press the **Previous Page** key to return to the COMMUNICATIONS MENU for the next selection.



To Configure COM1 or COM2 SERIAL DATA SETUP (3 and 7 keys from the Communications Menu):

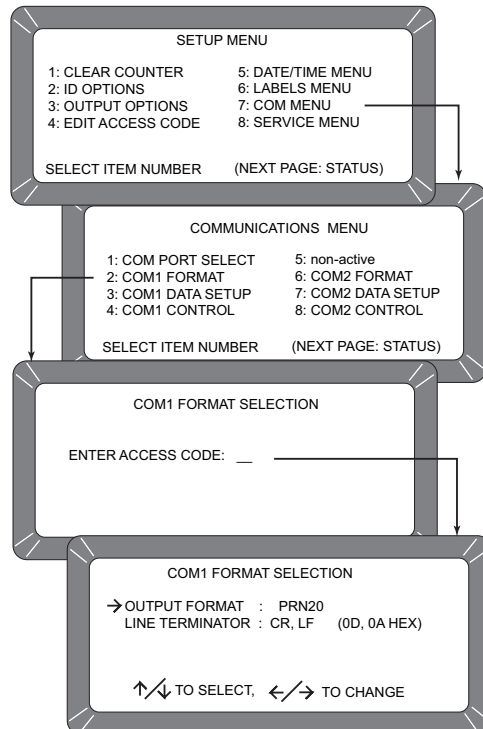
Both the COM1 and COM2 SERIAL DATA SETUP selections are similar and therefore described together.



1. After completing Steps 1 through 4 from the Basic Entry Procedure above, edit the configuration. Either of the COM SERIAL DATA SETUP Menus display four lines but only the top line (Baud rate) can be changed for the COM1 SERIAL DATA SETUP (refer to Figure 36). Select the baud rate line for the COM1 SERIAL DATA SETUP of the printer. Use the **Left/Right Arrow** keys (1 or 3 key) to cycle the Baud Rate through seven choices; 300, 600, 1200, 2400, 4800, 9600, and 19200 bits/ second. Choose the one that matches the rate of the equipment in use.
2. Select the DATA BITS, PARITY and STOP BITS in that order. These items for the COM1 port cannot be changed. The COM2 port items can be adjusted. Definitions of each item is as follows:
 - DATA BITS – Set for 7 or 8 bit character lengths.
 - PARITY – Set to NONE, EVEN or ODD via left/right arrow keys.
 - STOP BITS – Set to 1 or 2.

Figure 36

Accessing the COM1 Serial Data Setup Screen

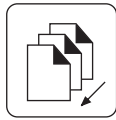


3. After editing is complete, press the **Previous Page** key to return to the COMMUNICATIONS MENU for the next selection.



To Configure COM1 or COM2 CONTROL LEAD SETUP (4 or 8 Keys from the CONTROL LEAD COMMUNICATIONS MENU):

Both the COM1 and COM2 CONTROL LEAD SETUP selections are similar and therefore described together in this procedure (See Figure 37). Differences are noted as applicable.



Previous Page key

1. After completing Steps 1 through 4 from the Basic Entry Procedure above, edit the configuration of the COM1 Port screen. The COM1 (DCE) CONTROL LEAD SETUP Menu displays two lines (See Figure 36, Accessing COM CONTROL LEAD SETUP Screens). The Busy Line, BUSY (11), notifies the GAC[®] 2100 G/GI when the buffer in the printer (computer) is full and cannot accept more data. The polarity of this line is important and is set to be compatible with the printer. The Control Lead Busy Sense has three polarity choices: IGNORE, ACTIVE (+) or ACTIVE (-). The DTR (20) (Data Terminal Ready) line notifies the GAC[®] 2100 G/GI that the printer (computer) is turned on. The Control Lead DTR Sense has two states: IGNORE or ACTIVE.
2. Edit the configuration of the COM2 Port screen. The COM2 (DTE) CONTROL LEAD SETUP Menu displays seven items (See Figure 36, Accessing COM CONTROL LEAD SETUP Screens) but only two lines can be changed.
 - RTS (4) : ON (+) or AUTO
 - DSR (6) : IGNORE or ACTIVE
3. After editing is complete, press the **Previous Page** key to return to the COMMUNICATIONS MENU for the next selection.



Figure 37
Accessing COM Control Lead Setup Screens

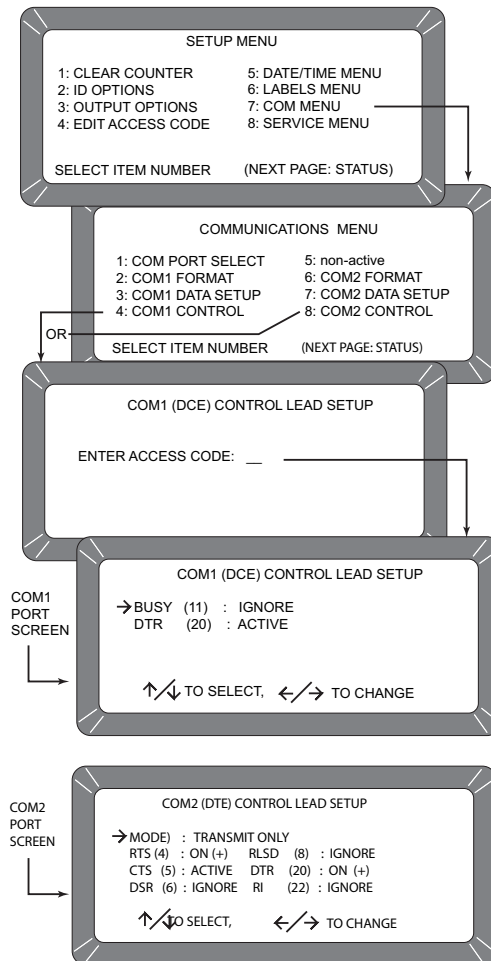


Figure 38
Common Acronym Definitions

BUSY – Line busy	DTR – Data Terminal Ready
CTS – Clear To Send	RI – Ring Indicator
DCE – Data Communications Equipment	RLSD – Receive Line Signal Detect
DSR – Data Set Ready	RTS – Request To Send
DTE – Data Terminal Equipment	RxD – Receive Data
	TxD – Transmit Data



Nonactive (5 Key from COMMUNICATIONS MENU)

The nonactive selection (refer to Figure 33) has no function and only emits a long beep when pressed. No other action results.

USING THE SERVICE MENU (8 KEY)

The SERVICE MENU contains individual unit calibration constants and is accessed by DICKEY-john trained and equipped service personnel.





TESTING UNIT PERFORMANCE

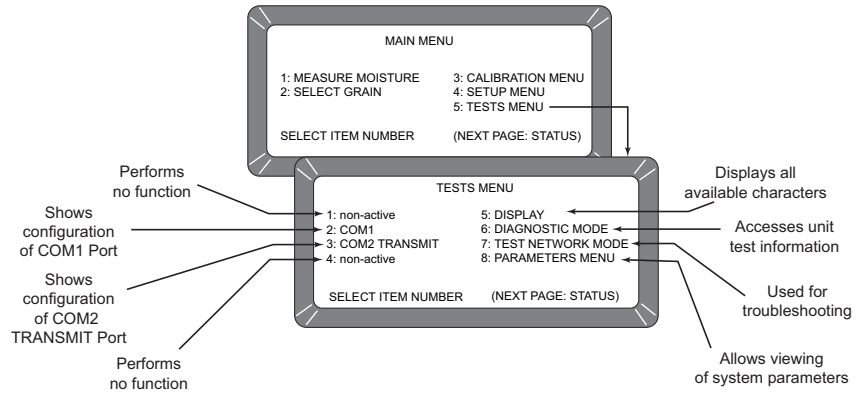
The TESTS MENU displays diagnostic tests and status information for operating values. The information is useful to technicians for overall performance evaluations and isolating problems. During normal operation, these are not generally referenced. However, problem identification can be assisted by reviewing certain values occasionally and observing changes. Most values cannot be edited but the contents can be printed for records. Also, while viewing the Factory Modes, earlier encountered errors stored in memory can be printed.

To access the TESTS MENU, press the 5 Key from the MAIN menu. The TESTS MENU appears showing eight choices as shown in Figure 39.

NONACTIVE KEYS

The 1 and 4 key selections are nonactive and have no function assigned. Pressing either key will only result in a audible beep. (Refer to Figure 39).

Figure 39
Entering the Tests Menu

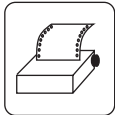




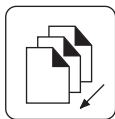
VIEWING COM1 PORT (2 KEY)

The COM1 TEST screen displays the configuration of the COM1 (communications) port. Values are set from the Setup Mode to match the driving device (i.e. printer) of the port.

To access the COM1 port:



Print key

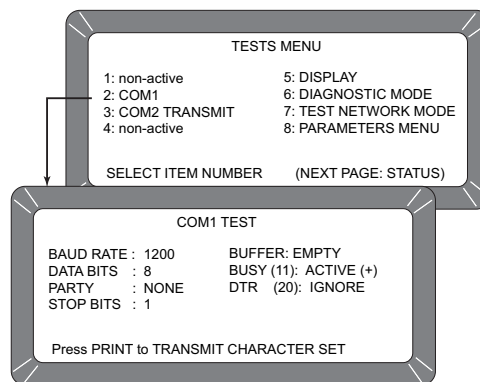


Previous Page key

1. Access the COM1 Menu by pressing the 2 key from the TESTS MENU (Refer to Figure 40). The COM1 TEST screen will appear displaying the COM1 Serial Data Setup status (BAUD RATE, DATA BITS, PARITY, STOP BITS) on the left half of the screen. The COM1 Control Lead Setup status displays on the right side displaying the Buffer Status. The BUFFER line indicates either BUSY or EMPTY.
2. Verify that a printer is connected and press the Print key to print a sample of the entire TRANSMIT CHARACTER SET. When completed, press the **Previous Page** key to return to the TESTS MENU.

Figure 40

Entering the Com1 Test Menu



VIEWING COM2 TRANSMIT PORT (3 KEY)

The COM2 TRANSMIT TEST screen displays configuration of the COM2 TRANSMIT port. Values are set from the Setup Mode to match the communicating device (i.e. computer) of the port.

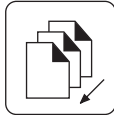
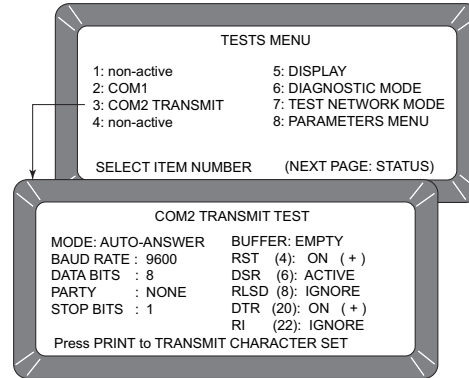
To configure the COM2 TRANSMIT port.

1. From the TESTS MENU, select COM2 TRANSMIT TEST using the 3 key (Refer to Figure 41). The screen displays the COM2 Mode, Serial Data Setup (BAUD RATE, DATA BITS, PARITY, STOP BITS), Buffer Status and the COM2 Control Lead Setup. If the buffer contains information, the line will indicate BUSY, otherwise EMPTY is indicated. Pressing the **Print** key produces a printout of the character set through the COM2 port. Press the **Previous Page** key to return to the TESTS MENU.



Figure 41

Entering the Com2 Transmit Test Menu



Previous Page key

VIEWING DISPLAY CHARACTERS (5 KEY)

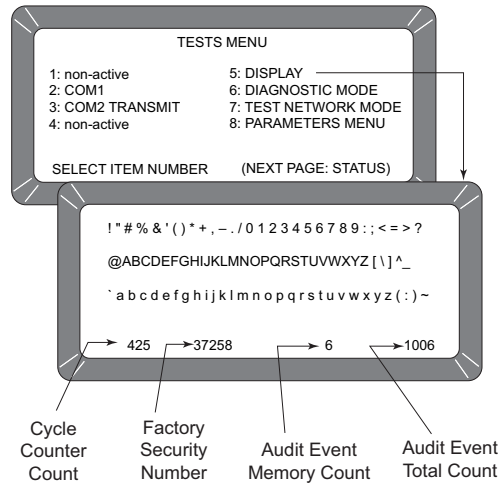
Typical characters are used to identify operator generated messages (Refer to Figure 42).

To access displayable characters:

1. From the TEST MENU, press the 5 key to select DISPLAY that shows available characters, symbols, and digits. After viewing, press the **Previous Page** key to return to the TESTS MENU.

Figure 42

Display Screen





VIEWING DIAGNOSTIC MODE (6 KEY)

The Diagnostic Mode accesses unit operating values. Most of these readout values relate to the test cell circuitry.

To access Diagnostic details:

1. Press the 6 key to enter the DIAGNOSTIC MODE (Page 1). Two pages of information are available as shown in Figure 43.
2. Press the number key next to each selection, one key at a time. Each value calculates and appears next to the line title. If the printer is connected, a printout of each result is automatically printed (Refer to Figure 44 for page 1 printout and Figure 45 for page 2 printout).

The meaning of each line is as follows:

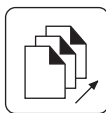
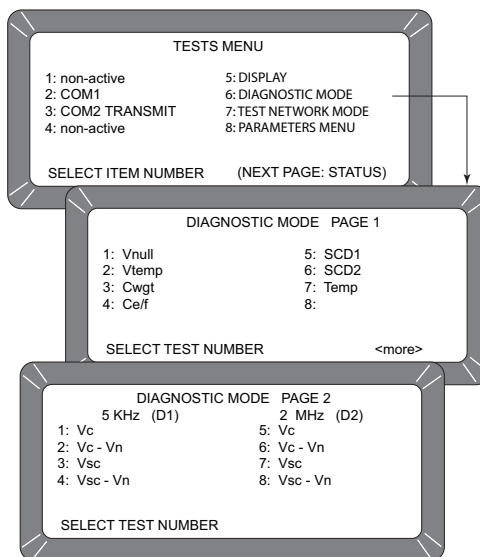
- **1: Vnull** - null voltage from cell board.
- **2: Vtemp** - temperature diode voltage from cell board.
- **3: Cwgt** - counts from weight oscillator.
- **4: Celf** - ratio of empty cell weight oscillator counts to full cell weight oscillator counts. When 4 key is pressed, item 3 blanks to recalculate. A message states PLEASE WAIT followed by PLACE WEIGHT ON CELL THEN PRESS ENTER. A test weight is placed on top of the test cell and then the Enter key is pressed. After a short wait, the results display.
- **5: SCD1** - D1 (conductivity) self-check - 379 ± 20 . When either the 5 or 6 key is pressed, these two items calculate.
- **6: SCD2** - D2 (capacitance) self-check- 2500 ± 20 .
- **7: Temp** - Computed cell temperature in degrees C.



Enter key

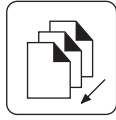
Figure 43

Diagnostic Mode Screens



Next Page key

3. Press the **Next Page** key to view Page 2 of the DIAGNOSTIC MODE. The display screen is divided into two columns; 5 kHz and 2 MHz (See Figure 43).



Previous Page key

5 kHz (D1) – Left half of screen

- 1: **Vc** - Voltage of 5 kHz oscillator.
- 2: **Vc-Vn** - Voltage of 5 kHz oscillator minus null voltage.
- 3: **Vsc**- Voltage of 5 kHz oscillator with on-board test network engaged.
- 4: **Vsc - Vn** - Voltage of 5 kHz oscillator with the on-board test network engaged minus null voltage.

2 MHz (D2) – Right half of screen

- 5: **Vc** - Voltage of 2 MHz oscillator.
- 6: **Vc - Vn** - Voltage of 2 MHz oscillator minus null voltage.
- 7: **Vsc** - Voltage of 2 MHz oscillator with on-board test network engaged.
- 8: **Vsc - Vn** - Voltage of 2 MHz oscillator with on-board test network engaged minus null voltage.

When finished, press the **Previous Page** key two times to return to the TESTS MENU.

Figure 44

Diagnostic Mode Page 1 Printout

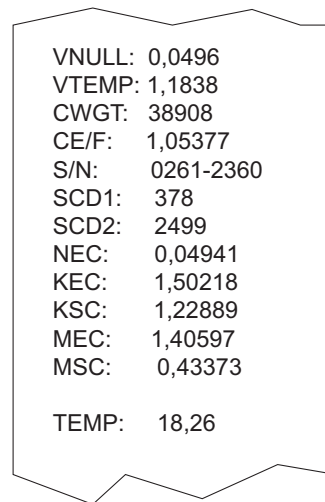
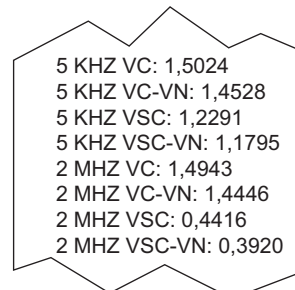


Figure 45

Diagnostic Mode Page 2 Printout





USING TEST NETWORK MODE (7 KEY)

This mode is used by trained authorized personnel in troubleshooting. The screens and printout are shown for reference only.

To Access the TEST NETWORK MODE:



Load key

1. Press the 7 key - TEST NETWORK MODE (See Figure 46). The message PLEASE WAIT will appear followed by the PRESS LOAD TO BEGIN.
2. Press the **Load** key to start the measuring cycle. When the test completes, the results display and automatically print if a printer is connected (See Figure 47).



Figure 46
Displaying Test Network Mode Results

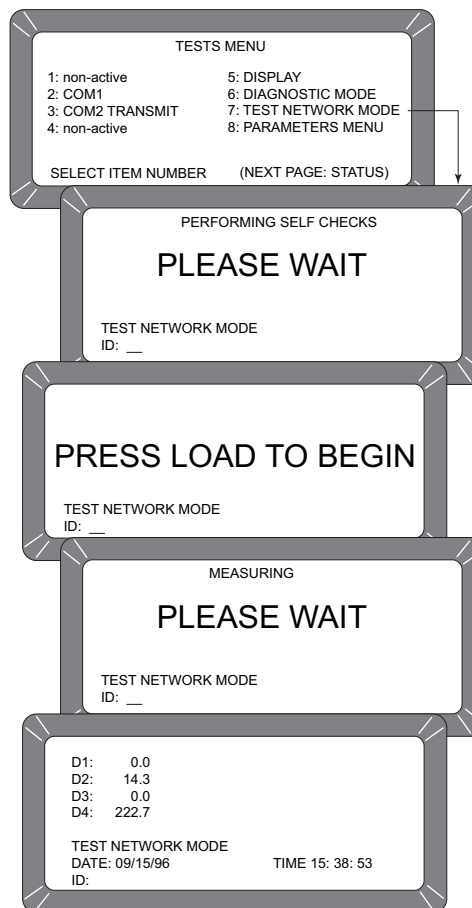
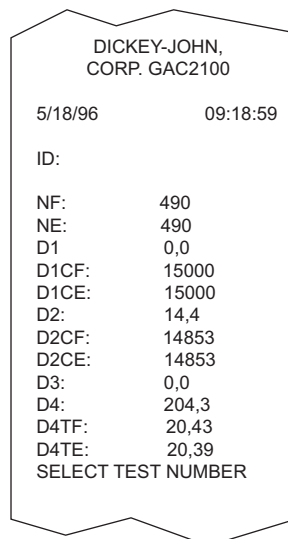


Figure 47
Test Network Mode Printout



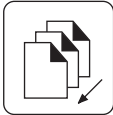


VIEWING/PRINTING PARAMETERS (8 KEY)

The PARAMETERS MENU (8 key) operates similar to the SERVICE MENU, located in the SETUP MENU. The major difference is the inability to edit values on these screens. However, the VIEW FACTORY MODE screen is useful in viewing the number of currently stored errors in memory.



Print key



Previous Page key

To view the PARAMETERS MENU:

1. Select the PARAMETERS MENU by pressing the 8 key from the TESTS MENU (See Figure 48). This menu allows the operator to view the unit parameters.
2. To print the values, select any menu and press the **Print** key. A printout of all the screens results (See Figure 49). Item 6 also prints all stored errors.
3. When finished viewing any screen, press the **Previous Page** key to return to the TESTS MENU.



Figure 48
Viewing Parameters Menu

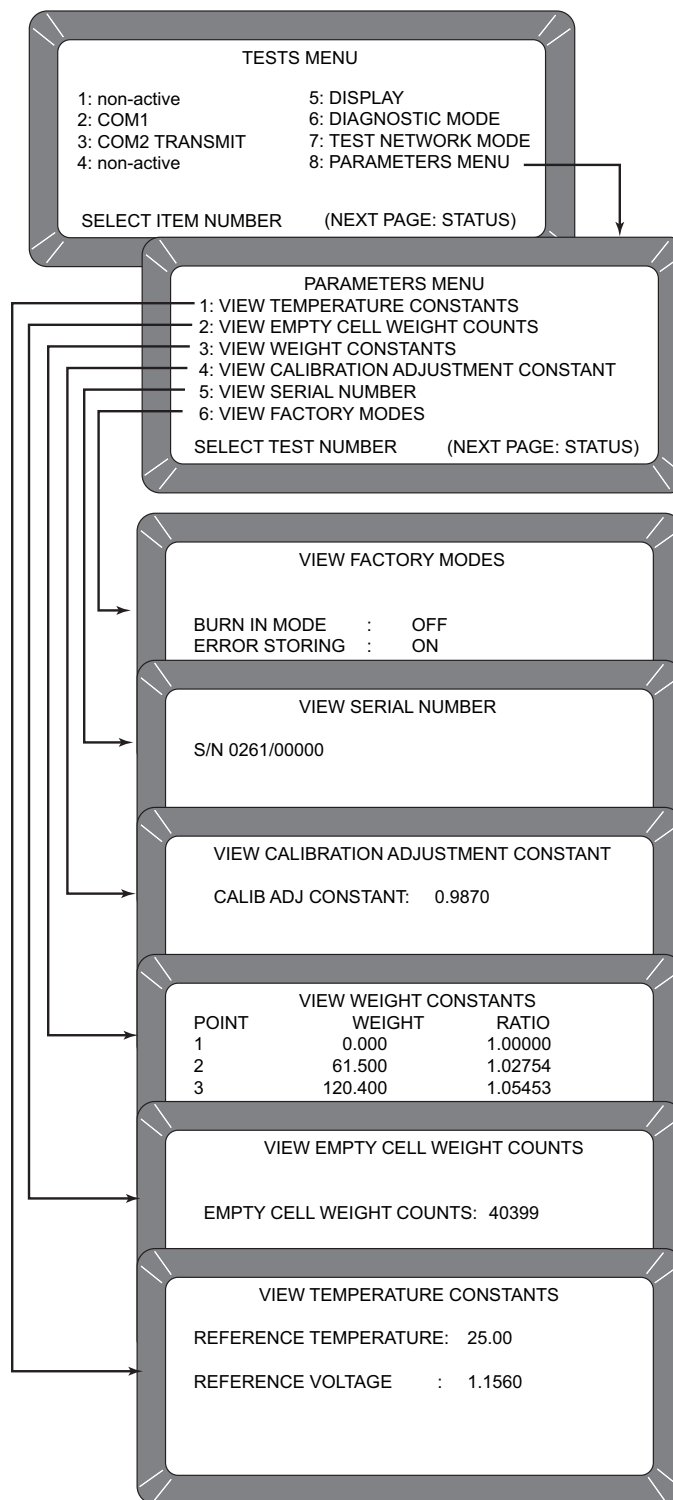




Figure 49
Parameter Values Printout

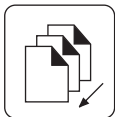
```
5/18/96      09:59:46
S/N: 0261-23601
REF TEMP: 25.00
REF VOLT: 1,1560
EC COUNT: 40399
WEIGHT TABLE:
1  0,0000  1,00000
2  61,500  1,02754
3 120,400  1,05453
4 181,800  1,08340
5 240,600  1,11179
6 300,300  1,14108
CAC: 1,0000
IC: 1122
BURN IN MODE: OFF
ERROR STORING: ON
CURRENT ERRORS
=====
ERROR 2
05/04/96 18:42:2
05/17/96 16:50:4
5
50134
SELECT TEST NUMBER
```



Load key



Unload key



Previous Page key

OPERATOR MAINTENANCE

CELL CLEANING – DAILY

1. From the MAIN menu press the 5-key to display the TESTS menu. Press the 6-key to display the DIAGNOSTICS menu.
2. At the DIAGNOSTICS menu, press the **Load** key. The hopper doors open and remain open until **Unload** is pressed.
3. Use the brush supplied in the accessory kit to clean the inside of the grain cell.
4. Slide the GAC® 2100 G/GI to the front of the worktable and remove the grain drawer. Reach up inside and very carefully clean the strike - off arm spring.

CAUTION

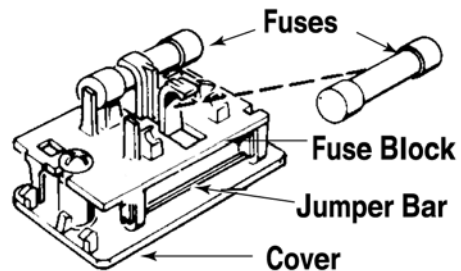
Before performing Step 5, ensure that all fingers or other foreign objects are not in the cell area.

5. Press the **Unload** key. The cell will rotate 180 degrees to dump the residue from the cell cleaning procedure. The hopper doors close. Pressing the **Previous Page** key twice returns the display to the MAIN menu.

FUSE REPLACEMENT

1. Disconnect the line cord from the rear of the unit. Using a small blade screwdriver or similar tool, remove the cover and fuse block assembly.
2. Replace the blown fuse with a 1 Amp Slo-Blo fuse (Fuse Size = 5mm (0.197") dia. x 20 mm (0.787") long).
3. Reinstall fuse block assembly and cover.

Figure 50







ERROR CODES

The GAC[®] 2100 G/GI contains a microprocessor to control the grain sample measurements and self-checks to determine the integrity of the internal electronics. If any limit is exceeded or malfunctions occur, an error code displays.

ERROR 1

Probable Cause:

The empty cell self check reading is out of limits.

Corrective Action:

Dump the cell and ensure it is empty.

ERROR 2

Probable Cause:

The empty cell weight reading is out of limits.

Corrective Action:

Dump the cell and ensure it is empty.

ERROR 3

Probable Cause:

The unload mechanism has malfunctioned.

Corrective Action:

Check the cell position and ensure it is free to operate.

ERROR 4

Probable Cause:

The strike-off mechanism has malfunctioned.

Corrective Action:

Ensure the cell and strike-off arm are free to operate.

ERROR 5

Probable Cause:

An invalid calibration is referenced.

Corrective Action:

Reselect the same grain or select a new grain and try again. If the condition continues, contact DICKEY-john Service Department.



ERROR 6

Probable Cause:

The moisture reading exceeds the upper limit.

Corrective Action:

Select a new grain and try again.

ERROR 7

Probable Cause:

The moisture reading exceeds the lower limit.

Corrective Action:

Select a new grain and try again.

ERROR 8

Probable Cause:

The empty cell ambient temperature has exceeded its limit.

Corrective Action:

Allow the GAC[®] 2100 G/GI to reach normal operating temperature.

ERROR 9

Probable Cause:

The sample temperature exceeds its limit.

Corrective Action:

Allow the sample to either cool down or warm up, then retry.

ERROR 10

Probable Cause:

The difference in temperature between empty cell ambient and full cell condition exceeds its limits.

Corrective Action:

Change the appropriate conditions and try again.

ERROR 11

Probable Cause:

Test weight exceeds stored average bulk density value by more than + 20 percent or -30 percent.

Corrective Action:

Use a more representative sample.



ERROR 12

Probable Cause:

A system memory error occurs.

Corrective Action:

Turn the power off for at least five seconds and then back on again. If the condition continues, contact DICKEY-john Service Department.

ERROR 13

Probable Cause:

An on-board RAM memory error has occurred.

Corrective Action:

Turn the power off for at least five seconds and then back on again. If the condition continues contact the supervisor.

ERROR 14 - NOT USED

ERROR 15

Probable Cause:

The real time clock battery is faulty.

Corrective Action:

Contact DICKEY-john Service Department.





APPENDIX A COMMUNICATION PORTS

COM1 PORT OPTIONS

The COM1 Port is a serial port conforming to the EIA/TIA RS-232-E standard and configured as Data Communication Equipment (DCE). Data out is RS-232-E levels and parity with adjustable format, data setup and control.

Function	Option	Hex
Output Format	PRM 20	
	PRN 80	
	TST 20	
	PRN 81	
	CSV 01	
Line Terminator	PRN 21	
	LF (Line Feed)	0A
	CR (Carriage Return)	0D
	LF & CR	0A, 0D
Data Setup and Baud Rate	CR & LF	0D, 0A
	300	
	600	
	1200	
	2400	
Control Busy	4800	
	9600	
	19200	
Control DTR	Ignore	
	Active (+)	
	Active (-)	
Control DTR	Ignore	
	Active	

COM1 PIN ASSIGNMENT DETAILS

COM1 is configured as Data Communication Equipment (DCE).

- **Protective Ground (pin 1)** – electrically connected to frame.
- **Received Data (pin 3)** – transmitted data from the GAC[®] 2100 G/GI.
- **Data Set Ready (pin 6)** – ON (positive voltage) whenever the GAC[®] 2100 G/GI is powered.
- **Signal Ground (pin 7)** – common reference for all other COM1 signals.
- **Received Line Signal Detector (pin 8)** – ON (positive voltage) whenever the GAC[®] 2100 G/GI is powered.



- **Busy (pin 11)** – gates the transmission of data from the GAC[®] 2100 G/GI. The COM1 CONTROL LEAD SETUP can be configured ACTIVE (+), ACTIVE (-) or IGNORE. When the line is inactive, up to 2048 characters are buffered. If not connected, configure this line as IGNORE.
- **Data Terminal Ready (pin 20)** – indicates the connected device is not available. The COM1 CONTROL LEAD SETUP screen configures this line as ACTIVE or IGNORE. If configured ACTIVE, an OFF condition (negative or zero voltage) inhibits the transmission of data from the GAC[®] 2100 G/GI. Results display but not buffered for output on COM1. If not connected, this line should be configured as IGNORE.

Pin Number	Designation	Signal Name	Direction
1	AA	Protective Ground	NA
3	BB (RxD)	Received Data	To Device
6	CC (DSR)	Data Set Ready	To Device
7	AB	Signal Ground	NA
8	CF (RLSD)	Received Line Signal Detector	To Device
11		Busy	To GAC2100
20	CD (DTR)	Data Terminal Ready	To GAC2100



COM2 PORT OPTIONS

Table 3. COM2 Programmable Options		
Function	Option	Hex
Output Format	PRM 20	
	PRN 80	
	TST 20	
	PRM 81	
	CSV 01	
	PRN 21	
Line Terminator	LF (Line Feed)	0A
	CR (Carriage Return)	0D
	LF & CR	0A, 0D
	CR & LF	0D, 0A
Data Setup Baud Rate	300 600 1200 2400 4800 9600 19200	
Data Bits	7 or 8	
Parity	None, Even, or Odd	
Stop Bits	1 or 2	
Control MODE	Transmit Only	
Control RTS	On (+)	
	Auto	
Control DRS	Ignore	
	Active	

COM2 PIN ASSIGNMENT DETAILS

COM2 is configured as Data Terminal Equipment (DTE).

Protective Ground (pin 1) – electrically connected to frame.

Transmitted Data (pin 2) – data is transmitted from this pin.

Received Data (pin 3) – data is received on this pin.

Request To Send (pin 4) – configured ON (positive voltage) whenever unit is powered or to be ON (positive voltage) only when there is data in the COM2 buffer to be transmitted. Use the COM2 CONTROL LEAD SETUP screen to configure this line.

Clear To Send (pin 5) – gates transmission of data from the GAC[®] 2100 G/GI. This line must be ON (positive voltage) to obtain data on COM2. If an appropriate signal is not available from the connected device, connect this pin directly to Request To Send (pin 4). When the line is inactive, up to 2048 characters are buffered.



Data Set Ready (pin 6) – notifies the GAC[®] 2100 G/GI that the connected device is not available. The COM2 CONTROL LEAD SETUP screen configures this line as active or ignored. If configured as active, an OFF condition (negative or zero voltage) inhibits the transmission of data from the GAC[®] 2100 G/GI. Results display but not buffered for output on COM2. If not connected, this line should be configured as ignored.

Signal Ground (pin 7) – common ground reference for all other COM2 signals.

Received Line Signal Detector (pin 8) – currently not used.

Data Terminal Ready (pin 20) – ON (positive voltage) whenever the GAC[®] 2100 G/GI is powered.

Ring Indicator (pin 22) – currently not used.

Table 4. COM1 Connector Pins Identification

Pin Number	Designation	Signal Name	Direction
1	AA	Protective Ground	NA
2	BA (TxD)	Transmitted Data	To Device
3	BB (RxD)	Received Data	To GAC2100
4	CA (RTS)	Request to Send	To Device
5	CB (CTS)	Clear to Send	To GAC2100
6	CC (DSR)	Data Set Ready	To GAC2100
7	AB	Signal Ground	NA
8	CF (RLSD)	Received Line Signal Detector	To GAC2100
20	CD (DTR)	Data Terminal Ready	To Device
22	CE (R1)	Ring Indicator	To GAC2100

Dealers have the responsibility of calling to the attention of their customers the following warranty prior to acceptance of an order from their customer for any DICKEY-john product.

DICKEY-john[®] WARRANTY

DICKEY-john warrants to the original purchaser for use that, if any part of the product proves to be defective in material or workmanship within one year from date of original installation, and is returned to DICKEY-john within 30 days after such defect is discovered, DICKEY-john will (at our option) either replace or repair said part. This warranty does not apply to damage resulting from misuse, neglect, accident, or improper installation or maintenance. Said part will not be considered defective if it substantially fulfills the performance expectations. THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES OF MERCHANTABILITY, FITNESS FOR PURPOSE, AND OF ANY OTHER TYPE, WHETHER EXPRESS OR IMPLIED. DICKEY-john neither assumes nor authorizes anyone to assume for it any other obligation or liability in connection with said part and will not be liable for consequential damages. Purchaser accepts these terms and warranty limitations unless the product is returned within fifteen days for full refund of purchase price.

**For DICKEY-john Service Department,
call 1-800-637-3302 in either the U.S.A. or Canada**



Headquarters:

5200 Dickey-john Road, Auburn, IL 62615
TEL: 217-438-3371, FAX: 217-438-6012, WEB: www.dickey-john.com

Europe:

DICKEY-john Europe S.A., 165, boulevard de Valmy, 92706 - Colombes - France
TEL: 33 (0) 1 41 19 21 80, FAX: 33 (0) 1 47 86 00 07