HM-400
HarvestData System
HDRB-DOS User's Manual

HarvestMaster, Inc.
1740 North Research Park Way
Logan, Utah 84341, USA
Phone: (435) 753-1881
Fax: (435) 753-1896

HM-400 Regular Bucket-DOS- Inv.#10232
Model # MA-HM-DOS

Printed in the U.S.A. July 28, 1999

Table of Contents

Chapter 1

Chapter 2

Chapter 3

Software

System Operation

Chapter 4

Chapter 5

Troubleshooting

Chapter 6

General Care and Warranty

Appendix A

Specifications

Appendix B

DataLink for DOS

Appendix C

MountingDiagram

Appendix D

Keyboard Commands & Menu Structure

Appendix E

System Control Cable

Fieldmaps Generated from ASCII

Appendix F

Windows 95 Installation

Appendix G

External Input Battery Pack

Appendix H

Index

Chapter 1
Introduction

This manual will guide you in installing and using your HarvestData System. The system is employed on combines to record the weight and moisture content of grains. A HarvestData System aids research scientists by automating data collection. It is designed for use by seed researchers, chemical treatment researchers, and combine operators.

Features

The HarvestData System is a powerful, custom-built unit. Major features are as follows:

- Simplified menu structure and menu control, with **"ESC"** key backing through menus one level at a time.
- Pop-up FUNCTION (**"FTN"**) helps.
- New, flexible field map generator.
- Display positional X-Y relocation upon entry of harvest mode, or with hot-key during harvest

.

- Menu selection for renaming field maps.
- Flexible setups for bucket and hopper operation, including door actuator signal timers.
- Automatic enable/disable of field printer.
- Enable/disable for hopper door operation on the fly (0 = disable).
- Weigh bucket retare margins are set by the user.
- Upload/download of system setup parameters to/ from a host computer (IBM PC Compatible).
- Diagnostics menu to assist in system checkout and trouble shooting.
- "Memory Available" item added to the menu.
- Choice of international language (English, French, German, Spanish) for prompts, selectable from the "INSTALL" menu, when the program is loaded to the hand held field computer.
- Keyboard entry of visual observations or notes, in addition to taking harvest data.
- Improved temperature compensation for zero drift of the moisture sensor.
- Improved moisture sensor curve editing.
- Upload/download moisture curves to/from a host computer (IBM PC Compatible).

- User selection of moisture curve when entering harvest mode with ability to change selection part way through the field map.
- Settable “freeze reading” timer for the moisture sensor.
- Rename (moisture) Curve” menu selection.
- Menu selection for moisture curve printing on the field printer.
- New “INSTALL” program.

The Field Computer

When the combine is running, the batteries of the hand held field computer charge from the combine’s electrical system. This prevents draining the hand held's battery during long usage on the combine.

Manual Override Switches

HarvestData System's override switches allow manual bucket control. Four switches are used for individual control of the bucket actuator(s). The fifth switch enables either the manual override switches or the hand held field computer to control bucket movement.

Electrical Transient Protection

HarvestData System's electrical transient protectors protect against voltage surges. They also protect the system from transient voltage spikes.

Dust-resistant Enclosure

The placement of the electronics and the printer in an enclosed environment provides a dust-resistant design for the system's components. This provides protection from dust and grain particles which could cause malfunctions in electronic and mechanical components.

How to Use this Manual

In this manual, keyboard commands are indicated using quotation marks that surround the key or keys to be pressed. For example, **"ENTER"** prompts you to press the Enter key, and a sequence such as **"BLUE", "□"** means press the blue function key followed by the right arrow key.

Note: The blue key on the Pro2000 Field Computer functions as a shift key on other hand held computers.

To execute any single-key command, simply press the designated key and release it. To execute commands that designate more than one key, press the first key; release it, and then press the next designated key. For example, to execute a **"BLUE", "□"** command, press the blue key once, release it, and then press the right arrow key.
In this manual, "select," means to scroll to an option using

the up or down arrow key and then press **"ENTER"**. An arrow on the screen moves from option to option as you scroll with the arrow keys.

Moving forward to the next screen or backward to the previous screen is easy. Just remember that **"ENTER"** is the key command that will take you to the next screen after you have made your selection(s) or entries or simply viewed the message on a screen. **"ESC"** normally takes you back to the previous screen.

Since different key commands are available at different screens, a listing of available key commands appear beside the screens they are associated with throughout this manual.

All direct instructions to the user are in bold print and follow a bullet box, as illustrated by the instruction below:

■ **Follow instructions in bold print.**

The following list gives definitions of the key commands and sequences available in the HarvestData System.

Keyboard Commands

ENTER: Accept individual value and move to the next item or step.

ESC: Escape to next higher menu, or back up to previous screen.

SPACE: Enter a space or blank in text.

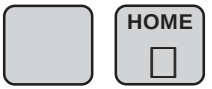
UP ARROW: Move cursor to previous entry/selection item within a screen.

DOWN ARROW: Move cursor to next entry/selection item within a screen.

LEFT ARROW: Delete previous character or step backward through available entries for a selection item.

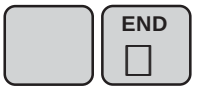
RIGHT ARROW: Step forward through available entries for a selection item.

BLUE, LEFT ARROW: Move to the first of the available entries for a selection item. (Press the **Blue** key once; release it, then press the **Left Arrow** key).



BLUE, RIGHT ARROW: Move to the last of the available entries for a selection item. (Press the **Shift** key once; release it, then press the **Right** Arrow key).

BLUE, UP ARROW: Move to the top of the menu item list.



BLUE, DOWN ARROW: Move to the bottom of the menu item list.

FUNCTION 1 (F1): "View Help" - provides user context sensitive help.

FUNCTION 2 (F2): "Pop-up Notes" - if a numerical or text variable is ACTIVE, but turned off (FTN 3), this key sequence allows user entry on a request basis.

FUNCTION 3 (F3): "On/Off Notes" - if numerical or text variables are "ACTIVE", this key allows the user to hide the variables temporarily if they don't need to be recorded.

FUNCTION 4 (F4): "Relocate" - when in harvest mode, this key pops up a field map and allows the user to reposition the data acquisition prompts to a new location in the field.

FUNCTION 5 (F5): "Advance Paper" - pulse the paper advance solenoid on the field printer.

BLUE, FUNCTION 6 (F6): "Retare Bucket" - when in harvest mode, selection of this function cycles the plot bucket and

records a new tare weight measurement for the weigh bucket and test chamber; and a new moisture zero.

BLUE, FUNCTION 7 (F7): "Edit Data" - when in harvest mode, this key sequence allows the user to edit harvest data.

BLUE, FUNCTION 8 (F8): "Show Version" - shows current version of the HarvestData System software.

BLUE, FUNCTION 9 (F9): "Set Backlight" - allows the user to turn the backlight on or off. Key in "Y" or "N" to turn the backlight on or off.

Chapter 2
Installation

This chapter explains in detail how to install your HarvestData System for the first time. If you purchased the system already installed, you can skip this chapter. It is important to follow the installation procedures in the order they are presented.

Requirements for Installation

If you have your weigh bucket(s) installed and ready, plan on 5 to 10 hours to complete the HarvestData System installation and checkout.

For ease of installation, make sure you have these tools on hand:

- A Phillips-head screwdriver
- A flat-blade screwdriver
- A 1/2" open-ended wrench
- A drilling template (See Appendix C)
- A drill with a 7/32" bit
- Two #28 x 1/4" eye bolts for each load cell

Components

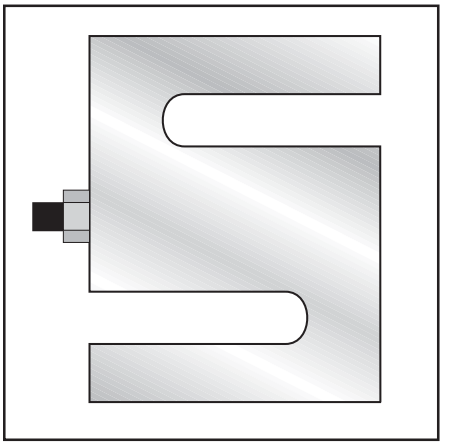
The basic unit of your HarvestData System is the control and conditioner unit (SCCU) with its console base (see Figure 2-3).

The console base accommodates the removable FieldBook data acquisition computer and (optionally) a HarvestData System FieldPrinter. Together, these components are referred to as the HarvestData System console.

You should have these system components:

- A system control cable (beige multi-conductor cable with a 37-pin connector on both ends.)
- A break-out box (brown panel with 7 connectors on the front and a 37 pin connector on the bottom).
- A power cable (black two-conductor cable with a two-pin connector on one end and bare wires on the other end).
- An S-shaped plot-weight load cell (see Figure 2-1). If you received two load cells, the one with the larger weight rating is the plot-weight load cell.

Figure 2-1
An S-shaped load cell.



- Four #10-32 x 1/2 threaded mounting bolts and nuts.
- A FieldBook hand held computer (see Figure 2-3).

Optional components may include:

- FieldPrinter (see Figure 2-3.)
- A second S-shaped test-weight load cell (see Figure 2-1). The test-weight load cell has a smaller weight rating than the plot-weight load cell.
- A 1", 3", or mini 4" grain moisture sensor (see Figure 2-2.)

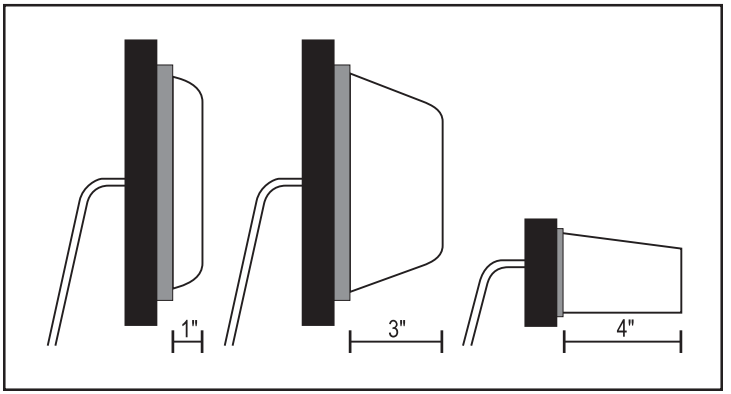


Figure 2-2
Three types of grain moisture sensors.

Also, with your FieldBook, you should have these items:

- HarvestData System manual and a diskette with DataLink DOS PC based support soft ware.
- Hand held computer operator's manual.
- PA-009 RS-232 communications cable.
- PW-WC110V AC wall mount charger or PW-WC220V AC Euro-plug wall mount charger.

■ Inventory the items to be installed.

You should have, at a minimum, all the items shown in Figure 2-3 (with the possible exception of the optional HarvestData System FieldPrinter).

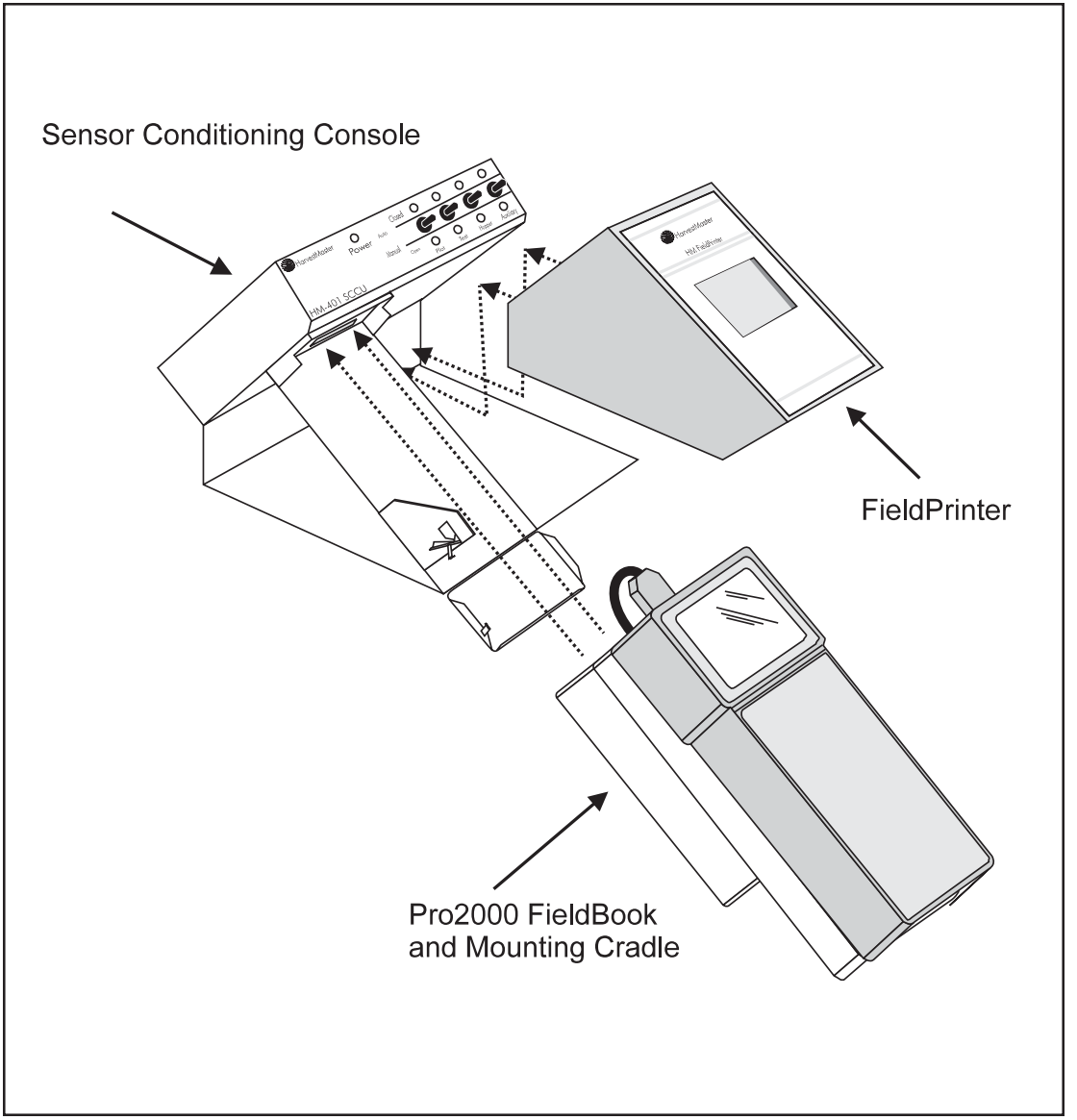


Figure 2-3
The HarvestData System Console. The FieldBook and HarvestData System FieldPrinter fit into the HarvestData System console base. The FieldPrinter is an optional component for convenient field use.

Supporting Hardware

Before installing the HarvestData System, you should have the following hardware items in place:

- A plot-weight bucket.
- Mounting points for the S-shaped load cells or other load cells should your implementation vary from the suspension shown.

Depending on your requirements, you may also need to have these items ready:

- A holding hopper for grain (cyclone or holding hopper).
- A moisture sensor chamber with a rectangular port in the side to accept the grain moisture sensor.
- A test-weight/moisture sensor chamber (When used, this will usually incorporate a mounting position for the grain moisture sensor).

Figure 2-4 illustrates placement of the two S-shaped load cells and the moisture sensor in a basic test-harvest system.

■ **Make sure the appropriate hardware is in place and ready for the load cells. This in cludes the plot-weight bucket and, if used, the test-weight/moisture sensor chamber.**

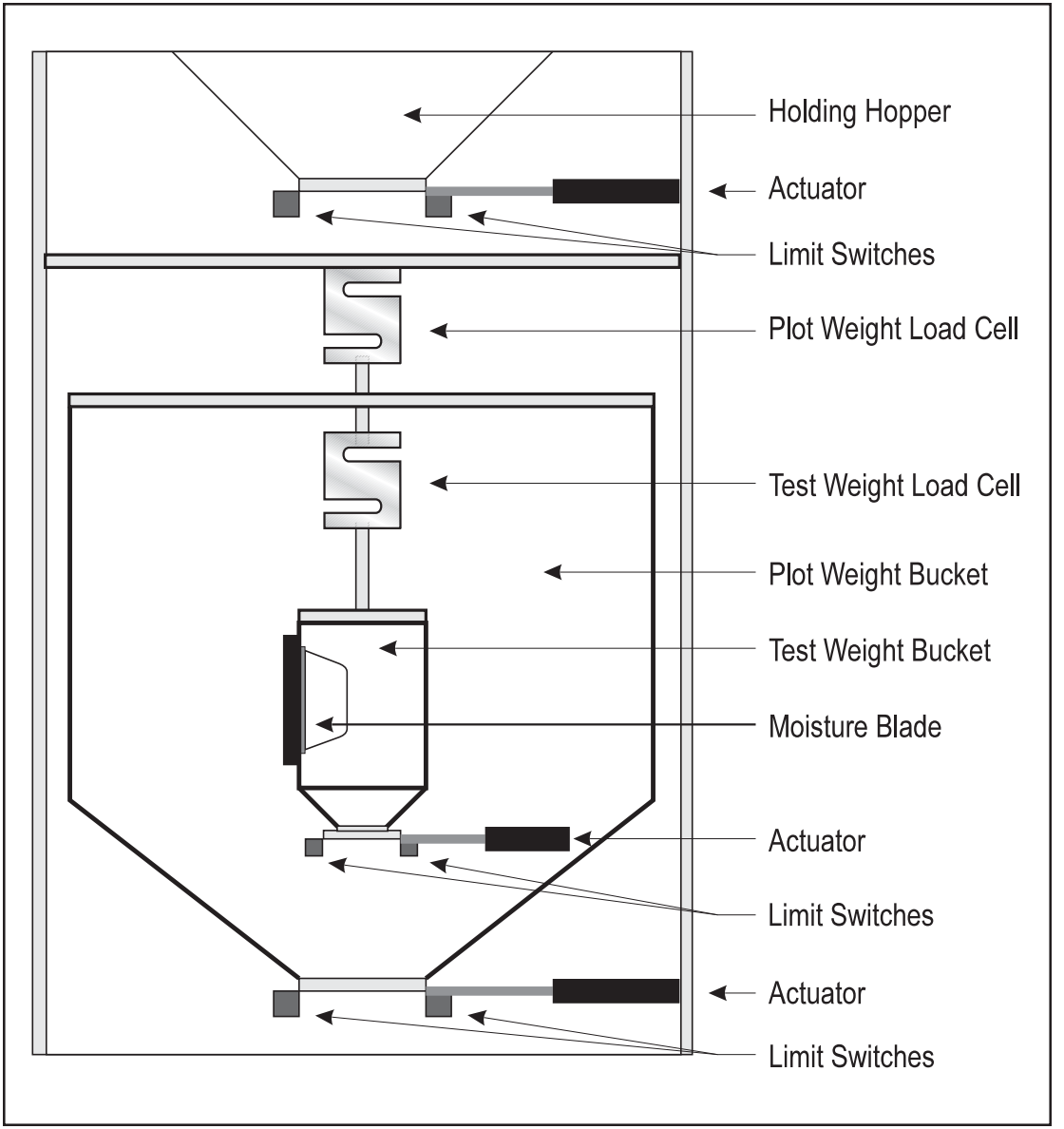


Figure 2-4
A Basic Test-Harvest System. This installation includes a test-chamber load cell as well as a plot-weight load cell; therefore, the assembly includes a test chamber. A moisture sensor is installed in the test chamber in this example.

How to Mount the Harvest Data System Console

We recommend that you mount your HarvestData System console on a flat surface. The location should be within arm's reach at a convenient height for the operator. The FieldBook screen needs to be positioned at an easily visible angle. The mounting hardware provided is designed for mounting to a surface that is 1/4" thick or less.

- **Select the location for the HarvestData System console.**

Follow these steps to mount the HarvestData System console on the combine:

- **Mark where you want the holes drilled on the equipment surface . (Please refer to the dimensioned mounting diagram in Figure 2-5 or Appendix C.)**
- **Drill four 7/32" mounting holes on the desired mounting surface.**
- **Position the HarvestData System console over the holes and securely tighten the mounting screws.**

Figure 2-5 illustrates this mounting procedure.

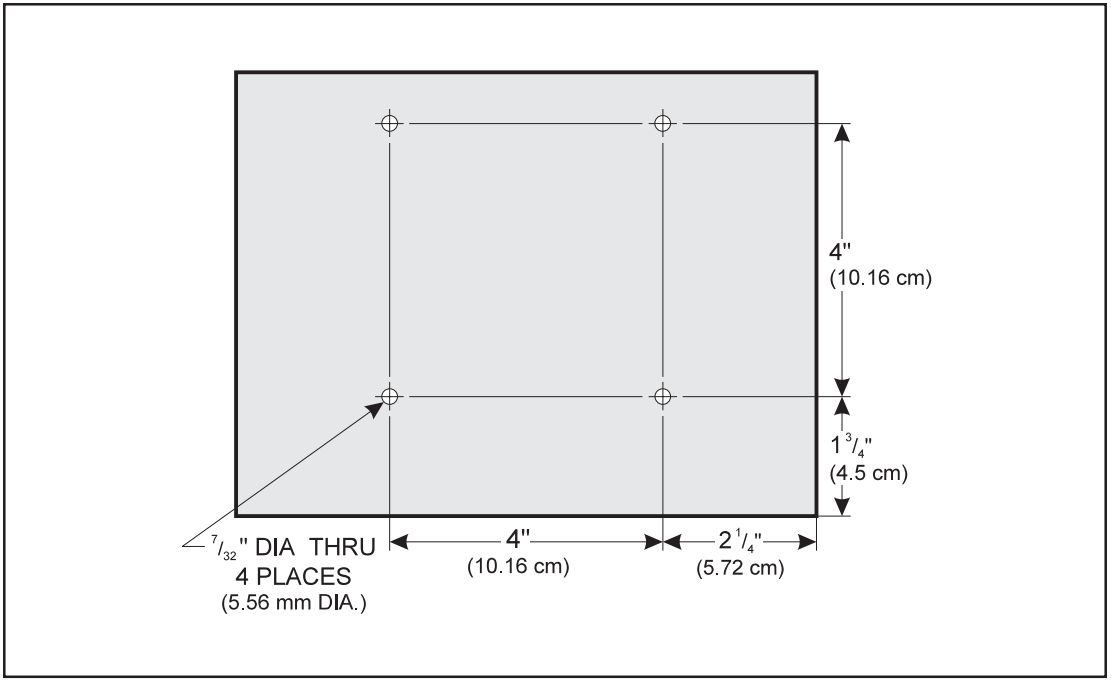


Figure 2-5
Bottom of the HarvestMaster Console. Secure the HarvestData System console base directly to the mounting surface using the four screw holes. The threaded mounting screws are #10-32 x 1/2. Nuts are included. Screw holes on the mounting surface should be 7/32" DIA.

How to Install the FieldBook

As you use your HarvestData System, you will probably remove and install the hand held computer on a daily basis.

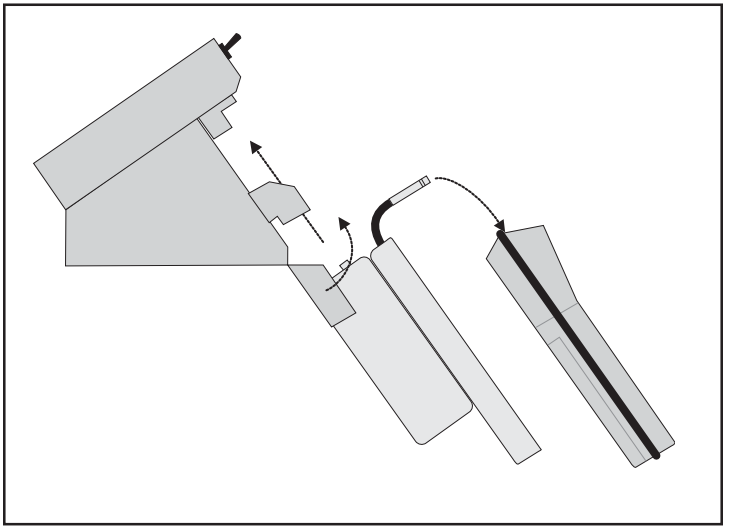


Figure 2-6 FieldBook Installation. When plugging the cradle into the HarvestData System console, be sure to open the drop-down door in order to mate the two connectors at the proper angle. This will avoid damaging them.

Before installing the cradle and hand held computer make sure the power is off. Then:

- **Release the latch on the left side of the SCCU console base to open the hinged drop-down door so that the console will easily receive the cradle (see Figure 2-6).**
- **Align the connectors located on the top of the cradle with the connectors in the SCCU console base.**
- **Push the cradle firmly up to mate with the connectors. (cont.)**

- **Secure the cradle by swinging the door up and snapping the latch on the left side shut.**

! Warning:

To avoid damaging the connector pins when installing or removing the cradle, always release the drop-down door and align the cradle connector directly with the connector in the HarvestMaster console base. Do not tilt the instrument at an angle for installation or removal to avoid opening the drop-down door. Make sure the connectors are mated. Do not force the connectors!

Note: Before installing the hand held, make sure the power is off, then:

- **Place the hand held computer on the mounting cradle (see Figure 2-6).**
- **Plug the 9-pin serial cable into the 9-pin comm. port #1 on the hand held.**
- **Secure the hand held computer in place.**

Connecting the Actuator Control Lines

Actuators control the holding hopper, plot-weight bucket, and test and auxiliary chamber doors. Different manufacturers have various types of mechanisms for opening/closing these doors. Some combines have electromechanical linear or windshield wiper actuators without limit switches, while others require limit switches. Combines with hydraulic actuators or pneumatic actuators may or may not use limit switches.

- **Refer to the applicable section on the fol lowing pages to install the motor control lines.**

Electromechanical Linear Actuators

- **Locate the 6 ft multi-conductor actuator control cable.**
- **Refer to your actuator manufacturer's specifications to determine the location of the positive and negative terminals on the actuator mechanism.**
- **Connect all actuators (maximum of three) according to Table 2-1.**
- **Run the cable to the location of the break-out box. Insert the connector end of the actuator cable into the actuators socket of the break-out box and twist the locking ring until it is secu**re.

Table 2-1
Electromechanical Linear Actuator Cable Connection

Connector Pin Number	System Control Cable Pin Number	Cable Wire Color	Signal	Actuator Connection
1	1	Red	close plot	plot bucket ctrl voltage (+)
2	2	Black	open plot	plot bucket ctrl voltage (-)
3	3	Green	close test	test bucket ctrl voltage (+)
4	4	Brown	open test	test bucket ctrl voltage (-)
5	5	Blue	close hopper	hopper bucket ctrl voltage (+)
6	6	White	open hopper	hopper bucket ctrl voltage (-)

Pneumatic Actuators

- **Locate the 6 ft multi-conductor actuator control cable.**
- **Refer to your actuator manufacturer's specifications to determine the location of the positive and negative terminals on the actuator mechanism.**
- **Connect all actuators (maximum of three) according to Table 2-2 below.**
- **Run the cable to the location of the break-out box. Insert the connector end of the actuator cable into the actuators socket of the break-out box and twist the locking ring until it is secure.**

Table 2-2
Pneumatic Actuator Connection

Connector Pin Number	System Control Cable Pin Number	Cable Wire Color	Signal	Actuator Connection
1	1	Red	close plot	plot close terminal
2	2	Black	open plot	plot open terminal
3	3	Green	close test	test close terminal
4	4	Brown	open test	test open terminal
5	5	Blue	close hopper	hopper close terminal
6	6	White	open hopper	hopper open terminal

Windshield Wiper Motors

- **Locate the 6 ft multi-conductor actuator control cable.**
- **Connect all actuators (maximum of three) according to Table 2-3 below.**
- **Run the cable to the location of the break-out box. Insert the connector end of the actuator cable into the actuators socket of the break-out box and twist the locking ring until it is secure.**

Table 2-3
Windshield Wiper Motor Connection

Connector Pin Number	System Control Cable Pin Number	Cable Wire Color	Signal	Actuator Connection
1	1	Red	close plot	plot park terminal
2	2	Black	open plot	plot low terminal
3	3	Green	close test	test park terminal
4	4	Brown	open test	test low terminal
5	5	Blue	close hopper	hopper park terminal
6	6	White	open hopper	hopper low terminal

Connecting the Limit Switches

If your plot-weight bucket's actuator does not require limit switches, this section is not applicable to you. Generally, pneumatic and hydraulic actuators do not require limit switches for operation. However, you may wish to install limit switches to give the operator an open/closed indication on the HarvestData System Console lights even if your system does not require them for operation.

If each of your doors have two limit switches (e.g. electromechanical actuators):

- **Connect the wire indicating the door is open to the limit switch that is activated when the door is open.**
- **Connect the wire indicating the door is closed to the limit switch that is activated when the door is closed.**
- **Connect the ground wire to the common terminal of both limit switches.**
- **Run the cable to the location of the break-out box. Insert the connector end of the actuator cable into the actuators socket of the break-out box and twist the locking ring until it is secure.**

Refer to Table 2-4 to connect the wiring for electromechanical linear actuators. Table 2-4 presents a configuration of two limit switches. Refer to table 2-5 to connect the wiring for windshield wiper motors. *Appendix E* gives instructions for connecting the wires.

Table 2-4
Electromechanical Linear Actuator Limit Switch Connection

Connector Pin Number	System Control Cable Pin Number	Wire Color	Signal	Actuator Connection
1	7	Red	plot open	to limit switch activated when plot door is open
2	8	Black	plot closed	to limit switch activated when plot door is closed
3	22	Green	plot ground	to ground of both plot limit switches
4	9	Brown	test open	to limit switch acivated when test door is open
5	10	Blue	test closed	to limit switch activated when test door is closed
6	22	White	test ground	to ground of both test limit switches
7	27	Orange	hopper open	to limit switch activated when hopper door is open
8	28	Yellow	hopper closed	to limit switch activated when hopper door is closed
9	22	Purple	hopper grnd	to ground of both hopper limit switches

If you only have one limit switch, determine whether the door strikes the limit switch when it is open or closed.

- **If the door strikes the limit switch when opening (e.g., windshield wiper motor actuators):**

- **Connect the plot-weight bucket open wire to the limit switch.**

- **Connect the ground to the limit switch on the common terminal.**

- **Clip off the plot-weight bucket closed wire.**

- **Run the cable to the location of the break-out box. Insert the connector end of the actuator cable into the actuators socket of the break-out box and twist the locking ring until it is secure.**

Refer to Table 2-5 for windshield wiper motors. Table 2-5 presents a configuration of one limit switch. *Appendix E* gives instructions for connecting the wires.

Table 2-5
Windshield Wiper Limit Switch Connection

Connector Pin Number	System Control Cable Pin Number	Wire Color	Signal	Actuator Connection
1	7	Red	plot open	to plot door limit switch
2	8	Black	NA	not connected
3	22	Green	plot ground	limit switch common terminal
4	9	Brown	test open	to test door limit switch
5	10	Blue	NA	not connected
6	23	White	test ground	test limit switch common terminal
7	27	Orange	hopper open	to hopper door limit switch
8	28	Yellow	NA	not connected
9	22	Purple	hopper grnd	hopper limit switch common terminal

Table 2-6
Auxiliary Connection

Connector Pin Number	System Control Cable Pin Number	Wire Color	Signal	Actuator Connection
1	23	Red	aux (+)	auxiliary bucket ctrl voltage (+)
2	24	Black	aux (-)	auxiliary bucket ctrl voltage (-)
3	20	Green	aux open limit switch	to limit switch activated when plot door is open
4	21	Brown	aux close limit switch	to limit switch activated when plot door is closed
5	11	Blue	+12VM	low current excitation
6	22	White	GND	ground

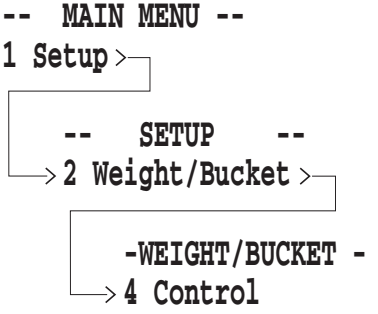
The auxiliary connector is normally not used. If there is another actuator or special function that you would like to control, it is possible by wiring it to this port. An extra 6 ft. of multiconductor control cable is required to do this.

The HarvestData script file will need to be modified for proper operation. Please consult with a HarvestMaster Customer Service Representative for a quote on your specific modification.

! Important:

When limit switches are used with the 401 SCCU to cut out actuator power at the end of the stroke, the following must be observed in order for them to operate.

"Limit Switch" must be selected ("Yes") in the "Control" Menu.



The limit switch must be wired properly. Limit switches are normally closed to ground. The limit switch signal is pulled to +5 volts inside the SCCU via a 100 K resister. The limit switch signal at 5 volts inhibits it's actuator voltage. This line must be pulled to ground in order for the actuator to operate.

If the limit switch has been selected in the software menu, and the actuator will not operate, the problem could be that the limit switch signal is not being pulled to ground. This can be checked by shorting the limit switch signal wire to ground and then activating the actuator. Note that the actuator halts simultaneously with the removal of the limit switch signal wire from ground. This is the way the limit switch works. (See *Chapter 5: Troubleshooting* for more details.)

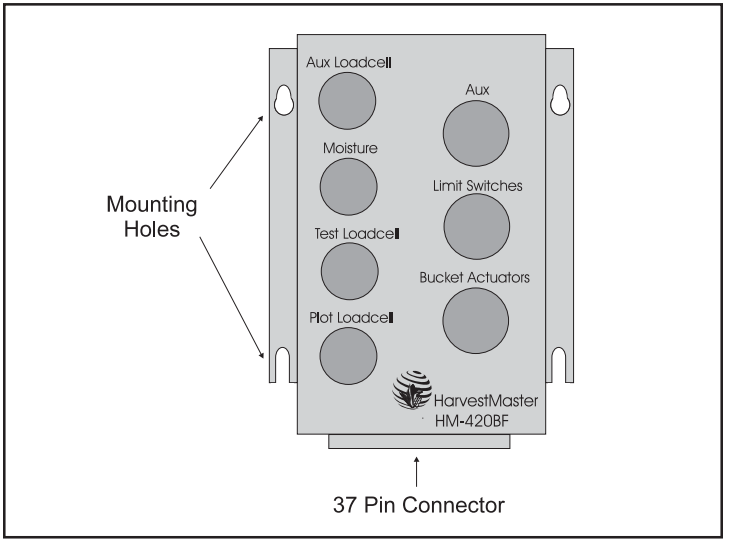
Break-out Box Installation

Using the four mounting holes provided, mount the break-out box on the combine within reach of the load cells and actuators. The break-out box is designed to be mounted within six (6) feet of the load cells and actuators. Most load cells and actuators come with more than six feet of cable.

- **Connect the 37 pin connector on the System Control Cable to the 37 pin con nector on the break-out box (see figure 2-7 below).**

- **Connect the sensor, load cell, actuator, and switch cables to the appropriately labeled connectors on the break-out box. Each connector is covered with a protective 'lid'. Lift the lid to expose the connector. Insert the connector end of the correct cable into the socket on the break-out box and twist the locking ring until it is secure.**

Figure 2-7
Break-out Box



Load Cells and Wiring

The load cell (or cells) need to be installed next. Generally, S-shaped load cells are used for plot weight and test weight on the HarvestData System. The SCCU is designed for load cells with a full bridge (differential output) circuit, providing a full scale output of roughly three millivolts per volt of excitation.

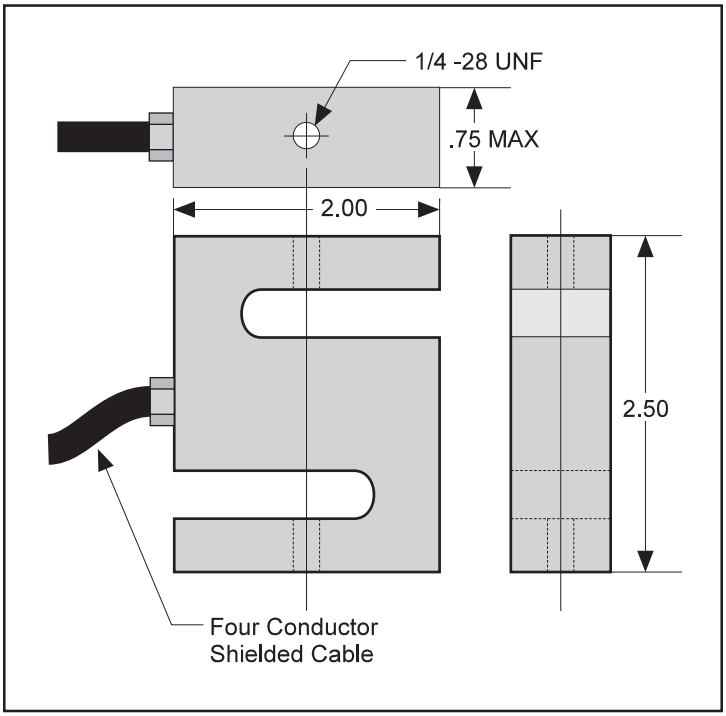


Figure 2-8
Load Cell. If you have two load cells, suspend the entire plot weight from the larger capacity cell; suspend only the test weight from the test-weight cell. Be careful to suspend the load cells in the correct orientation (with the writing right-side up).

If you have two load cells to install, the larger capacity cell is the plot-weight cell. Load capacities are marked on the sides of the cells. For example, you might have a load cell with a 100-pound (45.4 kilogram) capacity and another with a 50-pound capacity. The lesser of the two capacities is the test-weight cell.

Before installing the load cells:

- **Refer to the manufacturer of your bucket to determine the actual weight of the plot and test buckets with actuators (tare weight).**
- **Determine the maximum net weight of a plot by testing or from past experience.**
- **Add this to the tare weight of your bucket to decide the load cell capacity required.**

Plot-Weight Load Cell

For most applications the plot-weight load cell will be a 100-pound capacity, S-shaped load cell (Model HM-308). Many systems differ in weigh bucket design, however, a typical plot-weight load cell installation is depicted in Figure 2-9.

- **Suspend the entire plot weight from the plot-weight load cell (the heavier capacity cell, if you have two load cells).**

If you have trouble mounting the load cell, refer to your bucket manufacturer's load cell mounting procedures.

- **Once you have installed the Plot Weight Load Cell, run the cable to the location of the break-out box. Insert the connector end of the Load Cell into the Plot Weight Load Cell Sensor Socket of the break out box and twist the locking ring until it is secure.**

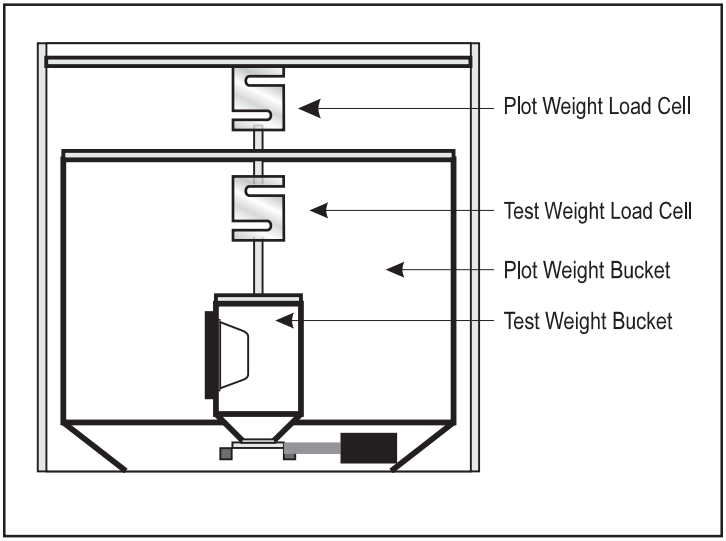


Figure 2-9
Load Cell Installation. Note that while the entire plot weight is suspended from the plot-weight load cell,only the test chamber is suspended from the test-weight load cell.

Test-Weight Load Cell

If you did not purchase a test-weight load cell, this section is not applicable to you. The test-weight load cell is typically a 50-pound capacity, S-shaped load cell (Model HM-307).

- **Suspend the test chamber from the test-weight load cell (the lighter of the two load cells).**

Figure 2-9 shows a typical test-weight load cell installation. If you have trouble mounting the load cell, refer to your bucket manufacturer's load cell mounting procedures.

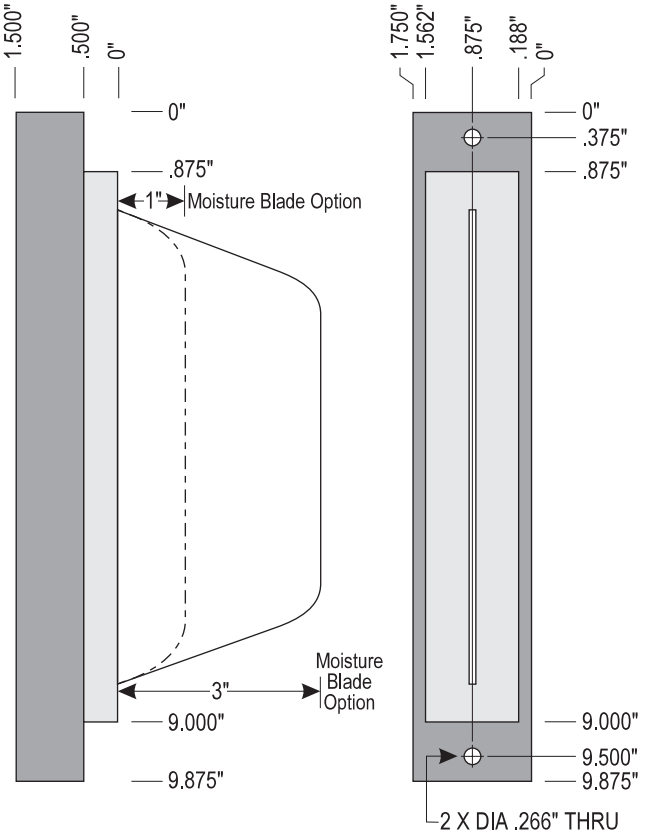
- **Once you have installed the Test Weight Load Cell, run the cable to the location of the break-out box. Insert the connector end of the Load Cell into the Test Weight Load Cell Sensor Socket of the break-out box and twist the locking ring until it is secure.**

Moisture Sensor Installation

There are three styles of moisture sensors; one inch, three inch, and four inch mini blade. After checking to see which moisture blade you have, refer to the following installation procedure that applies.

1" or 3" Moisture Blade

Figure 2-10
The one-inch blade configuration is identical to the three-inch blade configuration, only with the outer two inches of the blade cut off.

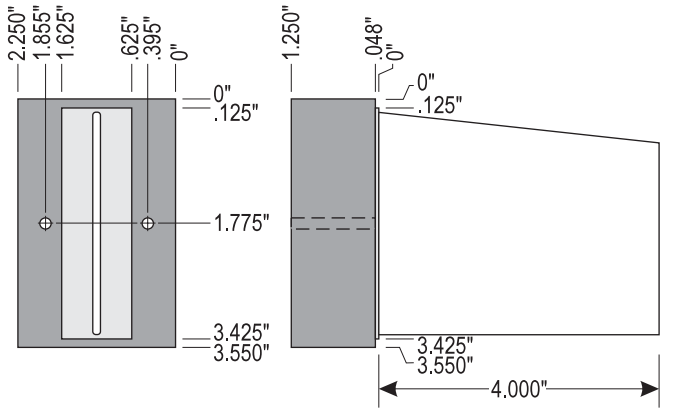


To install the one inch or three inch moisture sensor blade:

- **Place the sensor into the pre-cut hole on the weigh bucket.**

If your bucket manufacturer did not provide a pre-cut slot for the moisture sensor blade, you will need to take the weigh bucket to a machine shop to have the slot cut. The moisture blade should be mounted in a moisture test chamber.

- **Align the sensor's position and tighten the two screws in the holes.**



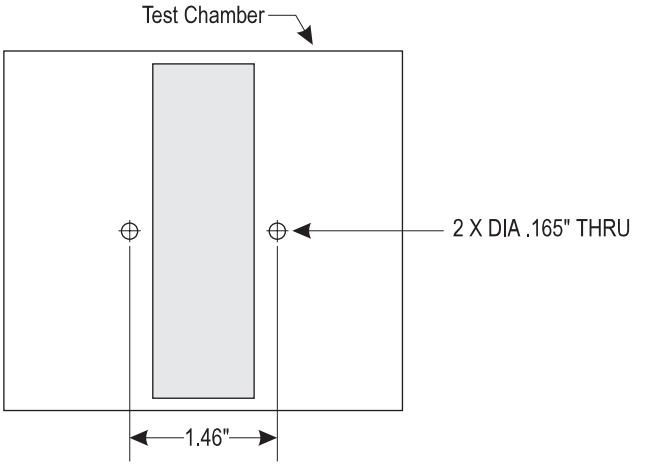
4" Mini-Moisture Blade

To install the four inch style mini moisture sensor:

- **Cut a rectangular slot in the side of the test chamber. The .048" shoulder of the moisture sensor should fit snug against the cut edges.**

- **Drill two .165" DIA mounting holes in the appropriate positions (refer to Figure 2-12).Insert the supplied clinch nuts (part # 3343).**

Figure 2-12
Test chamber in which the 4" mini moisture blade can be installed.



- **Place the moisture blade into the slot. Make sure the clinch nuts slide into the mounting holes on the blade housing.**

- **Tighten the two mounting screws se curely.**

Final Installation for 1", 3", or 4" Moisture Blade

! Important:

The metal plate on the top of the mois ture blade that the mounting bolts rest against MUST have good electrical contact to the test chamber. When mounting the sensor, make sure that the mounting bolts are not insulated by paint or gaskets, etc. To insure a good ground, you may choose to run a 22 AWG stranded wire from the back plate of the housing to the outside wall of the test chamber.

Systems differ; however, a typical moisture sensor installation is depicted in Figure 2-13.

The moisture chamber should be rectangular with the metal walls (ground) one to two inches away from, and parallel to, the moisture sensor blade.

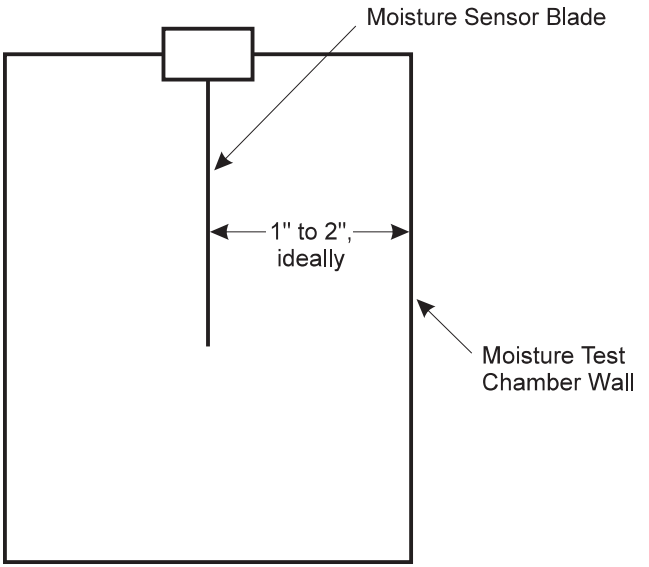


Figure 2-13
Blade-type Moisture Sensor in a Test Chamber (Top View). Greater sensitivity of the sensor results from closer spacing. Use a three-inch blade for greatest sensitivity.

- **Once you have installed the moisture sensor blade, run the cable to the location of the break-out box. Insert the connector end of the moisture sensor cable into the moisture sensor socket of the break-out box and twist the locking ring on until it is secure.**

Cable Connection to the SCCU

Next you will need to connect the system control cable and the power cable. The system control cable connects to the break-out box.

System Control CableConnection

The system control cable ends in a 37 pin connector on both ends. Plug one end into the back of the SCCU and the other end into the bottom of the break-out box(refer to Figure 2-14).

Using wire ties, tie the cable in place on the combine so that it will be protected from possible damage.

Twist the thumb screws on the connectors to secure the 37 pin connectors to the SCCU and the break-out box.

Power Cable Connection

To connect the power cable:

- **Attach the pigtail end of the power cable to the combine 12-volt power supply. It is recommended to connect the negative side of the power cable to the end of the ground cable futhest away from the battery. If your system is equipped with a lock-out system, this will eliminate any potential problems.**

- **Plug the power supply cable into the SCCU, and twist the locking ring to secure the connector to the SCCU.**

! Warning:

Make sure the polarity of the positive and negative battery terminal are wired correctly. Reversing the polarity could cause possible hardware damage.

The 12-volt power supply wire is red or white (+). The ground wire is black (-).

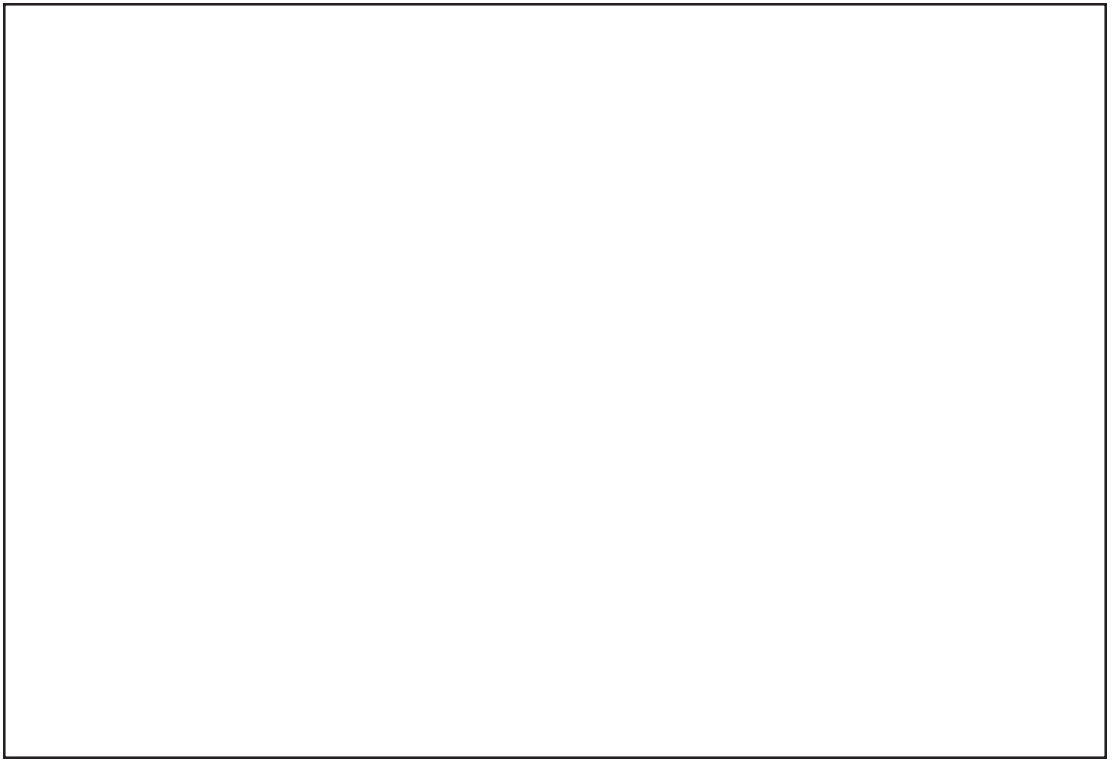


Figure 2-14
Cable Connectors for the SCCU. This shows the connector for the system control cable and the plug for the power cable.

Testing the Manual Operation of the Bucket Doors

Generally, the bucket doors will not be operational until software has been loaded into the SCCU from a FieldBook or other host. This is necessary because the software carries the bucket actuator configuration information that the SCCU uses to control the driving electronics. You may, however, manually configure the actuators before loading the software and test the bucket operation.

- **Hold one of the front panel switches active while turning on the "Power" switch to the SCCU.**

Normally, the SCCU is powered on without any of the other switches on the front panel being activated. When this happens, the green and red lights alternately flash until a software configuration is loaded to the SCCU. However, if the "Plot", "Test", "Hopper" or "Auxiliary" switch is held active when power is applied to the SCCU, a default configuration is loaded and the SCCU either opens or closes all of the buckets. The configuration loaded and the action taken depends on the switch held as described in Table 2-7.

Table 2-7

Switch Held	Switch Position on Power-Up	Actuator Configuration	Action
"Plot"	"Open"	Windshield Wiper	All buckets open
"Plot"	"Close"	Windshield Wiper	All buckets close
"Test"	"Open"	Electromechanical	All buckets open
"Test"	"Close"	Electromechanical	All buckets close
"Hopper"	"Open"	Hydraulic	All buckets open
"Hopper	"Close"	Hydraulic	All buckets close
"Auxiliary"	"Open"	Pneumatic	All buckets open
"Auxiliary"	"Close"	Pneumatic	All buckets close

After performing the above operation and switching the Auto/Manual switch to “Manual”, you will be able to use the “Plot”, “Test”, “Hopper”, and “Auxiliary” switches to run the buckets connected to the SCCU.

If you are performing this operation, only hold one of the switches (either "Plot", "Test", "Hopper", or "Auxiliary") when turning on the power and make sure it is the right switch for your actuator type. If you have a mixture of different actuator types, or you are uncomfortable performing the above test, do not use this manual test procedure.

- **Load the software to the host unit.**

- **Set the configuration as described on page 3-20. Then, load the configuration to the SCCU by connecting it to the host and turning the SCCU on.**

When performing the test described above, if you notice that the system fails to power-up, the doors do not open or close, or something else is amiss:

1. Go back and check the wiring connections.

2. Check for proper voltage (12 volts) at the actuator, including proper polarity forelectrical, bi-directional actuators.

Check actuator operation by disconnecting the HarvestMaster actuator cable from the break-out box and touching a live 12-volt source to the actuator terminal. (Refer to Chapter 5 for more information.)

Printer,Ribbon, and Paper Installation

Installing the Printer

■ **To mount the FieldPrinter in the console:**

1. Set the FieldPrinter on the right side of the console and slide it back until it mates with the 25-pin sub-D connector (see Figure 2-15).

2. Install two #6-32 x 3/8" screws to secure the FieldPrinter to the console as shown in Figure 2-15.

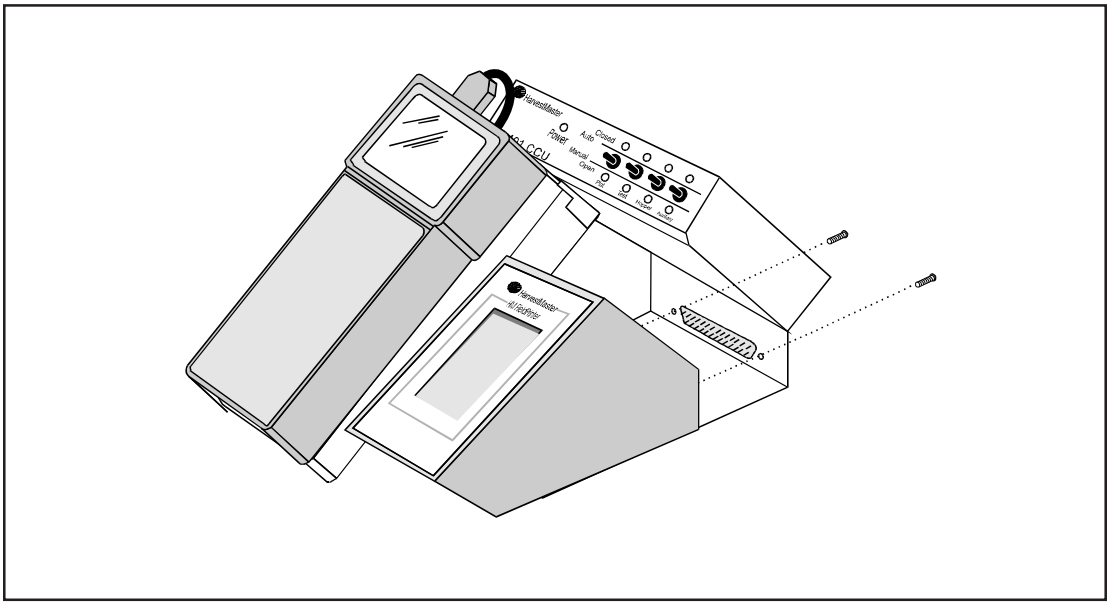


Figure 2-15
Installing the HarvestData System FieldPrinter. The FieldPrinter and the cabinet in the HarvestData System console base have mating connections. Two #6-32 x 3/8" Phillips pan head screws hold the HarvetData System FieldPrinter in place.

Warning:
Make sure the 25-pin connector is seated properly before the mounting screws are tightened.

Installing a Ribbon

The FieldPrinter comes with an Epson ERC-09 ribbon cartridge installed. This ribbon cartridge is available from business supply stores or HarvestMaster. Replace it when the printing becomes difficult to read or after using one complete roll of paper with one ribbon cartridge.

- **To install a ribbon cartridge into the FieldPrinter:**

Warning:
Avoid changing the ribbon cartridge while collecting data since damage could occur to the printhead if the ribbon cartridge is changed during printing.

1. Make sure the SCCU power switch is in the OFF position.

2. Remove the paper from the printer (refer to page 2-40 for futher instruction).

3. You will notice the word "PUSH" on the right side of the ribbon cartridge. Push down to remove a used cartridge (see figure 2-16).

✏ Note: The Hm-402 Printer does not have a power OFF feature. If you are not using it with the HM-400 SCCU, you wil need to disconnect its power source.

4. Situate the replacement ribbon cartridge in the same position as the old one. After making sure the ribbon cartridge is properly aligned, press down gently to seat.

✏ Note: You may have to turn the ribbon slightly to get the gears to mesh you push down on the new ribbon.

5. Re-insert the paper into the print mechanism (see figure 2-17).

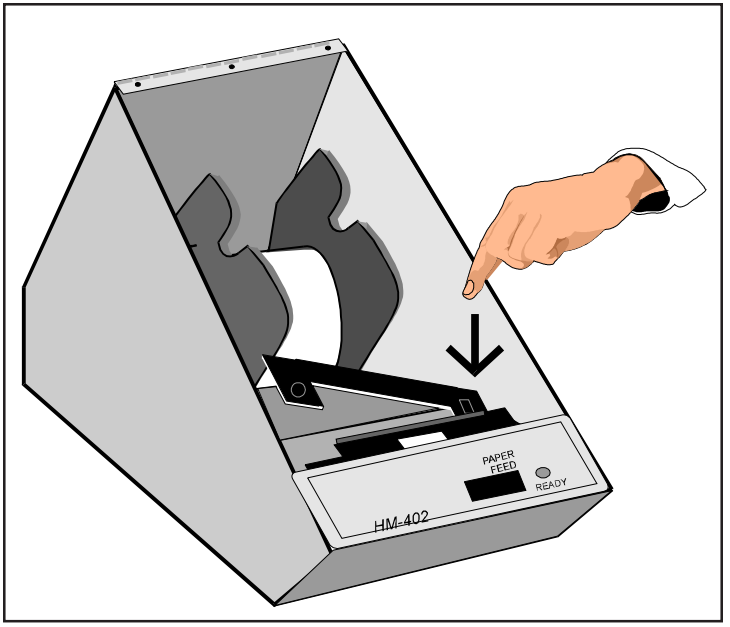


Figure 2-16: Ribbon placement in the HarvestData System FieldPrinter. To remove a used ribbon, press down on the right side of the cartridge (as shown by the arrow) and lift it out. Put a new ribbon in its place.

Warning:

To prevent weak or irregular printing, make sure the ribbon cartridge is firmly inserted. If ribbon ink gets on the printer's case, immediately wipe it off with a cloth.

Inserting a Paper Roll

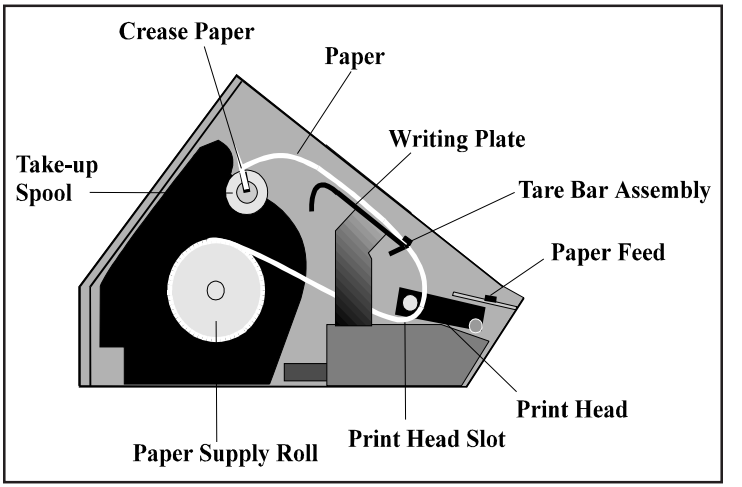


Figure 2-17 Paper Path in the FieldPrinter. Creasing the paper about 1/2" from the end makes it easier to insert into the slot of the take-up spool.

■ **To insert the paper roll, complete the following steps:**

1. Make sure the SCCU power switch is in the ON position.

✏ Note: The HM-402 does not have a power ON feature. If you are not using it with the HM-400 SCCU, you will need to connect its 12V power source.

2. Insert the paper roll onto the supply spool.

✏ Note: The paper supply roll is rolling toward you as you are facing the front of the printer.

3. Unroll several inches of the paper and cut the edge diagonally to a point on one side.

✏ Note: Be careful not to slide the paper under the print head. There is a "V" shaped slot the paper must be inserted into in order for it to feed correctly.

4. Slide the end of the paper into the print head slot and gently pull the diagonal point up until the full width of the paper is through the print head.

5. Carefully pull the paper through, or press the PAPER FEED switch until there is a sufficient amount to start on the take-up spool.

✏ Note: The take-up spool is controlled by the hand held and will not advance with the paper feed switch.

6. Place the excess paper out of the way.

7. Insert the right side of the writing plate under the two screws and then squeeze the left side until it slides under the screw on the left.

8. Feed the end of the paper through the tare bar assembly. (see figure 2-17)

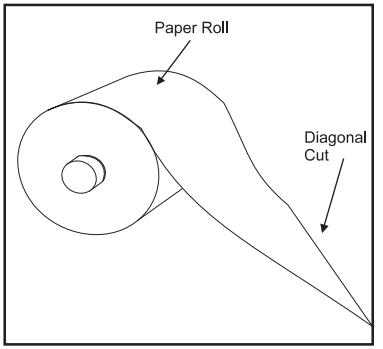
9. Cut the point off of the end of the paper. Fold the end of the paper and crease it, then insert it into the slot in the take-up spool.

10. Roll the take-up spool a few turns to hold the paper in the slot and place the spool into its position in the take-up assembly with the gear on the left side..

11. Turn the take-up spool manually or use **F5** on the FieldBook to advance the paper until there are several wraps around the take-up spool.

12. Close the printer's enclosure cover and secure it with the latch.

Figure 2-18
Cut the paper diagonally to a point on one side before feeding it through the print head.



✏ Note: Make sure the writing plate is locked into place.

Removing a Paper Roll

■ **Proceed through the following steps if you need to remove the printed paper roll before the supply roll is empty.**

1. Advance the paper through the FieldPrinter until all printing clears the printhead by using the line feed switch on the printer or **F5** on the Field Computer.

2. Tear off printed paper above the printhead.

3. Re-insert the paper on the take-up spool as shown on page 2-38.

■ **To replace the supply roll:**

1. Proceed with steps 1 & 2 above.

2. Grab the writing plate with one hand and squeeze the left side until it pops free of the fastening screws.

3. Take the writing plate out of the printer and set it aside.

Warning:
Do not pull the paper out of the print head backwards. This could cause damage to the print head.

4. Tear the paper between the supply roll and the printer.

5. Pull the remaining paper through the printer mechanism or advance it with the paper feed switch or **F5**.

6. Insert a new supply roll as shown on page 2-38.

Printer test and setup

The HM-402 Printer is tested and set up at the factory. You should not have to make any changes to the setups. However, we have included the following for your information. Using the rocker switch on the printer performs printer tests and setups.

Printer test

With the power to the HM-402 printer OFF, (the main power switch on th HM-401 controls the power to the printer) press and hold the right side of the rocker switch as you turn the power ON. The printer will print out a list of the configuration as it currently exists and then do a continuous print test. To stop the print test, press either side of the rocker switch.

Accessing the Setup Menu

To access the setup menu, follow these steps:

With the power to the HM-402 printer OFF, (the main power switch on the HM-401 controls the power to the printer) press and hold down the left side of the rocker switch and turn the power to the printer back ON.

The printer will advance the paper. After the paper advance has stopped, count 3-5 seconds and release the switch. The following will be printed:

***** SETUP MENU *****
CONFIGURE. . . [NEXT/OK]

If you wait less than 3 or more than 5 seconds, **Ready....** may be printed and you will have to start over.

Warning!

Changing the default setups may cause undesirable print formatting when used with the HarvestData System. Please take note of the current setups before you make any changes.

After you access the setup menu, if you press "**NEXT**" (left side of switch) repeatedly, you will see the following list printed. If you keep pressing "**NEXT**" (left side) this list repeats itself.

The setup menu contains the following items:

- CONFIGURE menu
- CUSTOM menu
- SET CLOCK menu
- RESET SEQ#

The following pages explain these items and how to customize the printer to your needs.

Configure

The first setup menu item reads:

CONFIGURE. . . [NEXT/OK]

[NEXT/OK] is a visual clue so you know that pressing the left side of the rocker switch will go to the **NEXT** part of the menu and that pressing the right side of the rocker switch will accept (or say **OK** to) what this line of the setup menu says.

With the printer in the setup menu and with **CONFIGURE . . . [NEXT/OK]** as the last item printed, press OK (right side) to access the configure menu. The following is printed:

```
*** SETUP MENU ***
CONFIGURE. . .          [NEXT/OK]
*** CONFIGURE MENU ***
LOAD DEFAULTS           [NEXT/OK
```

LOAD DEFAULTS gives you the oportunity to reset the printer to all default settings (shown below).

```
*** CONFIGURATION MENU ***
LOAD DEFAULTS          [NEXT/OK]
* BAUD=1200            [NEXT/OK]
* DATA BITS=8          [NEXT/OK]
* STOP BITS=1          [NEXT/OK]
* HSHAKE=BUSY-BUFF     [NEXT/OK]
  COLS=32              [NEXT/OK]
  INVERT=NO            [NEXT/OK]
  FONT=5X7             [NEXT/OK]
  MAG=NONE             [NEXT/OK]
  Ready...
```

** The parallel interface does not have these selections.*

Choose **OK** to do this or **NEXT** to go to the next parameter. The following is printed:

```
        *** SETUP MENU ***
CONFIGURE. . .         [NEXT/OK]
*** CONFIGURATION MENU ***
LOAD DEFAULTS          [NEXT/OK]
BAUD=1200              [NEXT/OK]
```

Baud rate is the next parameter you can set in the configure menu. the complete list of parameters and their possible values is shown below.

Baud Rate

The sample list above shows the current baud rate is 1200. To accept this, press **OK** (right side) or view the next baud rate value by pressing **NEXT** (left side). Press **OK** when the baud rate you want is displayed.

Choose from these baud rates:

300, 600, 1200, 2400, 4800, 9600, 19200

Data Bits

DATA BITS is the next parameter. Choose the date bit balue the same way baud rate was chosen. Choices are 7 or 8 data bits. If you choose 7 data bits you can select **EVEN** or **ODD** parity. If you choose 8 data bits parity defaults to **NONE**.

Stop Bits

STOP BITS is the next parameter. Choose 1 or 2 stop bits.

Handshake

HANDSHAKE is the next parameter. Choose from the following settings:

BUSY-LINE
BUSY-BUFFER
XON/XOFF-LINE
XON/XOFF-BUFFER
NONE

Columns

COLUMNS is the next parameter. Select the number of characters per line (columns) for this parameter. The choices you have are 24, 32, or 40. Below are samples of each:

24 Column Text
32 Column Text
40 Column Text

Invert

INVERT is the next parameter. Choose **YES** if you want inverted text (upside down) or **NO** if you want non-inverted text (righ side up) in your printouts. Below is an example of inverted text:

FONT is the next parameter. choose from a 5 x 5, 5 x 7, or 5 x 8 dot matrix print pattern. the 5 x 5 dot pattern produces only upper case (capital) letters. The other two fonts can output upper and lower case letters.

5 x 5 TYPE IS ALWAYS CAPITALS

5 x 8 Upper and Lower Case

The last parameter is **MAGNIFICATION** . This refers to the size of printed type from your printer. Your choices (with exaples) are:

NONE

NONE

DOUBLE WIDE

DOUBLE WIDE

DOUBLE HIGH

DOUBLE HIGH

DOUBLE WIDE/HIGH

DOUBLE WIDE/HIGH

After you choose one of the magnifications the printer will print **READY...** to show the printer is out of the configuration menu and the setup menu and is ready to print.

The next setup menu item after **CONFIGURE. . .** is **CUSTOM. . .**. With the printer in the setup menu and with **CUSTOM. . .** as the last item printed, if you press **OK** (right side) the printer will print the following:

```
*** SETUP MENU ***
CONFIGURE. . .                    [NEXT/OK]
CUSTOM. . .                       [NEXT/OK]
***** CUSTOM MENU *******
PRINT CUSTOM SETPUP               [NEXT/
OK]
```

This manual assumes the time and date option is installed and operating. If you do not have this option you will not see references to the clock or date listed in most menus.

If you press **OK** the printer will print the current custom setup. A sample is shown below:

```
*** SETUP MENU ***
CONFIGURE. . .                    [NEXT/OK]
CUSTOM. . .                       [NEXT/OK]
****** CUSTOM MENU *******
PRINT CUSTOM SETUP                [NEXT/OK]
MM/DD/YY  hh:mm ?M DOW            [NEXT/OK]
AUTO T&D=NO                       [NEXT/OK]
AUTO SEQ=NO                       [NEXT/OK]
ZERO=0                            [NEXT/OK]
POUND SIGN=#                      [NEXT/OK]
_(underscore)                     [NEXT/OK]
BUSY  INVERT=NO                   [NEXT/OK]
ONLINE/OFFLINE=YES                [NEXT/OK]
EXT CH SET=NO                     [NEXT/OK]
PRINT  READY=YES                  [NEXT/OK]
Ready. . .
```

This printout shows you how each item is currently set. following is an explanation of each item and the choices you can make for each.

TIME/DATE FORMAT is the next parameter. Choose from the following formats:

MM/DD/YY hh:mm ?M
MM/DD/YY hh:mm ?M DOW
MM/DD/YY hh:mm
MM/DD/YY hh:mm DOW
DD-MM-YY hh:mm ?M
DD-MM-YY hh:mm ?M DOW
DD-MM-YY hh:mm
DD-MM-YY hh:mm DOW
DD/MON/YY hh:mm ?M
DD/MON/YY hh:mm ?M DOW
DD/MON/YY hh:mm
DD/MON/YY hh:mm DOW
NONE

MM = month
DD = day
YY = year
hh= hour
mm=minutes
?M= AM or PM
DOW= day of week

This feature is available only on units with the time/ date option installed.

AUTO TIME AND DATE is the next parameter. Your choices are:

YES - autoprint after **CR** (carriage return)
NO - do not autoprint after **CR**

Autoprint of the time and date will not occur unless three seconds has elapsed since the printer has stopped printing.

AUTO SEQUENCE NUMBER is the next parameter. Choose:

NO - do not autoprint sequence number after **CR**
YES - do autoprint sequence number after **CR**

Autoprint of the sequence number will not occur unless three seconds has elapsed since the printer has stopped printing.

ZERO is the next parameter. Choose how you want the zero character to look in you printouts. Choose between **0 and 0.**

Pound Sign

POUND SIGN is the next parameter. Choose to show pound as # or as the British pound symbol £.

_Underscore

_UNDERSCORE is the next parameter. Choose which symbol the same ASCII code will print, an _underscore or a ← left arrow.

Busy Invert

BUSY INVERT is next.
Choices:

NO - voltage will be in a high state until the unit is busy then voltage level goes low.

YES - voltage will be in a low state until the unit is busy then voltage level goes high.

Online/Offline

ONLINE/OFFLINE is next.
Choices:

YES - enables the rocker switch to turn the printer offline.

NO - disables the ONLINE/OFFLINE ability.

Ext Ch Set

The choice to use the extended character set is available only when 8 data bits are chosen.

EXT CH SET is the next parameter. This stands for Extended Character Set.
Choices:

YES - Allows you to use hexidecimal numbers above 80 (true only for 8 data bits).

NO - Disables the Extedned Character Set ability.

Print Ready

PRINT READY is next.
Choices:

YES - Prints **Ready. . .** upon power up.

No - Disables printing **Ready. . .**

Warning!

If you choose NO, hold the left side of the rocker switch down for 4-6 seconds to access the setup menu. Begin timing when you connect power to the unit and the red light comes on. The paper feed motor does not run upon power up when Ready. . . is disabled.

Set Clock. . .

This feature is available only on units with the time/date option installed.

The next item in the setup menu is **SET CLOCK . . .**

With the printer in the setup menu and with **SET CLOCK. . .** as the last item printed, if you press **OK** (right side) the printer will print the following:

```
SET CLOCK. . .                    [NEXT/OK]
*** SET DATE ***                  [NEXT/OK]
Set Year:  9 . . . . . . . . . . . . . . . . [NEXT/OK]
```

The printer shows the year currently in memory. The **9** is reversed (white on black) to show the position of the cursor. This is the number which will be incremented if **NEXT** (left side) is pressed. If the number is correct press **OK** (right side) and the following is printed:

```
SET CLOCK. . .                    [NEXT/OK]
*** SET DATE ***
Set Year:  9 . . . . . . . . . . . . . . . [NEXT/OK]
```

The cursor now appears over the 2nd position. Press **NEXT** (left side) to increment this number if needed and **OK** if it is right. Continue this sequence of accepting or changing the year, month, day, and DOW (Day Of Week).

```
SET CLOCK                         [NEXT/OK]
*** SET DATE ***                  [NEXT/OK]
Set Year:  9 . . . . . . . . . . . . . . . [NEXT/OK]
Set Year:  9 9 . . . . . . . . . . . . . . [NEXT/OK]
Set Mon:  1 . . . . . . . . . . . . . . . [NEXT/OK]
Set Mon:  0 1 . . . . . . . . . . . . . . [NEXT/OK]
Set Day:  1 . . . . . . . . . . . . . . . [NEXT/OK]
Set Day:  1 1 . . . . . . . . . . . . . . [NEXT/OK]
Set DOW:  1 . . . . . . . . . . . . . . . [NEXT/OK]
```

When you have completed the **SET DATE** menu the following is printed automatically:

```
*** SET TIME ***
Set Hour:  16. . . . . .[NEXT/OK]
```

Choose **NEXT** (left side) to increment the number or **OK** (right side) to accept the **1**. Reapeat this same procedure for hours and minutes as shown below.

```
*** SET TIME ***
Set Hour:  16. . . . . .[NEXT/OK]
Set Hour:  15. . . . . .[NEXT/OK]
Set Min :  38. . . . . .[NEXT/OK]
Set Min :  37. . . . . .[NEXT/OK]
Start Clock. . . . . . . . . . . . . . . . [OK]
Ready. . .
```

When everything is as you want it, press **OK** and **"START CLOCK"** is printed. Press **OK** (right side) to start the clock. The printer then prints **Ready. . .** showing you that it is out of the setup menu and ready to print.

Reset SEQ#

RESET SEQ# is the last setup menu item. this menu item lets you reset the sequence number. This number is the number of print transactions since the last reset.

With the printer in the setup menu and with **RESET SEQ#** as the last item printed, if you press **OK** (right side) the sequence number will be reset to zero and the printer will print **Ready. . .** showing it is no longer in the setup menu and that the printer is ready to print.

To skip resetting the sequence number to zero, press **NEXT** (left side). **CONFIGURE. . .** is printed. Unplug and replug in the printer to return to printing mode. **Ready. . .** is printed.

Chapter 3
Loading Software & Creating Set-Ups

Loading Software

The distribution diskette (MS-DOS, IBM PC compatible format) contains the programs to install DataLink for Windows on your PC and (subsequently) the HarvestData software on your DOS handheld computer. The whole installation process takes 5-15 minutes, depending on your level of familiarity with computers.

■ **Make sure that your handheld is adequately charged.**

■ **Have your communication cable (model #CA-2009) on-hand.**

✏ **Note: If you are a DOS or Windows 3.1 user, please refer to Appendix B: DataLink for DOS for installation instructions.**

If you have Windows 95, 98, or NT installed on your PC, continue with the installation:

■ **Insert the DataLink for Windows diskette into Drive A:\ or B:\.**

■ **Click on "Start", and then "Run".**

■ **Run the program "Setup.EXE".**

✏ **Note: Windows installation wizard will guide you through the remaining procedures for this installation.**

Introduction to DataLink

DataLink is, as the name implies, your link to the data stored on the handheld computer. You may *upload* data (transfer data from the handheld to the PC) or *download* data (transfer data from the PC to the handheld) using DataLink. DataLink lets your PC and handheld computer communicate via the serial communication cable (model # CA-2009). The communication cable connects your remote data collection unit to your desk-top PC, and DataLink is the communication software that allows the handheld and PC to communicate.

Installing the HarvestData Software

DataLink and your handheld need to have the proper application installed before they can exchange information (see below). Once the application file has been installed, you can use DataLink to transfer files between the PC and handheld. This program also contains Pro Link, a means of transferring files other than those associated with your HarvestData applications (Pro2000 and Pro4000 handheld computers only).

DataLink is useful for transferring maps. Refer to appendix F for generating map files. We strongly recommend that you take a moment to review the Appendix G for a complete overview on how to use DataLink for Windows.

The steps to install the HarvestData Software on the PC are as follows:

- **Insert the HarvestData Applications diskette into Drive A:\ or B:\.**

- **Run DataLink for Windows.**

✏ **Note: Check your COM Port setting and communication cable if you are having problems with communications. For additional help on diagnosing communication problems, turn to *Chapter 5: Troubleshooting.***

- **Click on “Application Install” tab.**

- **Select the proper location to where your application diskette is located (e.g. A:\ or B:\ drive).**

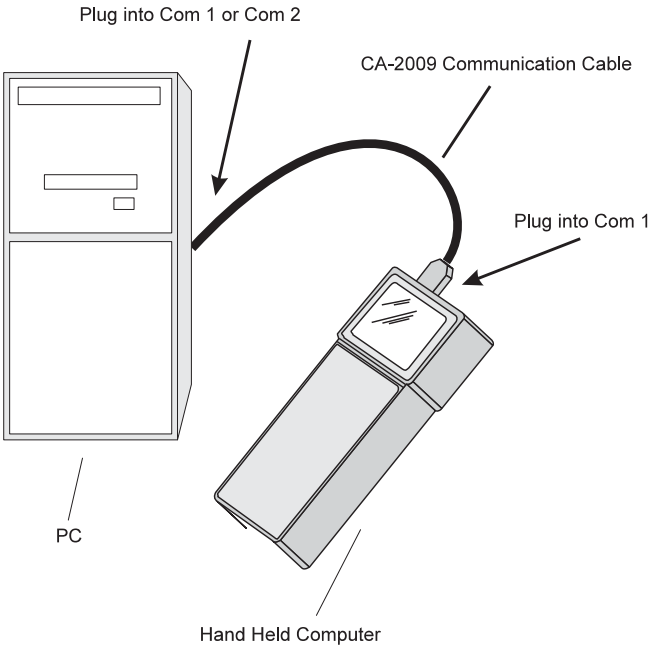
- **Select “Load Application from DISK” and wait as the files are copied to your PC.**

- **Your Application should now be displayed in the “Select Application” pull down menu.**

✏ **Note: You may load more than one application if you like. Each application version will be displayed in the “Select Application" pull down menu.**

Installing the HarvestData Software on the Handheld

- **Connect the PC to the handheld using the com munications cable. To do this, plug the communi cations cable into one of the serial ports on your computer (preferably port 1).**



✏ **Note: DataLink defaults to communicating via the PC's com1 port. Some computers may have a mouse or other external devices connected to com1. If this is the case, it will probably be easier to plug the communications cable into com2. Then, on your PC, go to the DataLink for Windows Comm Setup tab (see later in this chapter) and change the Com Port setting.**

- **To prepare the handheld to receive the HDRB DOS software, turn it on. Type *PS* to run the ProShell utility. (See the handheld's User's Manual for more information.)**

- **Create a subdirectory called "HDRB" (this will be the location of the application software) and change to this directory.**

- **In DataLink for Windows, make sure the application that you would like to load is displayed in the "Select Application" menu.**

- **Choose "English" language.**

✏ **Note: If you desire another language, please call HarvestMaster's Technical Support Team for further instructions.**

- **Click on “Send Application to Handheld”.**
- **On the handheld, press F5 to initiate the transfer process.**
- **On the handheld, press F1 to select the correct COM port for the handheld (COM1 is the default).**
- **On the handheld, press F4 to receive files.**
- **After the software has been downloaded, locate and execute the "Setbat.exe" file to update your autoexec.bat.**
- **Reboot the handheld.**

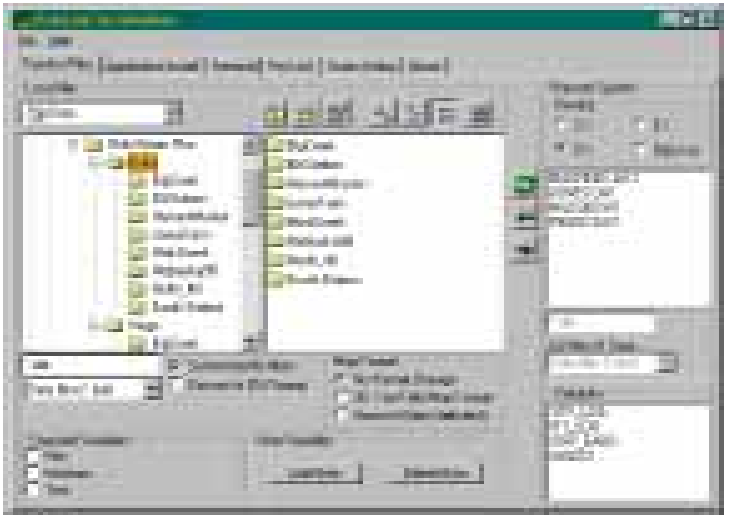
Note: The system should run the application automatically on boot-up. After a few seconds the system will display the message "SCCU terminal not found. Turn power OFF and connect SCCU remote." Do not be alarmed; this message is normal. Press "ESC" to go to the Main Menu.

Now that the software has been installed, you can transfer map and data files between the PC and handheld with a click of a button. To transfer files to and from the handheld:

- **Click on the "Transfer Files" tab if it is not already in the foreground.**

- **Click "OK" in the "Locating Remote System" box IF the handheld is on, connected, and running the application software.**

- **If the handheld is connected correctly and the communication setups are set correctly, the files from the handheld will be displayed in the box on the right side of the DataLink screen with the directory and files on your PC displayed on the left side.**



■ **If downloading a file, select the download format ("Map Format") to the type of file you are downloading, navigate to the file (or files) you would like to transfer to the handheld, highlight them, and then left click on the RIGHT-POINTING ARROW to start the download process.**

✏ **Note: Appendix F in your "HarvestData System User's Manual" explains the map download options (i.e. 2D test Field Map Format and Harvest Order (delimited) Format).**

■ **If uploading a file from the handheld, highlight the file (or files) to be transferred to your PC, and then left click on the LEFT-POINTING ARROW to start the upload process.**

✏ **Note: The option, "Convert to CSV format" will convert data files to a comma-separated format which is best used when importing into programs such as Microsoft Excel.**

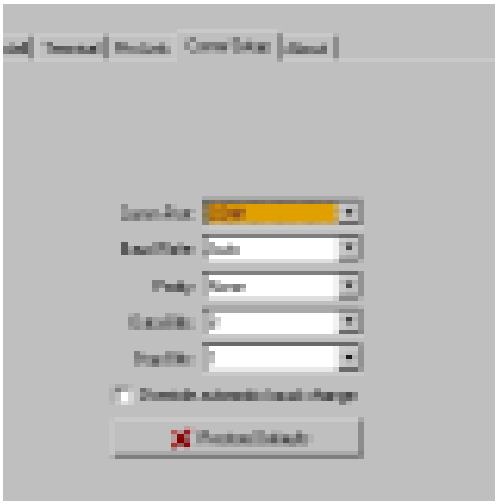
✏ **Note: Refer to Help in DataLink for Windows for specific information on transferring files.**

✏ **Note: To send and receive files other than those associated with the HarvestData software, use Pro Link. Refer to Help in DataLink for Windows for information on Pro Link.**

✏ **Note: Do not alter these settings unless absolutely necessary.**

If the PC and handheld did not communicate, the com port setting may need to be changed.

To change the com port settings, click the Comm Setup tab in DataLink. A sample Comm Setup screen, with the default settings, is shown below.



If the handheld computer, for example, is connected to COM2, use the arrow at the right edge of the Comm Port box to reveal a pull-down menu, then select COM2.

DataLink automatically sets the optimum baud rate for data and map transfers (9600) and Pro Link transfers (115k). If you must use a different baud rate, click the box beside "Override automatic baud change" so a check appears. DataLink will now exclusively use

whichever baud rate you select. Use the arrow at the right end of the Baud Rate box to reveal the pull-down menu, then change the setting as needed.

✏ **Note: Use the Restore Defaults button to reset customized settings to their original values.**

✏ **Note: For additional help on diagnosing communication problems, turn to Help in Datalink for Windows and *Chapter 5: Troubleshooting* of this manual.**

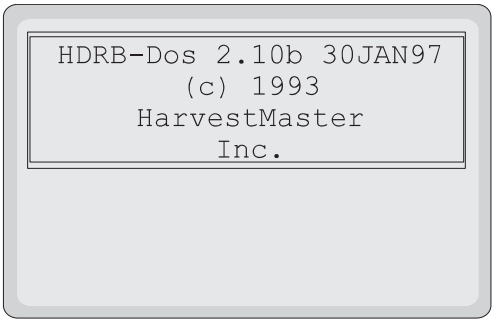
Running the HarvestData Software on the Hand Held Computer

The HarvestData executable file (now resident on your hand held) is called HD2.EXE. We strongly recommend that you place this file in an autoexec.bat file on your hand held so the HarvestData program runs automatically upon power up. The setbat.exe program will modify autoexec.bat for you.

Congratulations on reaching your first milemarker in HarvestMaster history: you've successfully downloaded your first program. Now it's time to put that program to use.

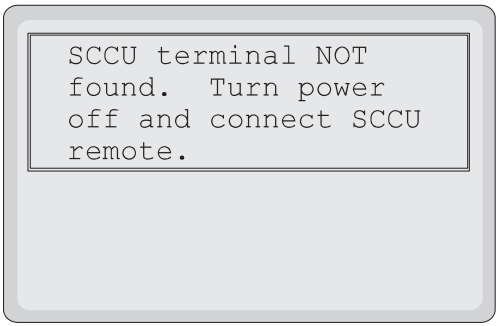
- **With the hand held and HarvestData System turned off, connect the hand held to your HarvestData System (if you've forgotten how, refer to *Chapter 2: Installation*).**

✏ **Note: You can run the HarvestData software on the hand held without attaching it to the SCCU. When the HarvestData program is run, press <*ESC*> while the HarvestData sign-on banner is being displayed:**



HarvestData Sign-On Banner. To run the HarvestData software while disconnected from SCCU, press <ESC> when this screen is displayed.

■ **Flip the power switch on the SCCU to the "ON" position. This supplies power to the hand held and the SCCU. The hand held will attempt to connect to the SCCU for approximately 7 seconds. <u>If it is unable to establish a connection, it will display the following message:</u>**

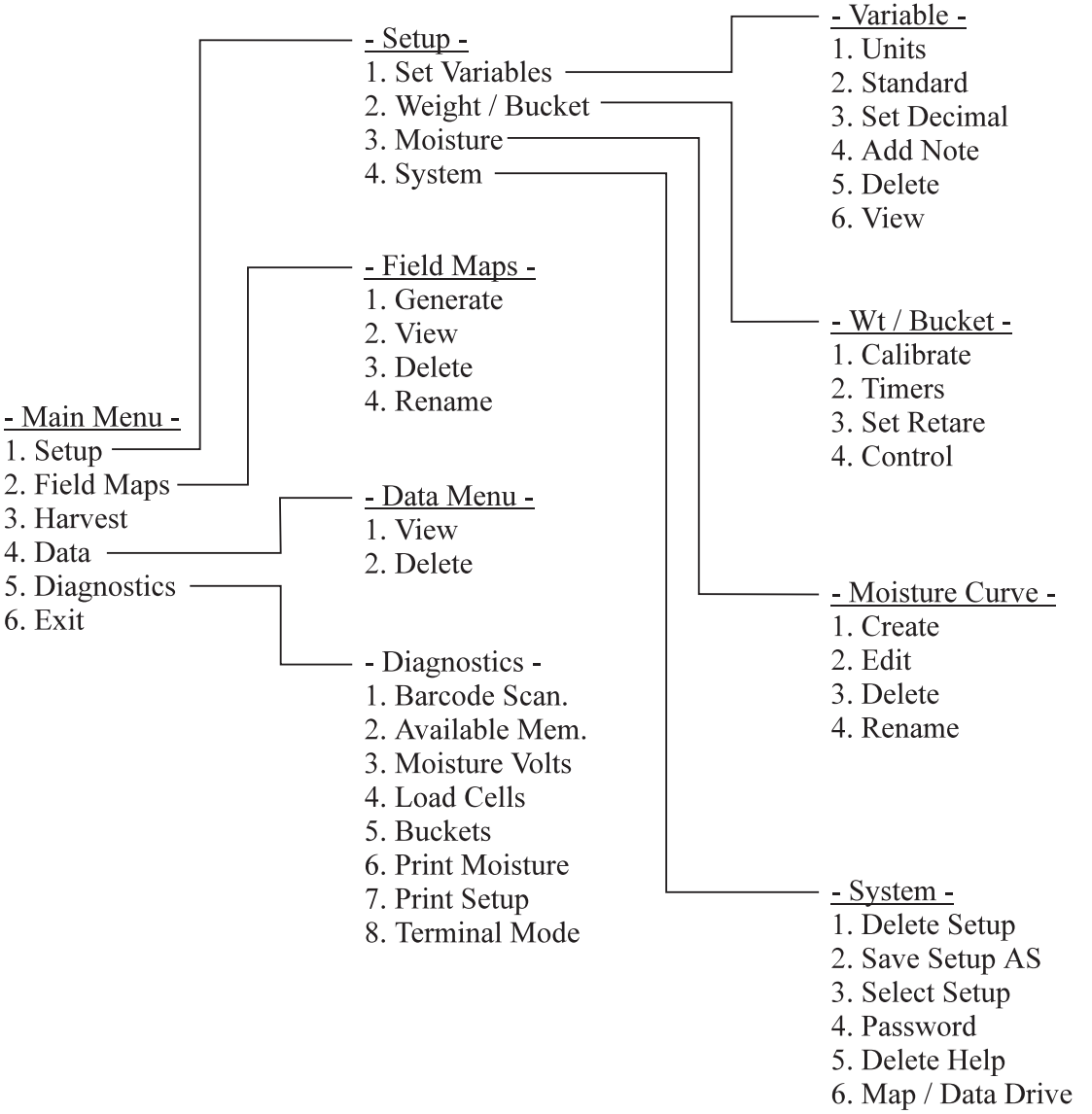


"SCCU Terminal Not Found" message indicates no communication link was established between the hand held computer and the HarvestData SCCU.

To bypass this screen and run the HarvestData software, press <ESC>.

HarvestData Menu Structure Overview

The menu presents the various processes you will use to set up your HarvestData System and acquire harvest data with it.



How to Move Through the Menu

UP ARROW - causes the previous menu option to be displayed.

DOWN ARROW - causes the next menu option to be displayed.

ENTER - causes the selection or activation of the marked menu option, or display of a lower level of menu.

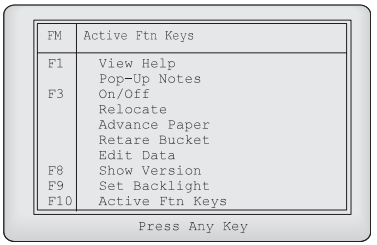
ESC - causes exit (escape) from current activity, or transition to a higher level of menu.

Function Keys

When you press the <***F10***> key, a pop-up menu of options appears.

Press the digit on the keyboard corresponding to the function you wish. Functions 2 and 4 through 7 are only active during the harvest activity.

The <***ESC***> key exits the function menu, and returns you to the previous activity.



Press <F10> to access the function menu

Help Information

Pressing <***F1***> causes help information to appear on the screen, relating to the current activity in process. For example, pressing <***F1***> when prompted for entry of the Map File Name, displays, "Enter the name of the field map to be created". To exit help, press <***ESC***>. Press the <***UP***> or <***DOWN***> arrows to scroll up or down the help information one line at a time.

Answering "Yes" or "No"

In certain places during adjustment of system setups, you may be requested to answer “Y” for Yes, or “N” for No. There is no need to spell out the whole word.

Letter	Meaning	Language
Y	Yes	English
O	Oui	Francais
J	Ja	Deutsch
S	Si	Español
N	No	All Languages

- **Depending on the language of the prompts which you selected at program loading time, the “Y” for Yes may be changed.**

Generally, all file transfers are controlled completely from HarvestMaster’s DataLink software running on a desktop computer (see Appendix G, DataLink). However, there are other ways of transfering files as explained in the hand held user's guide.

Before attempting to transfer files, ensure that cable connections between the hand held and the PC are secure and communications parameters are set correctly.

Selection of Moisture Curves and Field Maps

On many of the field map and moisture curve menu items, you will be prompted to select the field map, or to select the moisture curve. You will be asked to select one of each of these upon entry of the harvest activity on the main menu.

Press the **"UP"** or **"DOWN"** arrow to scroll up or down the list of file names to activate. Press **"ENTER"** to select the file name indicated.

Parameters

You will be requested to make a parameter selection when setting up variables and when setting units of measure.

Press the **"Left"** or **"Right"** arrow key to show the previous or next possible selection for the requested parameter. Press **<ENTER>** to select the parameter showing.

Set Up of the HarvestData System

The remainder of this chapter explains how to set up the HarvestData System. Using the "Setup" menu in the HarvestData Software on the hand held computer, you will perform the following activities to ready the system for recording harvest data.

1. "Set Variables" menu selection.

   a. Select "Units", either ENGLISH or METRIC.

   b. Select "Standard Vbls" (Standard Variables); i.e. choose those you wish to record:

PLOT WEIGHT	(YES or NO)
% MOISTURE	(YES or NO)
TEST WEIGHT	(YES or NO)

   c. Set the decimal location for your recorded data.

   d. Add any additional text or numeric variables you wish.
2. Calibrate the plot bucket and test weight load cells.

You will need a known weight with which to calibrate the weigh bucket and the test chamber weight readings. It's best to use a weight of about 50% of the full scale range of the weighing sys tem, or a weight roughly equal to the largest plot weights that will be harvested (each of the plot and test weights).

3. Calibrate the moisture sensor (required if "% MOISTURE" is selected as a standard variable).

   You will need several samples of the grain to be harvested with known moisture content (wet weight basis).

4. Set a user password for data erasure (optional).

5. Download or generate a field map.

You will notice that the menu structure is set up in levels of priority. For example it is recommended to complete the setup menu (1st selection) first, and then work from the first sub-menu to the last. When all of the menu options are completed under setup, then go to field maps, etc.

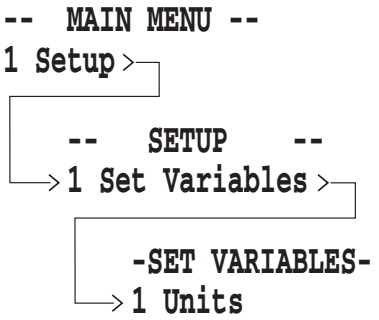
The first 4 steps are explained in this chapter. Field maps (step 5) are discussed in Chapter 4; since that is part of day to day operations.

Before proceeding with the set up, make sure that the HarvestData Software has been installed; as explained in the beginning of this chapter. Also, familiarize yourself with the menu structure on page 3-4, thereby giving you an overview of the procedures, activities, and diagnostic functions available.

Setting (selecting) Variables to Record

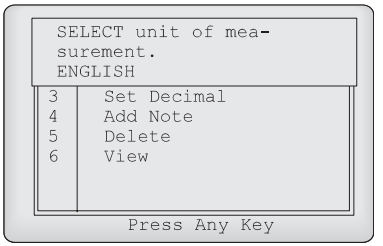
Before harvesting or taking field notes, begin by setting the variables.

- **Make this menu selection.**

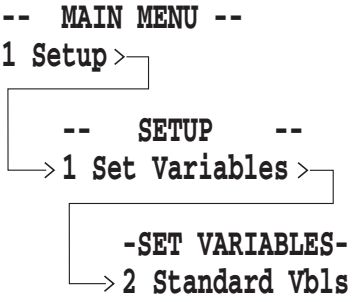


After you have selected “Units”, this screen will appear.

- **Press the "LEFT" or "RIGHT" arrow key to toggle between English and Metric. Press "ENTER" to finalize your choice.**

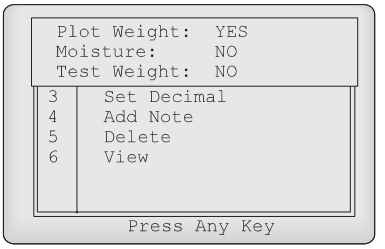


Standard Variables



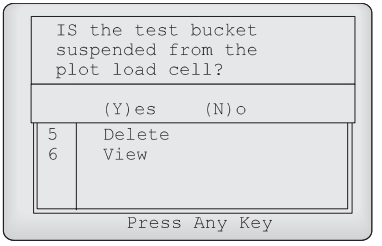
Next, select which of the harvest data variables you wish to record.

- **Make this menu selection**

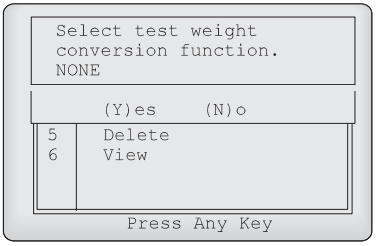


- **Press the left and right arrow keys to toggle between *YES* and *NO*. Press the *UP* and *DOWN* arrow keys to move between selections.**

✏ **Note: If you plan to use the system to take *only* field notes (rather than harvest data) it is recommended that you indicate 'NO' on all of these harvest variables.**



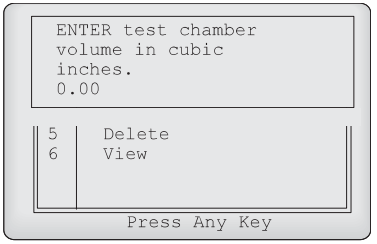
If you indicate YES to Test Weight, this screen appears to make sure the weight recording configuration is properly handled in the software. For most systems, the answer is YES.



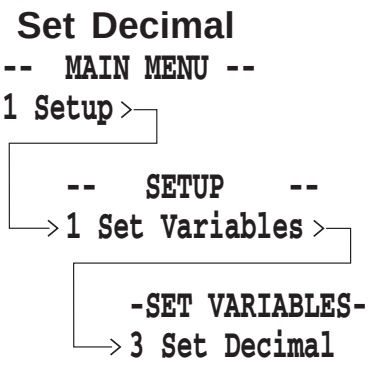
- **Press the *left* and *right* arrow keys to toggle between VOLUMETRIC WT and NONE, followed by <*ENTER*>.**

This will read "in cubic inches" if the choice of units is "ENGLISH" and "in cc's" if you choose "METRIC".

By keying in the test chamber volume, the units of recorded test weight will no longer just be pounds, or kilograms. In English, you will see lbs./bu, and in metric the units will be kilograms/hectoliter.

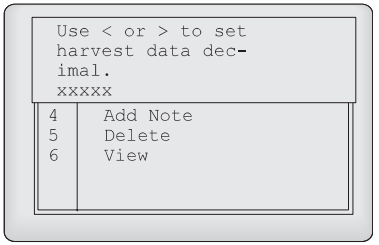


This menu selection gives you a screen to set the decimal position of your harvest data.



The harvest data fields are always 5 characters wide. Moving the decimal point with the **"LEFT"** or **"RIGHT"** arrow keys gives you the following choices:

xx.xx two digits after the decimal point
xxx.x one digit after the decimal point (default)
xxxxx no decimal point

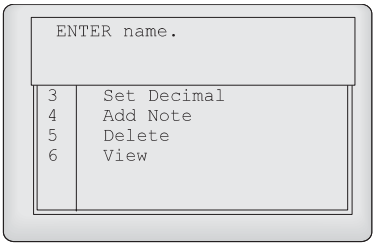


- **Press <*ENTER*> or <*ESC*> to return to the menu.**

Additional Notes

```
-- MAIN MENU --
1 Setup
-- SETUP --
   1 Set Variables
   -- SET VARIABLES --
   4 Add Note
```

This menu selection is for those who wish to record text or numeric observations only, or in addition to the standard harvest data variables.



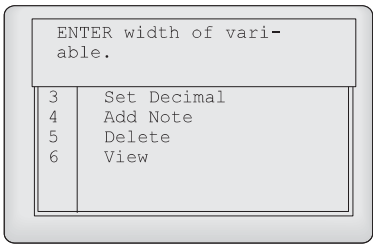
- **Key in up to 8 alpha characters for a name of the variable. Press <*ENTER*> when finished.**

✏ **Note: <u>There are two special note names: "barcode" and "seq#" that perform special functions:</u>**

"Barcode" lets you scan in (or key-in) a value for each plot AFTER the plot has been harvested and the buckets dumped. This is designed for those who wish to bag each sample and scan a corresponding identification to those bagged samples.

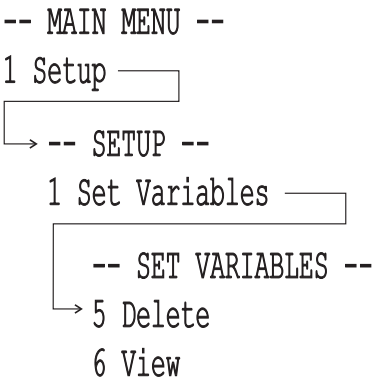
"Seq#" automatically assigns an incrementing value to each harvested plot. This lets you automatically record the order in which the plots were har vested.

✏ **Note: The "Seq#" is set up as a default paramter. If you do not want this vari able, simply delete it using the *Delete Variables* sub-menu.**



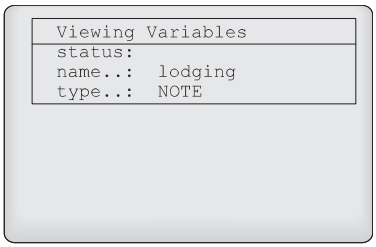
- **Key in the number of characters for a field width of the variable. A maximum of 16 may be used.**

Delete or View Variables

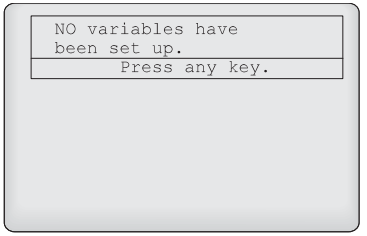


These last two menu items under "SET VARIABLES" allow you to delete or view any of the additional variables you may have set up.

In either case, use the <***LEFT***> or <***RIGHT***> arrow keys to review the additional variables you have defined. In the case of "Delete Vbl", press to delete the variable showing on the display.



If there are no variables, this screen appears.



! Important:

The variables and other choices you have set up at the time of first field map usage are those which will remain associated with that field map until the data is erased. Variables cannot be added to or deleted from the set associated with the field map after the map is created!

For example, if you set up and use MAP1 after having set up variables PLOT WEIGHT, MOISTURE, and DROPPED EARS, then deselect MOISTURE, and delete DROPPED EARS, you will continue to see all three variables when harvesting with MAP1. However, if you now generate a MAP2 and harvest with it, you'll only see PLOT WEIGHT.

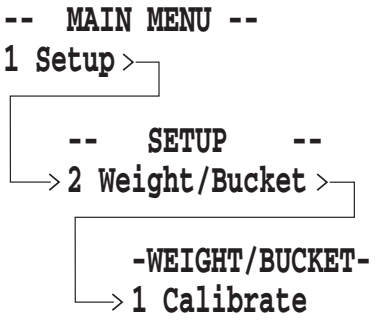
✏ **The rule is: The set of variables (as defined in the "SET VARIABLES" menu activity) existing at the time of first map usage is the set which will always be associated with that map; until you erase the data or that map. If you wish to record a variable for a specific map, make sure that the variable is set up BEFORE the map is generated.**

Weigh Bucket and Test Chamber Calibration

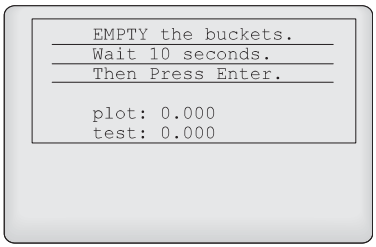
You must select harvest variables, according to the procedures of the previous section, before doing the weight calibration.

The accuracy of weight measurement of the plot and test weights depends on your performance of these steps which comprise the system weight calibration.

- **Make this menu selection.**

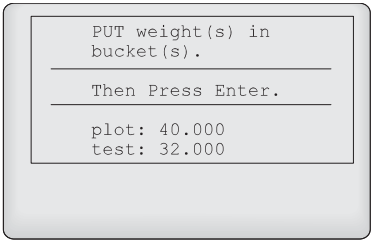


The screen of the hand held will prompt you.



Using the Calibration Weights

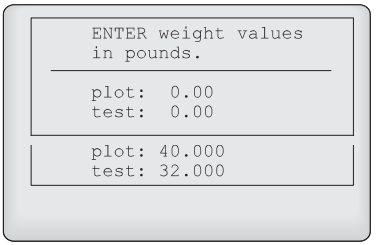
The figures showing by the “Plot” and “Test” prompts, in the display above, are percent of full scale range of the load cells, and will vary from 0.0 to 100.0. The figures you see on this display with the buckets empty, represent the percentage of the system weighing range being used by the weight of the plot bucket and test chamber.



Proceed through the weight calibration as follows:

- **Press "ENTER" to register the “zero” or tare weight values in memory.**
- **Place the calibration weights in the buck ets.**

Wait for the percent full scale readings to settle (about 10 seconds.)



- **Press "ENTER" to register the “weighted” measurement of the calibra tion.**

Now the prompts will ask you for the values of the calibration weights.

- **Key in the values of the calibration weights being used for the respective buckets (regardless of whether one load cell is suspended from another. Example: If you have a 5 lb. weight in the plot bucket and a 3 pound weight in the test bucket, enter 5 and 3, respectively.)**

✏ **Note: If you have previously selected units of measure as metric, the display will prompt you for calibration weights in kilograms (KGS).**

- **Press "ENTER" after having entered the test chamber calibration weight value.**

This completes the system weight calibration procedures. For best calibration accuracy, you should use a calibration weight approximately the same as the plot weights you intend to harvest. If this value is smaller than about 25% of the full scale range of the load cell being used on your system, you should get a smaller capacity load cell for your system. Calibrate the load cells with the combine running to ensure that voltage levels approximate those at harvest.

Calibration of the load cells is typically a one time exercise, and should only need to be repeated if you change load cells or electronic recording equipment on your combine. The <F6> key allows you to retare the plot bucket and test chamber during harvest, to account for any dust or trash accumulation on the weighing apparatus.

Bucket Door Timers

Bucket door timers refer to the length of time (in seconds) that each door is open, closed, or is in the transition state between open and closed. Total cycle time for an individual bucket is the accumulation of the bucket opening transition time, plus the bucket open time, plus the bucket closing time (see Figure 3-1). The way the HarvestData System handles door timers depends upon the type of bucket system.

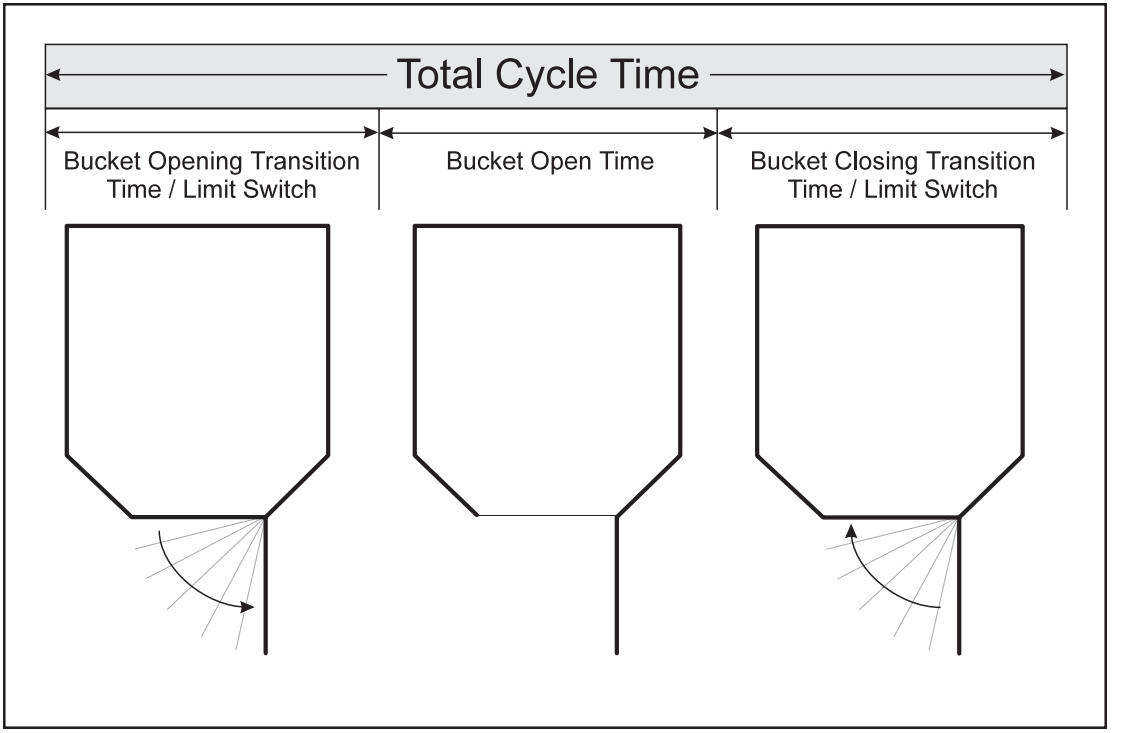


Figure 3-1
Bucket Cycle Time

Bucket Opening Transition Time

Bucket opening transition time is determined by the opening transition timer or, if using a limit switch, the time the door takes to travel to the limit switch. The transition timer or limit switch option is set in the **(1)SETUP: (2)WEIGHT/ BUCKET: (4)CONTROL** menu. Setting the transition timer or limit switch option is discussed later in the *Setting the Hopper and Bucket Door Timers* section.

Bucket Open Time

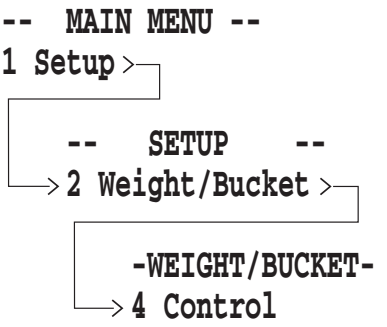
Bucket open time is determined by the Hopper, Bucket, Test Delay, and Moisture Timers set in the **(1)SETUP: (2)WEIGHT/BUCKET: (2)TIMERS** menu. Setting up the bucket open timer is discussed later in the *Setting the Hopper and Bucket Door Timers* section.

Bucket Closing Time

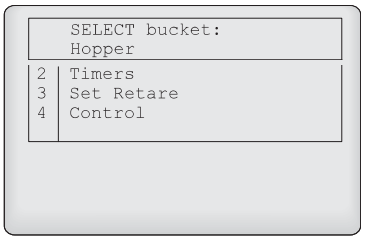
Bucket closing time is determined by the closing transition timer or, if using a limit switch, the time the door takes to travel to the limit switch. The transition timer or limit switch option is set in the **(1)SETUP: (2)WEIGHT/BUCKET: (4)CONTROL** menu. Setting the transition timer or limit switch option is discussed later in the *Setting the Hopper and Bucket Door Timers* section.

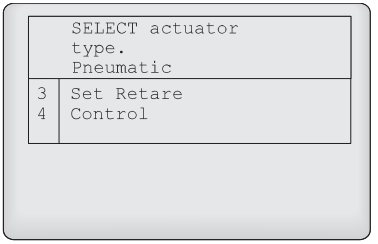
Changing the Bucket Setup

The Control menu allows you to change the bucket setup. The bucket setup controls how the SCCU opens and closes the buckets on the combine. Different types of bucket actuators require different signals. The following actuator types can be controlled by the software: Pneumatic, Hydraulic, Electromechanical, and Windshield Wiper. You should verify that your HarvestData System has been configured for the correct type of actuator on your combine by following the instructions below:

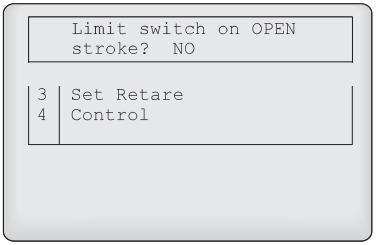


- **Use the "RIGHT" and "LEFT" arrow keys to view the four bucket selections (Hopper, Plot, Test, and Aux). Press "ENTER" to change a particular bucket setup, or press "ESC" to save the bucket setup and return to the menu.**





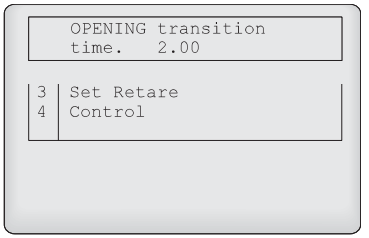
- **Press the "RIGHT" and "LEFT" arrow keys, to view the five actuator selections (None, Pneumatic, Hydraulic, Electrome chanical, and Windshield Wiper). Press "ENTER" to choose an actuator type for the currently selected bucket or press "ESC" to back up to the bucket selection screen.**



If you choose anything other than “None” in the actuator selection screen you will see this screen.

The HarvestData software needs to know whether or not the actuator for the selected bucket uses a limit switch or transition time to end the signal to the actuator when opening or closing the bucket door.

- **Press the "RIGHT" and "LEFT" arrow keys to select either “NO” or “YES” in answer to the question, or press "ESC" to back up to the actuator selection screen.**

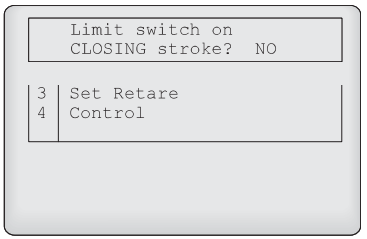


If you choose “YES” for the limit switch on the open stroke, you will not see this screen. Go to the next screen. If you choose “NO”, and either Hydraulic, Electromechanical, or Windshield Wiper as the type of actuator for the current bucket, you will have the opportunity to enter the opening transition time for your bucket door.

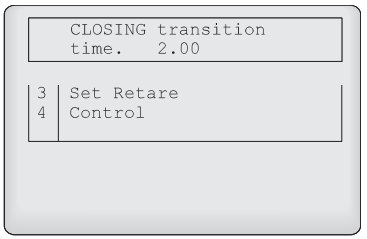
- **Enter the amount of time, in seconds, it takes your actuator to completely open the selected bucket.**

Fractional times (e.g. 2.5) are allowed.

- **Press "RIGHT" and "LEFT" arrow keys to choose “NO” if your actuator for the selected bucket does not require a limit switch to end the closing stroke or “YES” if it does require a limit switch.**



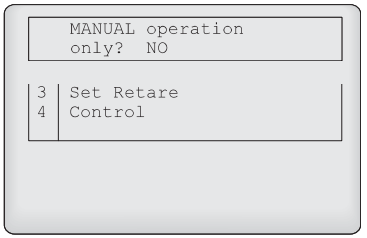
If you choose “YES” for the limit switch on the closing stroke, you will not see this screen. Go to the next screen. If you choose “NO”, and have either Hydraulic, Electromechanical, or Windshield Wiper as the type of actuator for the current bucket, you will enter the closing transition time for your bucket door.



- **Enter the amount of time, in seconds, it takes your actuator to completely close the selected bucket.**

Fractional times (e.g. 3.7) are allowed.

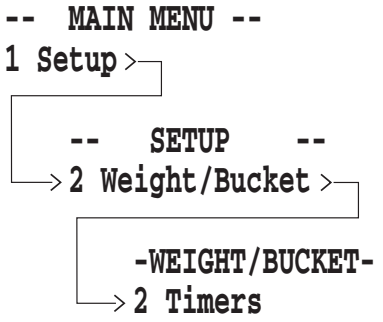
Answering “YES” in this screen forces the SCCU to only open or close the selected bucket when the front panel switch for that bucket is activated, regardless of the position of the Auto/Manual switch on the SCCU. You might choose this option if you have connected the Auxiliary actuator to a hopper that redirects grain flow under manual operator control or some other process that requires combine operator interaction. Most applications require a “NO” in response to this question.



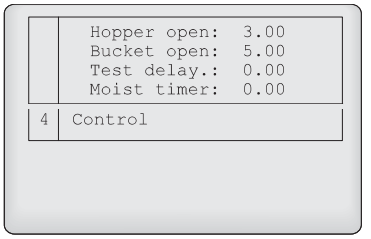
■ **Press the "LEFT" or "RIGHT" keys to answer “YES” or “NO”.**

After answering this question, you are returned to the bucket selection screen to continue the bucket setup.

Setting the Hopper and Bucket Door Timers



■ **Make this menu selection.**



For normal operation, leave the readings as they show. Values are in seconds. The meanings of Hopper Open, Bucket Open, Test Delay, and Moist Timer are as follows:

Hopper Open

This is the duration the hopper door is open. Set the time to zero if you wish the hopper door to remain open. This may be the case when each plot is taken directly into the weight bucket. Set it to zero if you wish the hopper door to remain open (i.e. the hopper door open signal will remain active all of the time). This may be the case when each plot is taken directly into the weight bucket.

Bucket Open

This is the duration the plot bucket and the test chamber doors stay open. If a limit switch is used in the circuit, such as is the case with linear electrical actuators and windshield wiper motor actuators, the active signal will be turned off when the limit switch is actuated. On pneumatic systems that depend only on the bucket door open signal to hold the door open, the door will close immediately at the expiration of the bucket open timer. For hydraulic actuators, this should be set to the length of time required for the opening stroke.

Test Delay

Normally, you will set this entry to zero. If you are harvesting large plots, and the grain buildup in the plot bucket interferes with the readings of the test chamber, you can specify a Test Delay time. Test Delay time causes the plot weight to be recorded and the plot bucket to be dumped. Test chamber weight and moisture will then be recorded. When the Test Delay time expires the chamber door will open. The Test Delay time must be long enough for the plot door to open and the test weight readings to settle. Three to four seconds is recommended.

Moist Timer

Normally, you would leave this setting at zero. In some situations, to avoid drift due to the packing effect caused by vibrations while the sample is in the test chamber, users have frozen the moisture readings after a set period in the test chamber. By using the timer, moisture reading consistency can be improved. If this is desired, set the value to at least 3 seconds longer than the “Hopper open” time. The moisture readings will all be “locked in” at the same number of seconds after entering the chamber, thus preserving compaction values. This is similar to the way most bench top moisture analyzers work.

When you are finished reviewing the values:

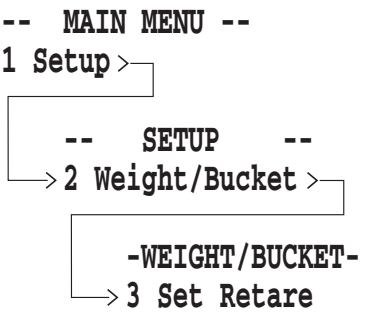
- **Press the "DOWN" arrow key or "ENTER" key until you return to the “Weight/Bucket” menu, if you want to save your changes.**

or

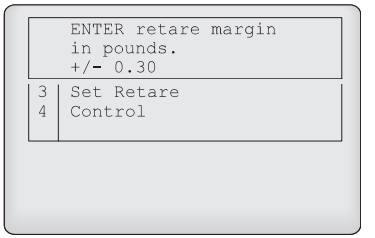
- **Press "ESC" if you don’t want to save the changes you made.**

Setting the Retare Margin

During the harvest activity, the HarvestData software checks that the bucket has returned to it's tare weight before closing the plot bucket door. In case it does not return to tare weight, indicating that perhaps grain or trash has lodged in the plot bucket, it prompts you with a message indicating system status, and asking for user input to resolve the problem. The retare margin adjusts the sensitivity of the system for this stop-and-check sequence. To do this, make the menu selections shown.



After setting the retare margin you are prompted with this screen. The units are LBS or KGS, whichever you have selected in the "Units" setup.



✏ **Setting a low weight (high sensitivity) here may cause a frequent warning message and necessitate resolution each time.**

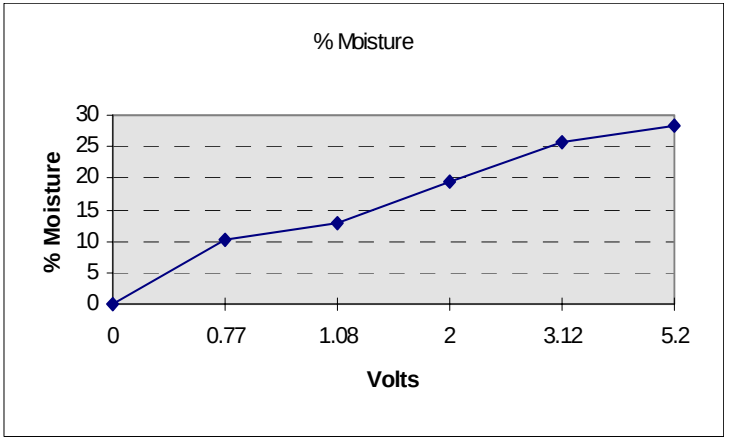
! Warning:

If you get a message during harvest that the weigh bucket did not retare, and if you go back to clean out the system, set the operator's SCCU switch to "manual" first in order to avoid the system automatically closing the bucket door on your hand!

Grain Moisture Calibration

Creating a Moisture Sensor Curve

A grain moisture sensor curve is a set of "known" data points to which the system refers when doing a measurement of moisture on a sample of grain. Graphically, it would appear like this:



Volts	% Moisture
0.000	0.0
0.770	10.3
1.080	12.9
2.000	19.3
3.120	25.7
5.200	28.2

Preparation

In proceeding with this exercise, the entire system must be fully operational, with the workings of the moisture sensor completely checked out (see "DIAGNOSTICS" menu.)

Here's a check list to follow in preparing to create the moisture curve:

- **Have at least 3 samples of different moisture content grain available, with each sample marked.**

They should be as widely spread over the expected range of measurement as possible. Ideally, they will have been measured with a bench top grain moisture tester within about an hour of the current time, and will have been sealed in a container between that calibration measurement time, and now. The samples must be large enough to fill the test chamber completely. After recording the sensor reading for each sample, place the sample back in its sealed container to minimize exchange of sample moisture with atmospheric moisture.

The HarvestData software will accept up to 20 samples for each moisture curve.

- **Plug the HM FieldBook into the HarvestData system console.**

- **Turn on the combine and run the engine and thresher at the speed at which will be used during harvest.**

- **Turn the SCCU power on.**
- **Select the “Moist Volts” option in the “DIAGNOSTICS” menu to view the raw moisture sensor reading.**

With a moisture sensor present on the system, this reading should be stable, and should settle on “0” with an empty test chamber. This reading should increase as you cover the blade completely with your sample.

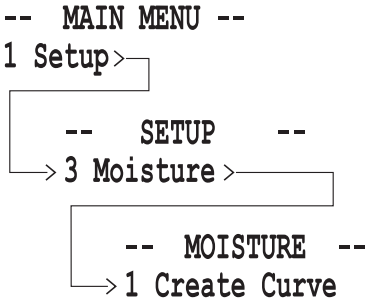
✏ **Note: If the reading is not "0", then press <*F6*> to retare the buckets. (Make sure the bucket is empty before pressing <F6>.) After retaring, the reading will be "0".**

- **Switch the SCCU console to “MANUAL”, so that you can operate the hopper, plot bucket, and test chamber doors under manual control.**

- **Close the test chamber door,**

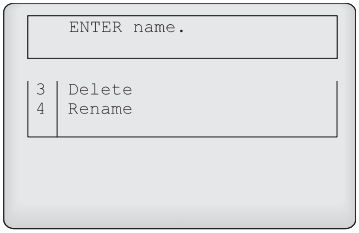
Calibration

- **Press <*ESC*> twice to get back to the “Main Menu”.**



- **Make this menu selection to create a moisture sensor curve.**

The first screen requests that you enter a name for the moisture curve.



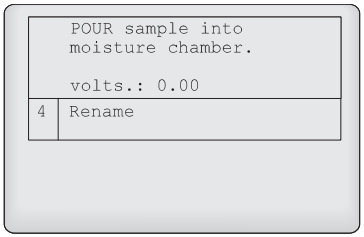
- **Key in the alphanumeric name you wish for the moisture curve to be created.**

✏ **Use a name that is similar to the type of grain that the moisture calibration curve is being calculated for; such as "CORN" or "WHEAT", or "WET-CORN".**

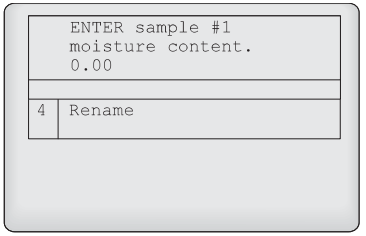
When entering harvest mode you will be asked to select one of the moisture curves you have entered (provided that you have included the grain moisture variable in your setups and that it is active upon entering the harvest menu option). Therefore, use a name which you will remember, and not confuse with other names in the system. If you key in a name which is already in use, the HM-FieldBook will ask whether you wish to overwrite the existing file.

The lower left corner of the next screen should be showing the percent of moisture full scale reading. With an empty chamber, it should be “0”. If it's not “0”, you will need to retare your bucket by using <F6> as explained in the *Retare Bucket* section on page 4-15 of this manual. When the percent full scale reading is “0” with an empty chamber, you are ready to proceed with your calibration.

- **As prompted by the message on the screen, pour the sample in the chamber.**



The lower left corner of the display shows the percent of moisture full scale reading produced by this sample of grain.



- **On the next screen, key in the moisture content of this sample, in percent mois ture wet weight basis (pct moisture = $MOIST_{wet}$ / ($MOIST_{dry}$ + $MOIST_{wet}$), which is the standard of measure of bench top grain moisture measurement systems.)**

- **Press "ENTER".**

- **Use the manual switches to open the test chamber door to pass the sample through. Catch the sample, and store it back in the sealed container.**

Repeat the previous steps for each sample of different moisture you have. You may use an empty test chamber for one of the samples, corresponding to 0 percent moisture.

- **Press "ESC" when all of the samples are entered.**

This completes the moisture sensor calibration.

You may want to check the sample voltages again in the (3)MOISTURE VOLTS option of the (5)DIAGNOSTICS menu and compare them with the corresponding curve. This can be done by following the steps in “Editing a Moisture Sensor Curve” on page 3-41. The voltages should be very similar.

Creating a Trial Moisture Sensor Curve

If you have moisture curve data that you wish to enter through the "Edit Curve" menu option, but do not have a moisture curve name assigned, you still need to use the "Create Curve" menu option to do so.

- **Connect the hand held to the SCCU and power it up as if you were going to calibrate moisture.**
- **Proceed with the above set of steps using an empty bucket and 0% moisture for all of the entries.**
- **Refer to *Editing a Moisture Curve* (below) to edit your data.**

✏ **Note: You will need at least two sets of points in order for the curve name to be saved.**

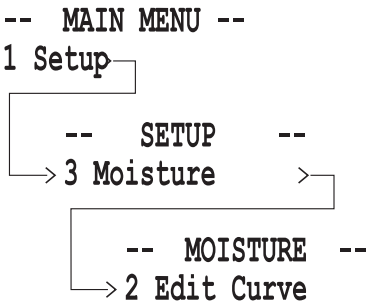
! Warning:

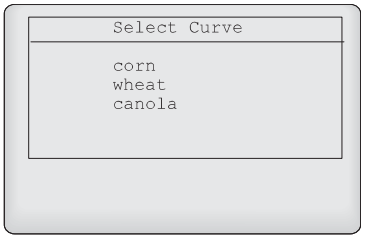
If you change moisture sensors on a HarvestData System, you must recalibrate for the new sensor.

Editing a Moisture Sensor Curve

The moisture sensor curve must exist before it is available to edit. If it does not already exist, create it using the steps in the previous sections. If it does exist:

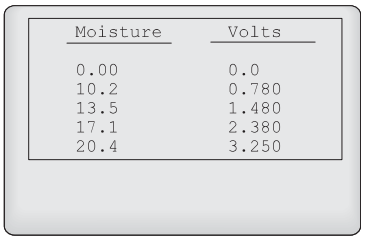
- **select "Edit Curve" from the "MOISTURE" menu.**





You are now presented with a list of all the existing curves in the hand held computer.

- **Select the desired curve using the "UP" or "DOWN"arrow key, followed by "ENTER" once the arrow is opposite the desired selection.**



Now the hand held presents you with a double column of numbers representing the moisture curve.

Use the following keys to edit the moisture/volts pairs:
UP and **DOWN** arrows select the line to edit.

LEFT and **RIGHT** arrows select which column to edit.

Keying **NUMERIC** keys (including the decimal point and minus (-) sign), followed by **"ENTER"** or any of the **ARROW** keys replaces data in the curve.

The arrow key applied after entry of a string of digits causes both the **ENTER** function and the cursor to move in the implied direction.

Use **"BLUE" + "RIGHT ARROW"** to insert a blank line into the curve after the selected line.

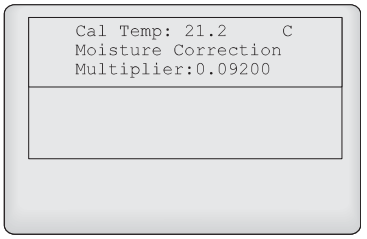
Use **"BLUE" + "LEFT ARROW"** to delete the selected line from the curve.

Use **"ESC"** to edit the temperature compensation (see page 3-43). If no temperature compensation is desired press **"ESC"** again.

Setting the Grain Moisture Temperature Compensation

Grain moisture readings taken at temperatures different from the temperature at which the calibration curve was calibrated need to be corrected back to the calibration temperature. The HM-400 HarvestData System can do this correction automatically. However, you may wish to adjust the correction coefficient.

✏ **Note: If you do not want to use temperature compensation, leave the values at 0.0 and press <*ESC*> to return to the moisture menu.**



The temperature compensation screen (right) automatically appears after pressing "ESC" in the Edit Moisture screen. "Cal Temp:" displays the temperature at which the system was calibrated. "Moisture Correction Multiplier:" displays the % moisture change for each degree Celsius difference between the calibration temperature and the current temperature.

- **To change the Cal Temp or Moisture Correction Multiplier, use the *"UP"* and *"DOWN"* arrow keys to go to the field you would like to change. To save the number that has been keyed in, press <*ENTER*>. Press <*ESC*> to exit the compensation screen.**

To illustrate how moisture compensation works:

The moisture sensor reads about .092% less moisture for each degree C that the sample is below the temperature at which the system was calibrated. Assuming the calibrations were done at 20° C, and the current corn temperature is 10° C, .092 * 10, or .92% moisture needs to be added to the measurement to correct for the cooler temperature.

Likewise, if the sample corn temperature is higher than the calibration temperature, a correction needs to be subtracted from the measured value.

The HarvestData Software does the correction automatically if you enter the correction coefficient in the moisture curve after editing that curve in **(1)SETUP: (3)MOISTURE: (2)EDIT** screen.

The two numbers to which you have access are:

Cal. Temp: 21.2
Corr. Coef: .092

Normally you won't change the calibration temperature (Cal. Temp) from what it was when you did the calibrations. Doing so will shift your entire curve up or down.

The correction coefficient is roughly .092 for corn. This may vary slightly for other grains and you may wish to adjust it based on your experience with other grains.

The equation for the moisture correction value for temperature is:

Corr. Moist. = Corr. Coef. * (Cal Temp - Actual Temp)

From our example above:

Corr. Moist. = .092 * (20.0 -10.0) = 0.92% moisture

Suppose that the system measured 19.5% moisture before the correction. The final recorded and displayed moisture content would be 19.5 + 0.92 = 20.4% moisture.

Temperature Compensation Summary

Complete moisture curve calibration includes:

1) Editing the moisture curve (Menu **(1)SETUP: (3)MOISTURE: (2)EDIT**) after having entered the moisture curve.

2) Making sure a correct temperature setting (°C) is showing for "Cal. Temp:"

3) Adjust the Corr. Coef. as needed for your crop. In the absensce of any further information, use 0.092.

4) Make a note of your numbers for future reference in a field notebook.

Moisture Compensation Diagnostics

Moisture compensation diagnostics allow you to view current temperature, corrected moisture percentage, and the amount of moisture compensation.

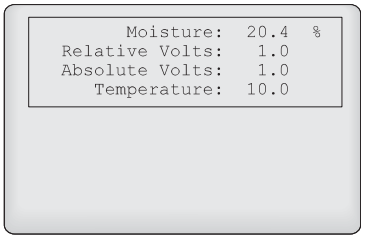
In order for the HarvestData Software to display the correct diagnostic values of a given moisture curve, you must first make sure that the *moisture standard variable* is active (see the *Setting (selecting) Variables to Record* section earlier in this chapter); and make sure you've selected the desired moisture curve in the harvest menu.

✏ **Note: You can select a moisture curve by going into menu *(3)Harvest*, then when asked which moisture curve you want to use, highlight the desired curve, press <ENTER> and then press <ESC> until you are back to the main menu.**

```
-- MAIN MENU --
5 Diagnostics
-- DIAGNOSTICS --
   3 Moisture Volts
```

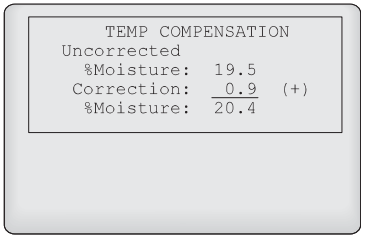
After you've selected the moisture curve you can view the moisture compensation diagnostics for that curve.

- **Make this menu selection.**



The first Moisture Volts screen displays the current compensated percent moisture reading along with the current temperature (in degrees C.)

- **Press <*ENTER*>**

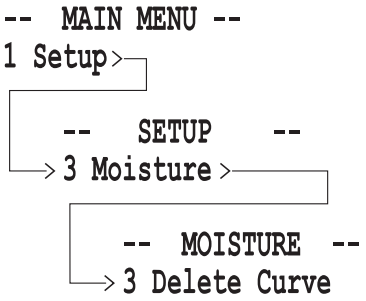


The second Moisture Volts screen displays the uncorrected percent moisture reading, the correction factor, and the corrected percent moisture reading (the moisture reading that has compensated for temperature differential.)

*Corr. Factor = Corr. Coef. * (Cal Temp - Actual Temp)*

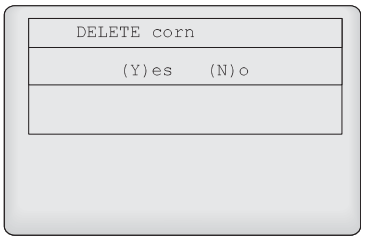
- **Press <*ENTER*> to toggle back and forth between the two moisture diagnostic screens. Press <ESC> to exit.**

Deleting a Moisture Sensor Curve



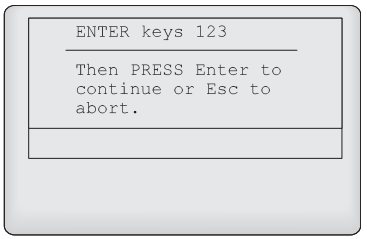
- **To delete a moisture curve, make this menu selection.**

If you have set up a password, you must supply it before being allowed to continue. Beyond that point, you are asked to select the name of the moisture curve to delete using the ***ARROW*** keys and pressing **<*ENTER*>**.



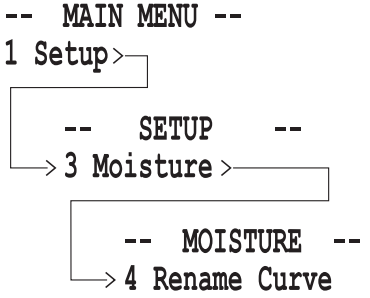
Once you have selected the name of the curve to eliminate, a confirmation is requested.

Upon pressing "Y" for yes, the program will request an additional verification. This keeps you from erroneously erasing a moisture curve.



- **If you wish to delete the curve, follow the instructions on the screen. If you wish to abort the "delete curve" option, press <*ESC*>.**

Renaming a Moisture Sensor Curve



Here's the menu path for renaming a moisture sensor curve.

You are requested to select the name of the curve to rename, and to key in the new name for the curve.

Setup Files

A setup file stores the following information:

- Weight Calibration Coefficients
- Bucket Setup Information
- Moisture Calibration Curves

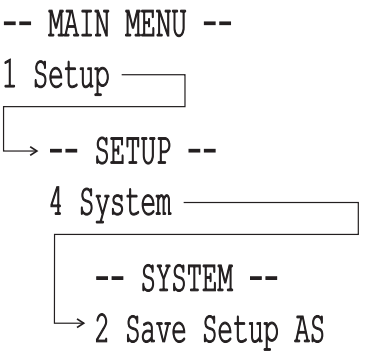
All of this information is defined in the **(1)SETUP: (2)WEIGHT/BUCKET** sub-menu and the **(1)SETUP: (3)MOISTURE** sub-menu.

You may find it advantageous to store multiple setup files on your hand held computer. This may be particularly useful if you plan on using the same hand held with multiple HarvestData Systems.

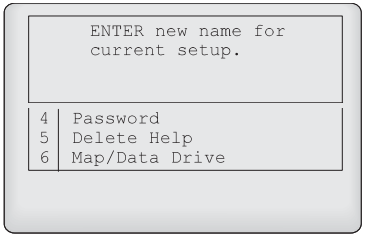
Creating Setup Files

Setup files may only be generated in the HarvestData Software on the hand held computer. The default setup file is automatically generated the first time you run the HarvestData Software.

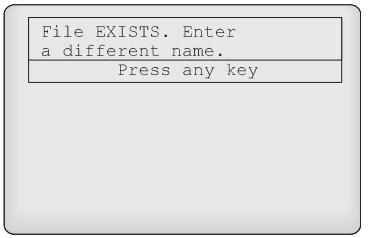
To create an additional setup file, save the existing setup file under a different name. To do this:



- **Make this menu selection.**



- **Key in the new setup file name. Press <ENTER> when finished, or <ESC> to abort.**



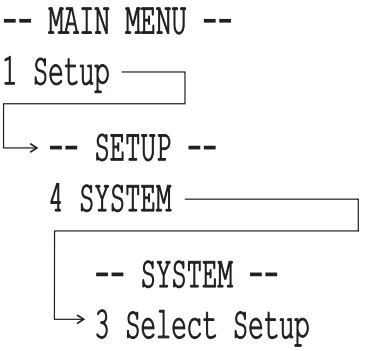
If, in the above step, you enter the name of a setup file that already exists on the hand held, you will see this screen. Duplicate names are not allowed.

- **Press any key to return to the previous screen and enter a different name.**

After you've saved a setup file under a new name, you can go back and re-load that same setup file at any time. You can create multiple set-up files to be used at your convenience.

Selecting a Setup File

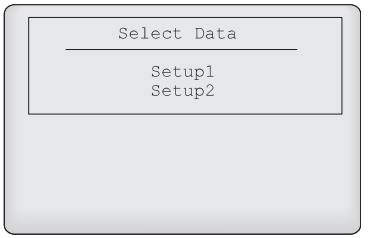
Like harvest data and field maps, setup files can be uploaded to your desktop PC. You can save the setup files on the PC and reload them to the hand held when you're ready to use them again (see Appendix B: DataLink for more information on uploading and downloading files).



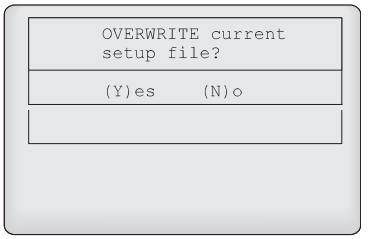
- **Make this menu selection to choose one of the setups that you have previously created or downloaded to your hand held.**

✏ **Note: When saving setup files, keep in mind that moisture curves are dependent on the sensor used during the calibration. Curves should not be created on one sensor and then used with another sensor.**

- **Use the *UP* and *DOWN* arrow keys to scroll through the selections, and the <*ENTER*> key to make the selection.**

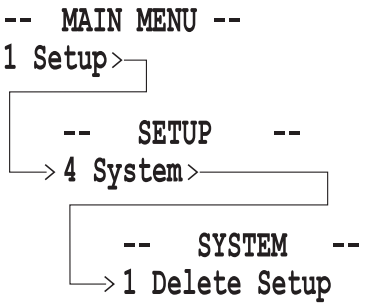


Since the HarvestData Software assigns a special name to the current setup file, you are asked if you want to overwrite the existing setup.



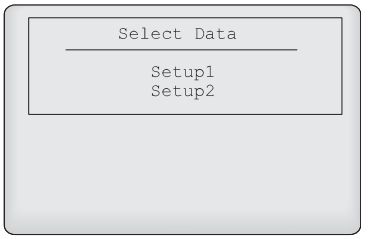
- **Answer "Y" for yes if you want to over write the current setup. Answer "N" if you want to save the current setup under a different name before overwriting it. Press <ESC> to abort.**

Deleting a Setup File



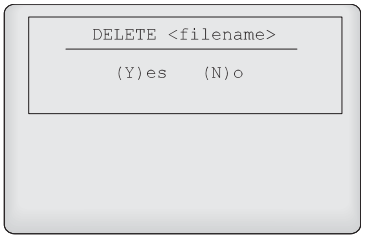
After downloading setups to the hand held computer from the PC, you may want to delete one. To do this:

- **Make this menu selection.**

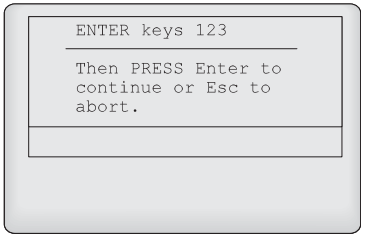


- **Use the UP and DOWN arrow keys to scroll through the selections, and the <ENTER> key to make the selection.**

The next screen requests verification of the action.



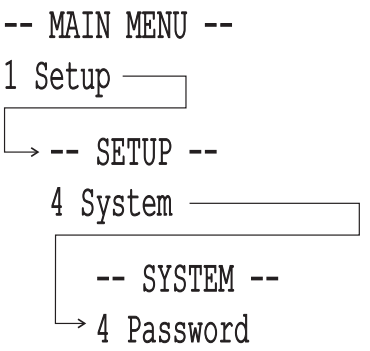
- **Press "Y" to confirm your selection.**



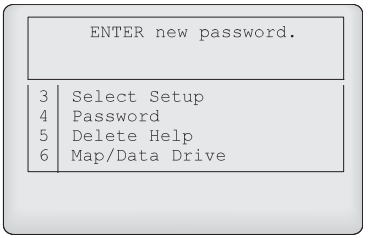
The HarvestData Software offers one final verification before erasing the selected setup file.

Set, Use, and Erase the Password

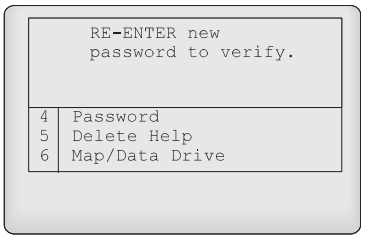
■ **Make this menu selection.**



If there is no password already in existence, you may enter your choice of passwords at this time. Dots will appear as each letter of the password is typed.



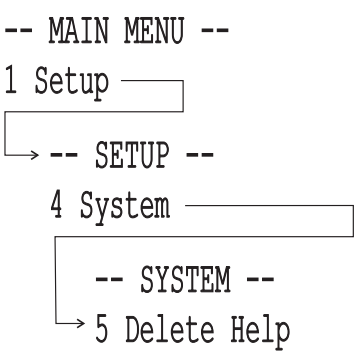
Just to make sure you haven't made a mistake, the machine asks you to verify your entry. If there's already a password, you must enter that password before being allowed to key in a new one. Should you choose to delete the password, proceed as if you were going to enter your password, but simply press **<ENTER>** instead of keying in any letters or numbers. It will ask you to verify as shown in the screens above; just press Enter again.



If you have forgotten your password, and need access to a password protected area, please call HarvestMaster technical support.

Password protection applies to erasure of data files, field maps, moisture curves, and changing from an existing password to another.

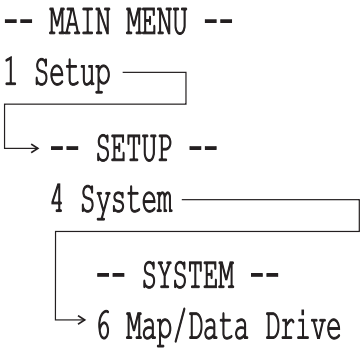
Deleting the Help File to Free Memory



Under the **(1)SETUP: (4)System** sub-menu, select the option to delete the help files. This will create additional space for approximately 240 additional plots worth of data.

Setting the Map/Data Drive

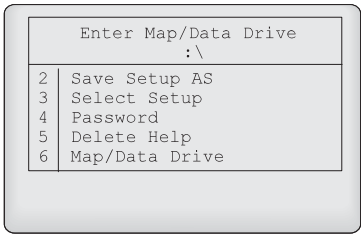
The MAP/DATA drive option lets you designate a disk drive to store harvest data and field maps on. To do this:



- **Make this selection**

- **You will be presented with this screen. Type in the letter of the drive on which you wish to store all of your data. Press <ENTER>.**

  Now the HarvestData software will write all of the data to the drive you just speci fied.



Chapter 4
System Operation

This chapter explains how to prepare field maps for harvesting, how to record harvest data, and how to record other user observations.

Field Maps

Use the Field Maps main menu option to create and manipulate maps of plots within the hand held. Each of the Field Map menu items are discussed below.

Generating a Field Map

Note: Remember that the set of variables (as defined in the (1)SETUP menu) existing at the time of first map usage is the set which will always be associated with that map; until you erase the data or that map. For this reason it is imperative that you have all variables set up prior to generating a field map.

Before you begin to generate field maps, please make sure you have done the following:

- Defined all variables you wish to have associated with the field map you're about to generate
- Calibrated load cells
- Generated moisture curves

Note: When you create field maps, the HarvestData software sets aside enough memory for you to collect data for each plot in your map. This eliminates the risk of running out of memory on your hand held.

```
--  MAIN MENU --
2 Field Maps>
```

```
   -- FIELD MAPS --
   1 Generate Map
```

The “Field Maps” selection from the main menu presents access to the field map options:

```
1 ->  Generate Map
2     View Map
3     Download Map
4     Delete Map
5     Rename Map
```

- **Press "ENTER" to select “Generate Map".**

```
      ENTER name of new
      field map.
      North40
3  Delete
4  Rename
```

You will be presented with this screen requesting the name of the new field map.

- **Key in a name of up to 8 characters in length.**

```
entries/rep...: 8
reps..........: 3
plots/range...: 10
start value...: 101
plot inc......: 1
rep inc.......: 100
route...: SERPENTINE
      Rating Order
```

After keying in an alpha-numeric name, under which the system will store your harvest data, you are requested to enter in values which define the field map you wish created.

- **Key in the values which represent the field map you want.**

Note: For instruction on generating field maps on your PC, see *Appendix F: Field Map Generation*.

Following are definitions of these fields.

Definitions

entries/rep:

The number of entries (sometimes termed treatments) to be represented in this map.

reps:

The number of replications of the entries (or treatments) of this map. The total number of plots that will be included in this map is entries multiplied by reps. For example; if there were 8 entries replicated 3 times, the total number of plots for the field map would be 24.

plots/range:

This is the number of plots wide in the field layout.

start value:

The plot number to be placed in the lower left corner of the map.

plot inc:

Plot increment is typically 1, and is the counting increment applied to the 1's place as the sequencing is advanced from one entry to the next in a single replication.

rep inc:

Replication increment is usually 100, with the hundreds place denoting replication in the plot number. However, it may be 1000 if there are more than 99 entries per replication.

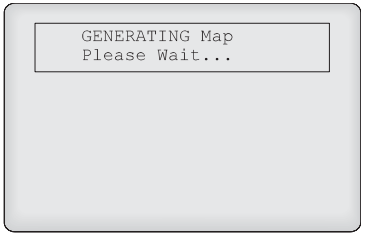
route:

There are two choices: SERPENTINE and SEQUENTIAL; select the one desired by pressing **"LEFT"** or **"RIGHT"** arrow key. Note that this implies the sequencing of plot number sideways across the study field, in the order that plots are usually rated (90 degrees orientation to harvest order, usually).

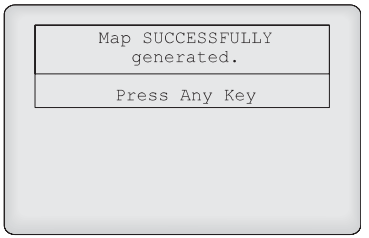
308	307	306	305	304	303
205	206	207	208	301	302
204	203	202	201	108	107
101	102	103	104	105	106

6 plots per range

Here is a map resulting from 8 entries, 3 replications, and a layout of 6 plots per range.

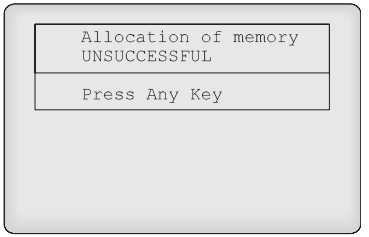


You will be shown a "wait" message while the map generates, which is usually only a few seconds; even for a fairly large sized map.



Field map generation is followed by this screen.

- **Press "ESC" or another key to leave this menu activity at this point.**



If you try to generate too large of a field map for the hand held computer, you'll see this message. Try again with smaller dimensions.

You don't have to pre-generate or download a field map. Once you have defined the harvest, or rating variables, you can go directly to menu option 3, "Harvest". Consult the *Generating a Field Map on the Fly* (later in this chapter) for further details.

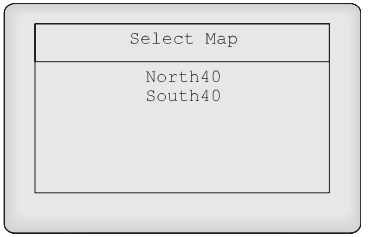
Viewing a Field Map

This menu option allows you to see the X-Y configuration of the selected field map.

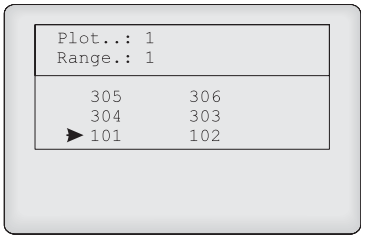
```
--  MAIN MENU --
2 Field Maps >

   -- FIELD MAPS --
  > 2 View Map
```

- **Select the field map to view by using the "UP" or "DOWN" arrow key followed by "ENTER".**



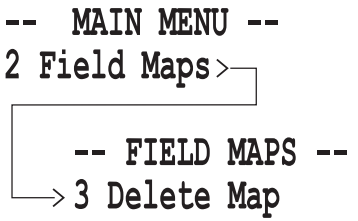
- **Use the arrow keys to position the FieldBook's screen over the portion of the map you wish to see (you may also use <CTRL> + <arrow keys> to move all the way to the edges, or <BLUE KEY> + <arrow keys> to move by the 20's).**



If the identifier is more than 8 alphanumeric characters then the identifier will be broken into groups of 8 characters and placed in multiple identifier holders in the data file.

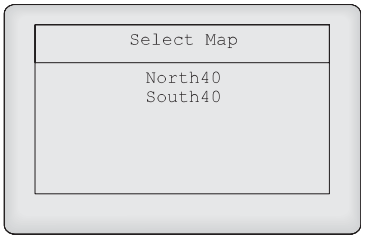
The arrow on the display points to the current plot position. As you move the arrow right and up to see the other plots, the display will window over the set of available plots in the map. The <ENTER> key will allow you to view any other identifiers which have been downloaded.

Deleting a Field



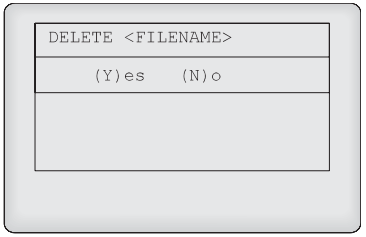
- **Select this menu option.**

You are then presented with a field map name choice screen.

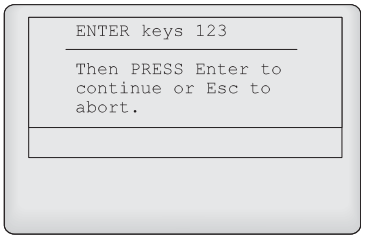


- **Use the "UP" and "DOWN" arrows to scroll through the selections.**
- **Press "ENTER" to make the selection.**

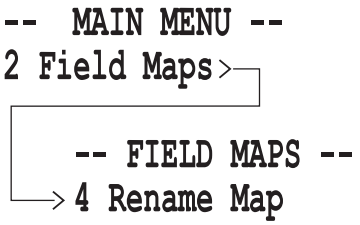
The next screen requests verification of the action.



This additional screen gives you one last chance to back out before erasing the selected map, and any recorded data which you may have acquired, with it.

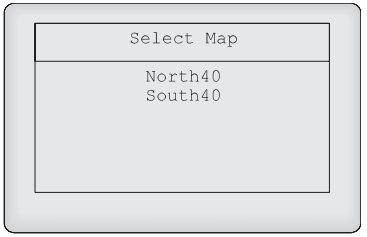


Renaming a Field Map

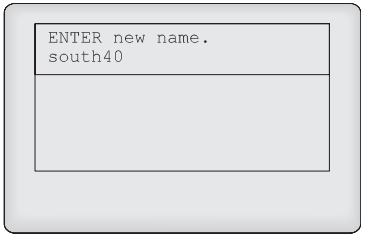


- **Select this menu option.**

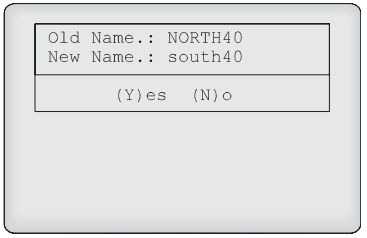
You are then presented with a list of map names.



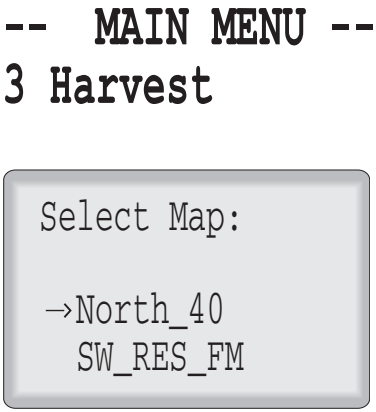
■ **Use the "UP" and "DOWN" arrow keys to scroll, and press "ENTER" to select.**



■ **Enter your new map name.**



■ **Confirm the change of map names.**



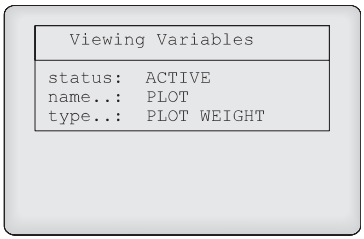
- **Select this menu option to collect harvest data.**

- **Use <*UP*> or <*DOWN*> arrows to scroll through the selections. Press <ENTER> to make the selection.**

Note: If you do not have a map created at this point, it is possible to do so on the fly by pressing "BLUE" + "RIGHT" arrow key. For more information on this sequence, see the section *Generating a Field Map on the Fly* (page 4-13).

Activating and De-Activating Variables

Use the <***UP***> and <***DOWN***> arrow keys to activate or deactivate the variable. Normally it would be left ACTIVE.

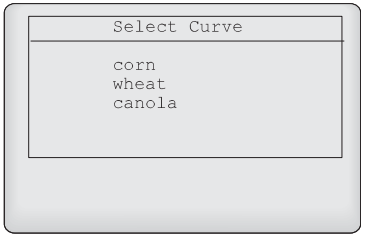


- **Press <*ENTER*> to continue the begin ning harvest sequence, or use the <*LEFT*> and <*RIGHT*> arrow keys to view the other variable names that will be included in the collection of harvest data.**

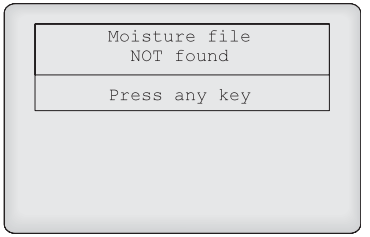
! Important:

Whatever variables you have set up in the master variables template, will be those associated with a specific map name from the point in time where that map was first selected. This is not changeable unless you delete the associated data file.

Selecting the Moisture Curve for Harvest Data



Use the **<*UP*>** and **<*DOWN*>** arrow keys to select the moisture curve to use for this session of collecting harvest data. This can be re-selected each time you enter a field map.



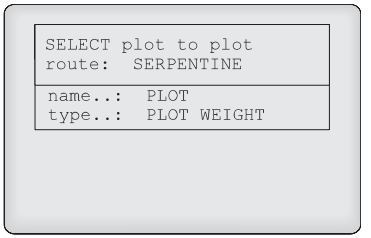
If you get this screen, it means you have not entered any moisture curves. You have 2 choices:

1) Go back and define a moisture curve.

2) Hit **<*ESC*>**, restart *Harvest*, scroll to the moisture variable, and set it to "*NOT ACTIVE*".

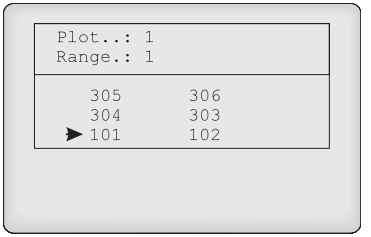
Selecting Harvest Routes (or Rating Routes)

- **Use the <*LEFT*> and <*RIGHT*> arrow keys to select between the choices of "SERPENTINE", "SEQUENTIAL", or "CIRCULAR". Press <*ENTER*> to proceed.**

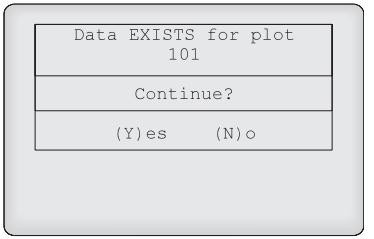


This screen shows where you are on the field, and allows you to reposition your starting point.

- **Use the arrow keys to move the " □ " on the screen to the desired position.**

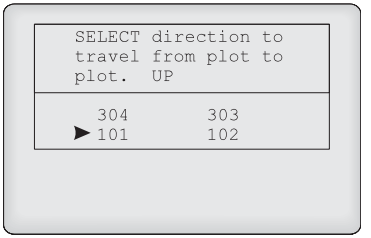


If the data storage cell for the plot on which you have chosen to start already has data in it, you will get this message. Choosing "N" for "no" brings back the repositioning menu.

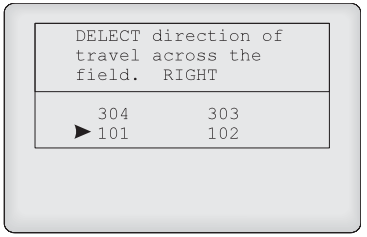


- **Use the "LEFT" and "RIGHT" arrow keys to scroll through the selections of "UP", "DOWN", "RIGHT", "LEFT".**

- **Press "ENTER" when you see the desired choice.**

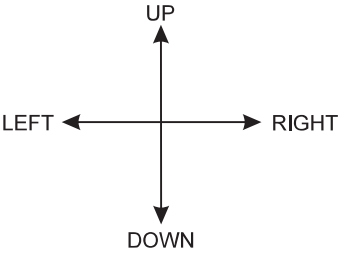


Normally, this would be UP or DOWN for collecting harvest data.



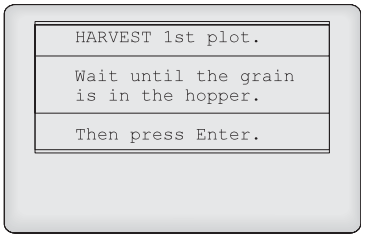
Now select the direction to travel across the field. Having selected “UP” or “DOWN” in the previous screen, your choices here will be “LEFT” or “RIGHT”.

Note: The directions "UP", "DOWN", "LEFT" and "RIGHT" will ALWAYS mean:

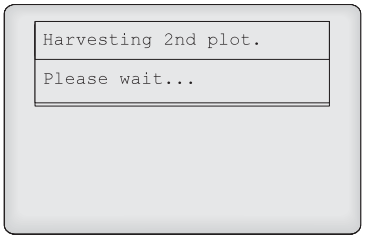


- **Use the <*LEFT*> and <*RIGHT*> arrows to view the selections, and press <*ENTER*> to make the choice.**

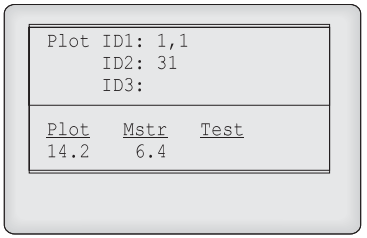
Harvesting



At this prompt, begin harvesting the first plot. If the hopper door is set to remain open (by setting hopper door timer to = 0 in bucket setup menu, “Timers”), this message will disappear after about 2 seconds.



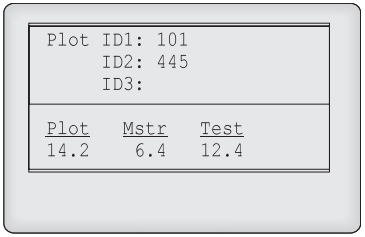
Upon pressing **<*ENTER*>** you will be briefly presented with this screen, before the harvest data screen is shown.



Here is the harvest data screen. When you have selected the option to generate the map on the fly, you will be prompted before this screen to key in a plot “ID”.

- **Use the <*LEFT*> and <*RIGHT*> arrow keys to view other IDs.**

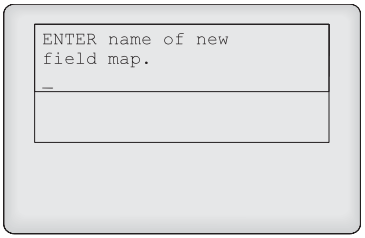
Data is recorded when this screen is showing, and you press **<*ENTER*>**. In this example, 3 harvest variables were chosen at setup time.



Generating a Field Map on the Fly

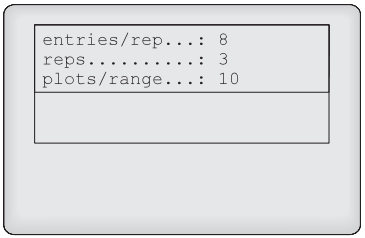
The HarvestData software also allows you to generate a field map quickly while already in the harvest menu. At the time you are requested to select a field map, press **<*BLUE*>** key then **<*RIGHT ARROW*>**.

- **Key <*BLUE*> + <*RIGHT ARROW*> for a quick map. Key in a name of 1 to 8 char acters, followed by the <*ENTER*> key.**



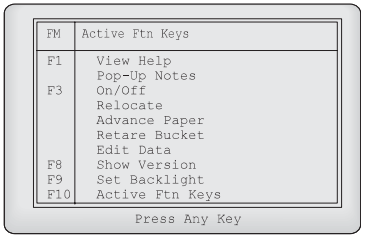
Specify the size of the quick map by responding to number of entries in the experiment, how many replications of these, and how many plots wide to make the field.

At this point, the harvest data collection sequence follows as described earlier.



Function Keys

The function keys provide several useful benefits, most of which come in handy during the collection of data, whether it be harvest data, pre-harvest notes, or post harvest observations.



Pressing the ***<F10>*** key on the hand held brings up this menu of quick action functions.

- **The various functions are selected by pressing their respective function keys at any menu.**

Note: Some function keys are only available in certain menus (F2, F4-F7 are available only in harvest).

View Help - F1

Context sensitive help is available through FTN 1 for most features of the HarvestData software.

- **Press <*ESC*> to get back to the activity you left when you invoked "Help".**

Pop-up Notes - F2

There is no screen for this selection. If you have toggled your notes variables off with <F3> (On/Off Notes), but need to key in a one time observation, <F2> allows you to do so without having to turn the notes variable(s) on and off again.

- **Key <F2> for one time entry of a notes variable.**

You must have the notes variables selected and "ACTIVE"

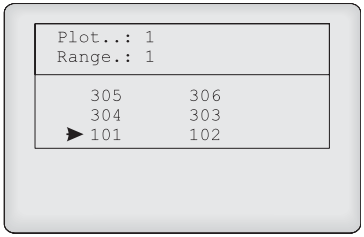
On/Off Notes- F3

in order for this function to work. If there are no "note variables" defined from your setup activities, this function will have no effect.

- **Key <*F3*> to toggle the notes variable on and off. Activating or having notes on will also print the notes to the printer.**

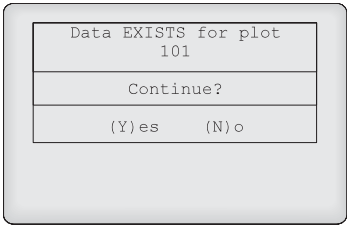
Relocate - F4

- **Key <*F4*> to set a new start point.**
- **Use the arrow keys to reposition yourself on the field map.**



The arrow symbol (□) indicates the plot number where the next data acquisition will take place.

If the data storage cell for the plot which you have chosen to start already has data in it, you will get this message. Choosing "N" for "no" brings back the repositioning menu.



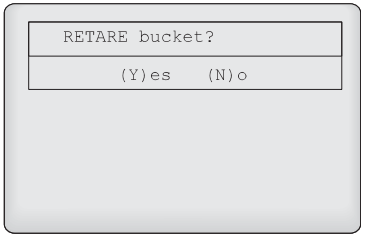
Advance Paper - F5

F5 provides a line feed character over the serial port to the printer, causing the paper to advance 1/6th of an inch.

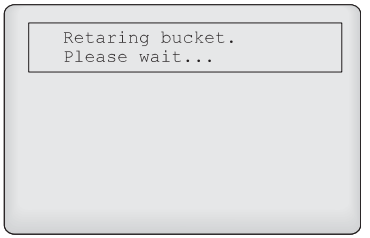
- **Key <F5> to advance the paper in the FieldPrinter.**

Retare Bucket - F6

Selecting yes after pressing **<F6>** will retare your bucket.



The next screen will show for a few seconds while the bucket doors open and close and a new TARE weight is being sampled and recorded.



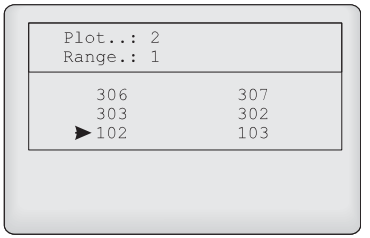
! Warning

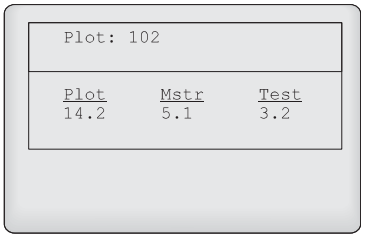
When using F6 to retare bucket, the moisture voltage also returns to zero.

Note: Do not use F6 when grain is in the moisture chamber.

Edit Data - F7

F7 allows you to edit recorded harvest data from the keyboard. The first screen you see after pressing this function key, is a location screen.



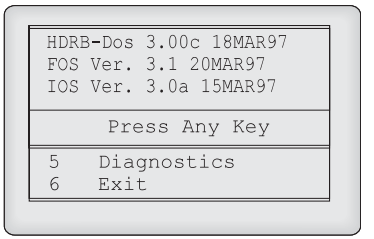


- **Use the arrows keys to position the arrow (□) on the plot to be edited.**
- **Key in the desired numbers. Upon press ing <*ENTER*>, the cursor moves to the next field.**
- **Use the <*LEFT*> arrow key to return to the previous field.**

Pressing **<*ESC*>** returns you to the positioning map. A second press gets you back to the harvest data acquisition screen.

Show Version - F8

F8 displays the current HDRB-DOS software version, the current FOS (fixed operating system) version, and the current IOS (injected operating system) version.



The FOS is the operating system that is resident on the HM-400 SCCU. The IOS is on the hand held and is "injected" into the FOS on the SCCU when the two are connected. The IOS essentially tells the FOS how to interact with the hand held and other hardware.

When you run the HarvestData software, the backlight is automatically turned on.

Set Backlight - F9

Use F9 to turn the backlight on and off.

- **After pressing <*F9*>, key in "Y" or "N" to turn the backlight on or off, respec tively.**

Note: When using the hand held away from the HarvestData System Console, turn the back light off to conserve power, since it creates a significant increase on system power drain.

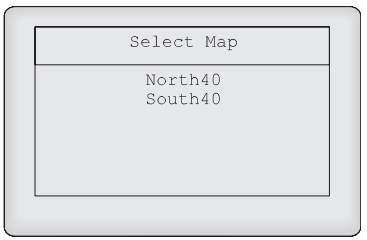
Uploading Data

Uploading data from the HarvestData System requires a desktop computer running DataLink. Refer to *Appendix B: DataLink* at the end of this manual for information on retrieving data from the FieldBook.

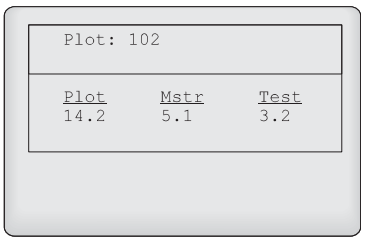
Viewing Data on the Hand Held Computer

```
--  MAIN MENU --
4 Data >
   -- DATA MENU --
  > 1 View Data
```

Viewing data lets you scroll back through a set of collected data using the arrow keys to move from range to range and row to row within the selected field.



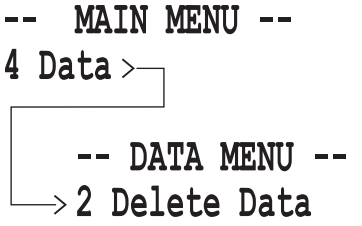
- **Use the <*UP*> and <*DOWN*> arrow keys to scroll through the field maps available, and press <*ENTER*> to select the one desired.**



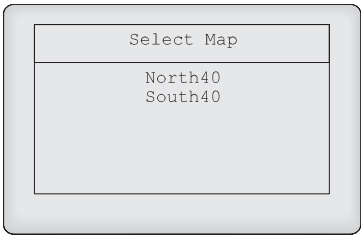
- **Use the arrow keys to move range to range, and row to row through the field viewing the data. Press "ENTER" to view other variables in the same plot.**
- **Press "ESC" when you're done.**

Deleting Harvest Data Files

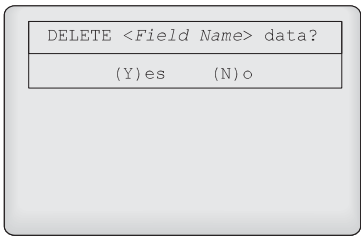
Once the data have been transferred from the hand held to the host PC, you can erase the data and the map if you wish.



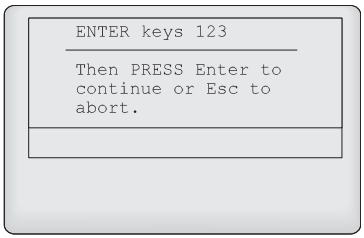
- **Select the file to erase from this screen.**



- **Confirm the action.**



- **Confirm all the action.**



Chapter 5
Troubleshooting

If you believe you have determined the reason for a problem, refer to the *Specifications* or *Installation* chapter for guidance; whichever is applicable. If there is a hardware problem, an RMA (Return Material Authorization Number) will need to be authorized. For further instructions on any of the outlined problems below or for an RMA authorization, please call Harvestmaster's Customer Service department at (801) 753-1881.

Problems

SCCU Power Failure (No Power LED)

- Check the power cord connection to see that it is plugged into the SCCU correctly.
- Check the power cord connections and polarity to the battery.
- Check the 6 AMP circuit breaker ("RESET" if needed).
- Check the battery voltage (desired 14.8V with the combine running).

Hand Held Communication Failure with the PC

- Check to make sure that you are using the CA-2009 communications cable from HarvestMaster. Any standard communications cable will not work. You will need a Null Modem cable to communicate with the hand held.

- Check the communications port that has been selected on the PC and/or hand held. Does it match the communications port that the Null Modem cable is plugged into?

- Make sure that you are following the communication procedures correctly for the hand held. Refer to the "*File Transfer Programs*" section in the hand held User's Manual.

- Try the other communications port on the hand held to eliminate a possible hardware problem with the hand held.

- Try another PC to verify a possible hardware problem with the PC.

Hand Held Communication Failure with the SCCU

- Check to see that the SCCU and the hand held are "OFF". Now, turn "ON" the SCCU and make sure that the hand held is powered up with it. When the HarvestData program runs, the system should come to the "Main Menu" automatically without pressing any keys. Pressing the "F8" key should display 3 versions of software. If there is any problems with the above outlined procedures, please continue as outlined below.

- Check to see if the LED's (Red and Green lights) on the front panel are flashing in the same sequence as when the SCCU is first powered up. If they are not flashing at all, and the power LED is the only one that is illuminated, the problem is in the SCCU HM-401 console. Please call HarvestMaster's customer service depart ment for an RMA.

- **Check to make sure that the hand held cradle is securely plugged into the SCCU console and the bottom door is latched tightly against the bottom of the cradle.**

- **Check to make sure that the cradle's 9-pin connector is securely plugged into the communications port #1 on the hand held.**

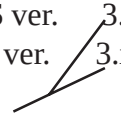
- **Transfer files from the PC to the hand held through the communications port #1 to insure that the port on the hand held is operational.**

Inaccurate Moisture and Weight Readings

- Check to see that the injected operating system (IOS) is loaded correctly by pressing "F8" to show its version.

- Check the software versions on the hand held by pressing <F8>. Make sure that the first number on the fixed operating system (FOS) is the same as the first number on the IOS.

  e.g. FOS ver. 3.xxx Dy-Mon-Yr
  IOS ver. 3.xxx Dy-Mon-Yr

  This number must match on both the IOS and FOS.

Note: After turning the system on, it should come to the "Main Menu" automatically.

- **Check the system control cable connection between the SCCU and the HM-420BF break-out-box. Inspect the pins on the SCCU and HM-420BF ends for damage or corrosion.**

Inaccurate Weight Readings (Moisture is Fine)

- **Check the load cell connection to the HM-420BF break-out-box. Make sure that they have been plugged into the appropriate ports. The test load cell into the "Test" port and the plot load cell into the "Plot" port.**

- **Make sure that the calibration was performed correctly. Refer to the *Weigh Bucket and Test Chamber Calibration* section in Chapter 3 of the HarvestData User's Manual.**

- **Eliminate the electronics by disconnecting the bucket system from the load cell. Hang a free floating weight on the load cell that is approximately 50 percent of its total capacity. Now check the accuracy without the bucket system connected. If the system continues to fluctuate, proceed with the following steps. If the fluctuation disappears, the bucket system probably has a bad load cell, chaff build up, or the bucket is binding somewhere.**

- **Plug the load cell into another load cell port on the break-out-box to see if the problem follows the load cell.**

No Test Weight (Plot Weight is Fine) or Vice Versa

- **Check the load cell connection to the HM-420BF break-out-box.**

- **Check the system control cable connection between the SCCU and the HM-420BF break-out-box. Inspect the pins on the SCCU and HM-420BF ends for damage or corrosion.**

- **Plug the load cell into another load cell port on the break-out-box to see if the problem follows the load cell.**

- **Replace the load cell with a known good one.**

No Test Weight or Plot Weight (Moisture is Fine)

- **Check the system control cable connection between the SCCU and the HM-420BF break-out-box. Inspect the pins on the SCCU and HM-420BF ends for damage or corrosion.**

- **Using a DC volt-meter, check the load cell excitation at the HM-420BF break-out-box. To do this, disconnect the load cell and insert the red probe of the volt-meter into pin 1 (+5V) and the black probe into pin 5 (Ground). With the SCCU "ON" , the voltage should be approximately 5V. If it is not, proceed with the next step, if not skip the next step.**

- **Using the DC volt-meter, check the load cell excitation at the HM-401 SCCU. To do this, disconnect the Control Cable from the HM-420BF break-out-box. Insert the red probe into pin 11 and the black probe into pin 15 of the female connector of the System Control Cable. With the SCCU "ON", the voltage should be approximately 12V.**

Note: If either voltage is not present, please call HarvestMaster Customer Service for further instruction.

- **Replace the load cells with a known good ones.**

- **Check the moisture cable connection to the HM-420BF break-out-box. Make sure that it is plugged into the "SENSOR" port.**

Inaccurate Moisture Readings (Weight Readings are Fine)

- **Follow the cable from the connector to the sensor inspecting the cable for damages as you go.**

- **Make sure all of the calibration points are entered correctly, and that they produce a near linear line when graphed (See the illustration in the *Creating a Moisture Sensor Curve* section in Chapter 3 of this manual).**

- **In the menu option "Moisture" under "Diagnostics", check to make sure the sensor reads 0 volts with an empty chamber and increases when you touch the blade with your hand.**

Note: This reading has to be zero before attempting to calibrate the system.

- **Run some grain samples through the system manually in "Diagnostics" to verify that the voltage readings are stable and that they compare to the readings recorded in the moisture curve. Refer to the *Editing Moisture Sensor Curve* section in chapter 3 of this manual.**

- **Check to make sure that the moisture sensor chamber is grounded properly. The backplate of the moisture sensor is a good source to ground. You may want to run an 18 AWG ground wire from the back of the sensor to the side of the moisture chamber.**

Note: DO NOT allow any part of the moisture chamber to come within 1/2" of the sensor blade.

Printer Does Not Respond (Power LED is Off)

- **Make sure the SCCU power is turned "ON".**
- **Check the manual "LF/ON/OFF" switch in the printer to see that it is in the "ON" position.**
- **Check the cable connections to the SCCU to make sure they are not loose or damaged.**
- **Check the printer connector to make sure it is lined up properly with its mate.**
- **Check the printer mounting screws to make sure that they are tight.**
- **This is a sign of a printer hardware failure and will need to be sent in for repair.**

Printer Does Not Respond (Power LED is ON)

- **Check the "Auto/Manual" switch to make sure that it is in the manual mode.**
- **Run the actuators in manual mode.**

Bucket Doors Do Not Operate Correctly

- **Make sure that you have chosen the correct actuator type that you are using. Refer to *Changing the Bucket Setup* section in Chapter 3 of this manual on page.**
- **If using limit switches, disable them in the "Control" menu option to see if they are causing the actuators to malfunction. Refer to *Changing the Bucket Setup* section in chapter 3 of this manual.**

Note: Use a transition time of at least 2-3 sec onds.

- **If the limit switches are the problem, enable them one at a time to find the one that is causing the problem.**

- **Double check the wiring of the actuators and limit switches (if used) to make sure that they are wired correctly. Refer to the *Connecting the Actuator Control Lines* section in chapter 2 of this manual.**

Note: Limit switches should be wired in the normally closed configuration.

- **With a DC Volt-Meter, Check the voltage at the actuator end of the cable to make sure that it is approximately 12V when the actuator is enabled.**

- **If windshield wiper motors are being used, check to make sure that the chassis ground is connected correctly.**

Chapter 6
General Care and Warranty

Maintenance

Harsh Weather

If your HarvestData System console is mounted in a location which is exposed to the elements, we recommend removing or covering the HarvestData System console during inclement weather. If the winter in your area is quite cold, remove the HarvestData System console during cold months. It's best to store them in a warm, dry environment.

We recommend that the HarvestData System be returned to the factory once every two or three years (depending on field usage) for recalibration and a system check up. The printer mechanism should last about three years under heavy usage. When the printer mechanism fails, you will

Printer

need to have a new print head installed. Contact HarvestMaster's Customer Service Department for an RMA (Return Materials Authorization) number before sending the printer in for repair.

The printer's cartridge ribbon will need to be replaced when the printing becomes faint or difficult to read. For instructions on replacing the cartridge ribbon, refer to page 2-34.

Return Procedure

If your HarvestData System needs repairs, contact HarvestMaster's Customer Service Department for a Returned Materials Authorization (RMA) number. Under the Express Service Agreement, HarvestMaster will ship you a replacement loaner Next Day Federal Express or UPS Red. Once you receive the loaner unit, package your equipment in the same box and ship it Federal Express, Next Day or UPS Red. Fill out the shipping and RMA forms that were included with your loaner equipment. The more information you can supply concerning the malfunction and the circumstances under which it occurred, the quicker our technicians can complete the repair. Package the unit properly to avoid shipping damage. Write the RMA# on the package you ship. Your equipment will be repaired and returned to you. After receiving your repaired equipment, you will have 1 week to return the loaner unit before you will be billed for it.

Limited Warranty

Hardware

All products manufactured by HarvestMaster, when properly installed, calibrated, and operated in accordance with instruction manuals accompanying the hardware and used for the purpose for which the hardware was designed shall be free from defects in materials and workmanship for a period of one (1) year from the date of shipment. In the event a defect in materials or workmanship is discovered and reported to HarvestMaster within the 1 year period, HarvestMaster will at its option repair the defect or replace the defective product. HarvestMaster's obligation hereunder will be limited to such repair or replacement. Customer shall have the responsibility to ship the defective equipment to HarvestMaster with all cost of shipment prepaid. After repair or replacement HarvestMaster will, at their own expense, ship the replacement or repaired item back to the customer using the same type of carrier.

Software

Software products which are designed by HarvestMaster for use with a hardware product, when properly installed on that hardware product, are warranted to the end user for a period of one year from date of delivery not to fail to execute their programming instructions due to defects in materials or workmanship. If HarvestMaster receives notice of such defects during the warranty period, HarvestMaster shall, at its option, repair or replace the defective software media.

The warranties provided herein do not apply in the case of improper or inadequate maintenance or in the case of repair by any person not previously authorized in writing by HarvestMaster to do such maintenance or make such repairs. These warranties likewise do not apply where the products have been operated outside the environmental specification of the product, where software products other than those specified by HarvestMaster have been used, or where attempts at software interface have been made by any person not previously authorized by HarvestMaster to perform such interfacing operations.

Disclaimer of Warranties

The warranties set forth herein are in lieu of all other warranties of HarvestMaster, whether written, oral or implied.

HarvestMaster makes no warranties regarding its products (hardware or software), including without limitation warranties as to merchantability, fitness for a particular purpose, any warranty arising from course of performance, course of dealing or usage of trade whether any of the foregoing warranties are either expressed or implied. HarvestMaster specifically makes no warranties as to the suitability of its products for any particular application. HarvestMaster shall in no event be liable for special, incidental, or consequential damages in connection with or arising out of the furnishing, performance or use of any product covered by this agreement whether such claim is based upon warranty (express or implied) contract, strict liability, negligence or otherwise.

Updates or Modifications

HarvestMaster shall be under no obligation to update or modify its products except as herein noted to correct program errors. Further, customer agrees that all representations and warranties contained herein shall be immediately null and void in the event of any modification, alteration or change in or to any product effected by or on behalf of customer except for a change made by HarvestMaster or other direction supervision thereof.

Removal of Serial Number

Removal of the HarvestMaster serial number label from an instrument will void any warranty on said instrument.

HarvestMaster will not repair or update an instrument and return it to an individual if the instrument is without said serial number label.

Appendix A
Specifications

For additional specifications on the FieldBook, refer to the FieldBook user's manual.

Measurement Performance

Grain Moisture

Repeatability: Typically ±.5% given constant density and temperature of sample.

Accuracy: Dependent upon accuracy of user calibration using samples of known moisture content. Typically ±1%

Range: 0-45%

Weight

Accuracy: Load cells and electronics measure to within .1% of load cell full scale range (e.g. using a 100 lb load cell, measurements will be accurate to within .1 lb).

Note: Weight measurement accuracy may be degraded due to friction of weigh bucket against stabilizing guides, etc. and by motion of the weighing platform. The HarvestData System software does a 3 second running time average of weights to minimize measurement error due to platform motion.

Data Storage

256K (448K optional)

Load Cell Capacities

Plot weight load cell: 50, 100 or 200 lb
Test weight load cell: 50 or 100 lb

System Power Requirement

12 volts DC (automotive)
.5 amp typical
6 amp maximum (depends on actuators being driven)

Physical

Dimensions

Size: 12" x 8.75" x 7.75"

Environmental

Operating Temperature Range

System: 0 to +50° C (+32 to +122° F)
Printer: +5 to +45° C (+41 to +113° F)

Storage Temperature Range

System: -20 to +70° C (-4 to +158° F)
Printer: -20 to +70° C (-4 to +158° F)

Humidity Range:

0-95% relative, non-condensing

Accessories

Load Cells

Temperature range: -18 to +66° C (-0.4 to +151° F)

Cable length: 20’

Moisture Sensor

Temperature range: 0 to +45° C (+41 to +113° F)

Cable length: 10’

Specifications

Interface-Serial	BAUD rate - 2400 (300, 600, 1200, 2400, 4800, 9600, 19200 available) Voltage Levels - RS-232C: -9 to 9V Busy Signal - Clear to Send (CTS) 20mA current loop
Character Buffering	1.5 Kb
Print Method	Impact dot matrix
Character Spacing	24 Column: 12.8 Characters/inch 32 Column: 17 Characters/inch 40 Column: 21 Characters/inch
Print Speed	130 lines per minute for 24 column 110 lines per minute for 32 and 40 column
Paper	Tabletop: 2.25”Wx2.75”D;0.44” I.D. Large Roll - 12,500 lines Small Roll - 3,000 lines
Power	1.5 Watts (idle), 15 Watts maximum while printing
DC Voltage	Optional 9-12 VDC 140 mA idle, 1 amp with 100% printing, 5.5 Amp peak with 100% printing

Operating Temperature

+5 Deg C - 40 Deg C, (+41 Deg F to +104 Deg F)

Print Head Life

1,500,000 lines mean character before failure.

Ribbon Life

Black - 200,000 characters
Purple - 250,000 characters

Communications

Wiring Diagram

Pin #	Signal	DTE Direction	Description
2	(TD) Transmitted Data	From Printer	Printer data output line.
5	(CTS) Clear To Send	From Printer	Signal (equivalent to BUSY) indicating that the printer is ready for operation and can receive data.
7	(SG) Signal Ground	-----	Signal Ground
9	(PTV) Paper Take-up Volt.	To Printer	Paper Take-up solenoid supply voltage.
10	(D01) Digital Out	To Printer	Digital output pulse to control the paper take-up.
12	(PTG) Paper Take-up Grnd.	-----	Pins 12,19, and 25 are Paper Take-up Ground.
19	(PTG) Paper Take-up Grnd.	-----	
22	(PTG) Paper Take-up Grnd.	-----	
25	(VSB) +12 Volt Print Supp.	To Printer	Printer Supply Voltage (12 VDC).

Appendix B
DataLink for DOS

Personal Computer Support Software for HarvestMaster Products

Description

In order for your hand held computer to communicate with your personal computer, you need to execute a terminal emulator program on your PC. DataLink is designed as a field partner for your hand held and your personal computer. It is a communications software package which allows your computer system to act as a smart terminal to a hand held, and lets you transfer files between your computer and your hand held computer.

DataLink saves you time setting up your data collection system because the software you purchase is specific to your computer. In most cases, you will need to load the DataLink program, add utility routines, and set several user-defined parameters before you can download data.

System Requirements

DataLink for DOS requires 2 Mb of hard disk space on a DOS (version 2.1 or higher) based computer with at least 512Kb of system RAM. It is not executable from floppy diskettes.

Installation

DataLink is distributed on a single 1.44 Mb 3½" diskette. Installation instructions are listed below (they're also on the disk label for your convenience).

1. Insert the Disk in drive A: or B: of your PC.

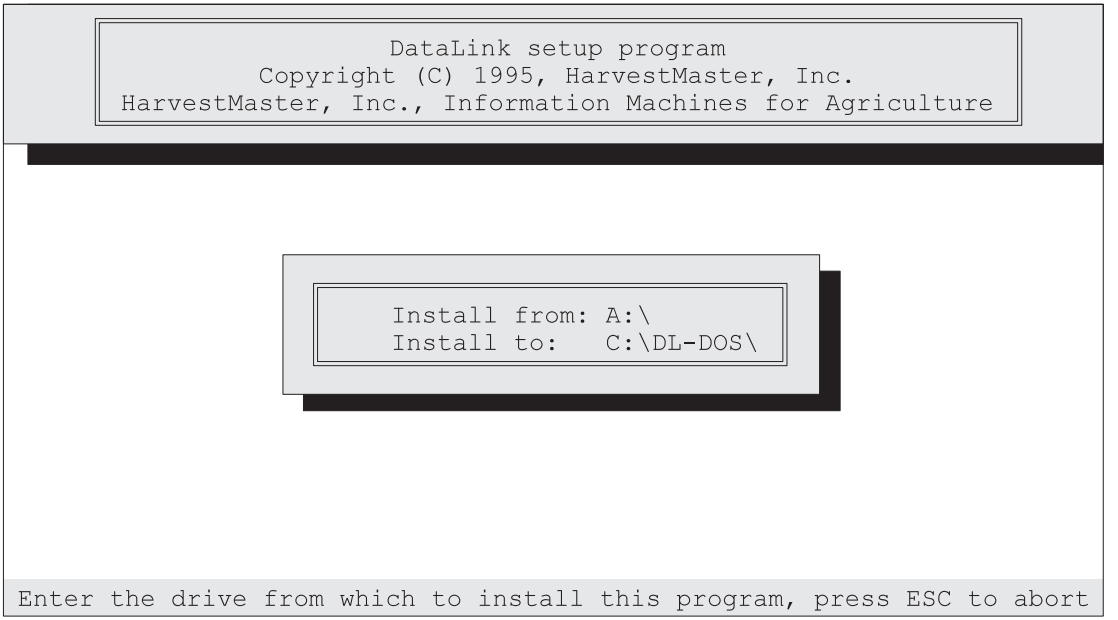
A: <ENTER>

2. If you're in Windows, exit to DOS and change to drive A: or drive B: by typing ***A:*** or ***B:*** followed by ***<ENTER>***

SETUP <ENTER>

3. Type ***SETUP*** to initiate the installation procedure

4. The setup screen appears (see below). The “Install from:” drive should be the drive where the HDRB-DOS disk is located.



DataLink Setup Screen

The "Install to:" drive and directory is, by default, set to install on your hard drive under the DL-DOS directory. It should read similar to:

Install to: C:\DL-DOS

Drive **Directory Name**

Note: You may change the drive and directory name where the DataLink program will be installed. To do this, press the *down arrow* to highlight the "Install to:" line. *Type in the drive and directory name* to which you wish to install the DataLink software.

<ENTER>

- **Press <*Enter*> when the "Install from:" and "Install to:" locations are set as desired.**

- **A display window appears, displaying files being installed on to your hard drive. When DataLink has been successfully installed, a "Program Installed" window appears.**

<ANY KEY>

- **Press *any key to continue*.**

CD\ <ENTER>

CD DL-DOS <ENTER>

- **You're returned to the DOS prompt where DataLink resides (in most cases this is C:\DL-DOS or D:\DL-DOS). If you are in another directory, you can change directories by typing *cd\ <ENTER>* and then *cd dl-dos <ENTER>*.**

DL <ENTER>

- **Type *DL <ENTER>* to run DataLink.**

The title screen appears briefly and then advances to the DataLink Main menu (you can make the title screen disappear immediately by pressing the ***space bar***).

Introduction to DataLink

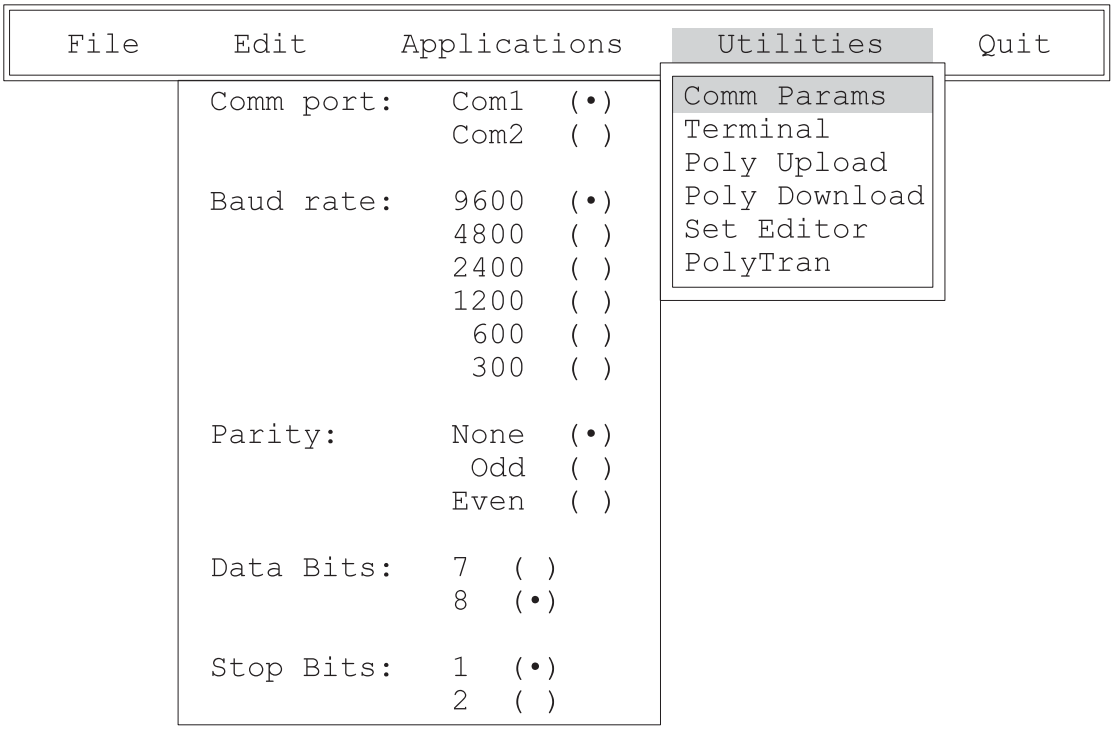
Welcome to the DataLink Main Menu. DataLink is, as the name implies, your link to the data stored on the hand held computer. You may *upload* data (transfer data from the hand held to the PC) or *download* data (transfer data from the PC to the hand held) using DataLink. DataLink lets your PC and hand held computer communicate via the serial communication cable (model # CA-2009). The communication cable connects your remote data collection unit to your desk-top PC, and DataLink is the communication software that allows the handheld and PC to communicate.

Using the arrow keys or striking the key of a letter that is highlighted on the display moves you to another option. Pressing <ENTER> completes the selection and pressing <ESC> cancels the selection and/or moves you to the previous menu. The banner on the bottom line of the screen contains further instructions.

DataLink Menu Bar

Following are the sub categories of activities under each of the main menu items. The sub-categories are discussed in the order you will use them during a typical usage scenario. Set the communication Parmeters on your PC. The UP and DOWN arrow keys will allow you to move from sub-item to sub-item. The <ENTER> key will move to the next item in the menu.

Utilities Menu



Com Params

Note: If any changes are made, each of the items will need to be entered (with the <ENTER> key) to save the data. The <ESC> key will abort without saving the changes.

- **Set the "Com Port" by moving the solid dot within the parenthesis, to "Com1" or "Com2".**

Note: On most PC's the nine pin male connector is Com1 and the 25 pin male connector is Com2.

Generally, for all HarvestData applications the baud rate, parity, data bits, and stop bits will stay at the default setting (9600, None, 8, &1).

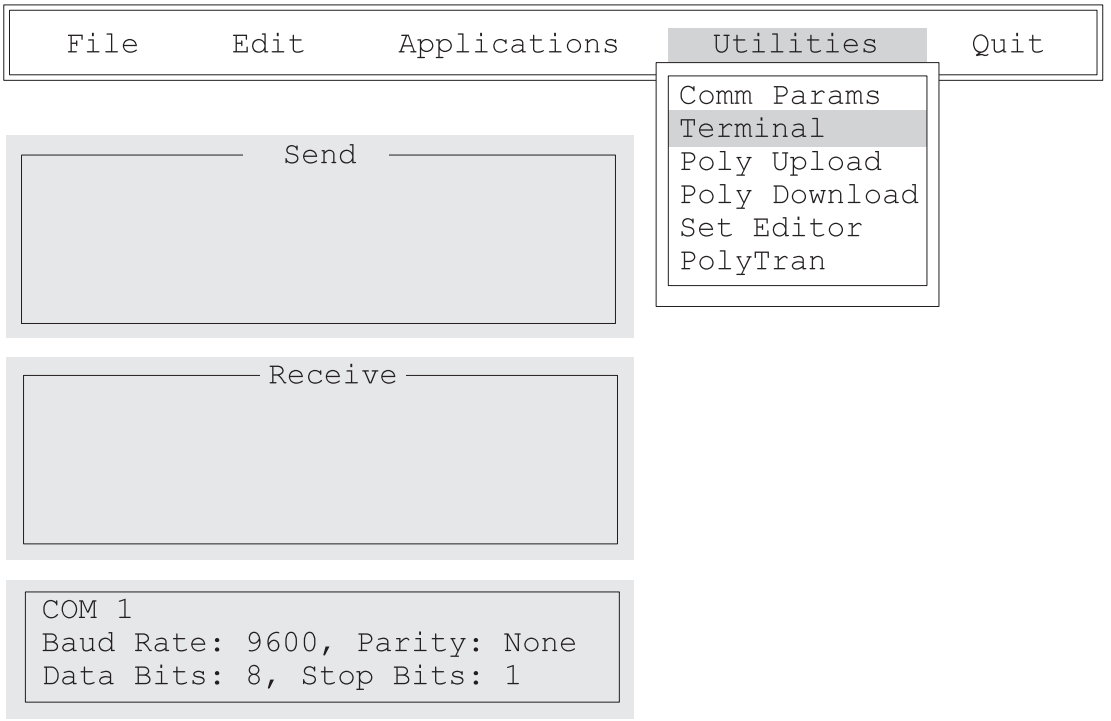
Terminal

Test the communications between the hand held computer and the PC.

- **When the TERMINAL option is entered, there will be three boxes on the display:**

The "Send" box will display any characters sent to the hand held computer, and the "Receive" box will display any characters received from it. The "Comm Parameter" box displays the current communication parameters.

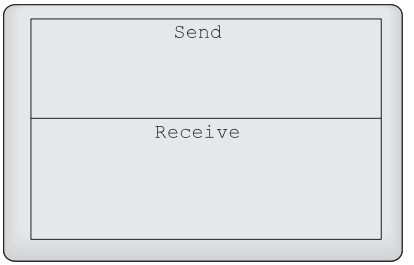
- **Plug the CA-009 (25 to 25 pin female), CA-009-9 (9 to 25 pin Female), or the CA-2009 (9 to 9 pin female) communica tion cable into the hand held com port (Com1 or Com2).**



DataLink Terminal Menu

By loading DataLink on the hand held computer (or any other terminal communications package), it is possible to send characters back and forth to insure proper communications before loading any files. To use this option, both the computer and hand held will need to be set up in terminal mode.

- **On your hand held computer, select "TERMINAL" mode under the (5)DIAGNOSTICS menu.**



Terminal mode brings up a screen with 2 windows, similar to the screen on the PC.

- **Key in a test message on the hand held. It should appear in the "SEND" box on your hand held display and in the "RECEIVE" box on the PC.**

- **Key in a test message on the PC. It should appear in the "SEND" box on your PC and "RECEIVE" box on the hand held.**

If these messages do not appear on both displays, refer to the *Troubleshooting* chapter in your HDRB-DOS User's Manual.

Note: The Terminal mode is used mainly for troubleshooting communication problems.

Upload an ASCII text file from the HM-1 or HM-2 FieldBook. This option is used to upload data to the HM-1 or HM-2 FieldBook. Please refer to the HM-1/HM-2 Users Manual for further information.

Poly Upload

Note: This option is not used with DOS hand held computers such as the Pro2000 Field Computer.

Download a Polycode executable file or other ASCII text file to the HM-1 or HM-2 FieldBook. This option is generally used only by programmers writing their own applicatons. Please refer to the HM-1/HM-2 User's Manual for further information.

Poly Download

Note: This option is not used with DOS hand held computers such as the Pro2000 Field Computer.

Set Editor

Set the path and file name to the ASCII editor of your choice. The editor is defaulted to the DOS editor (EDIT). To change the default, type the complete path and executable name of the editor that you prefer (e.g. c:\brief\b.exe).

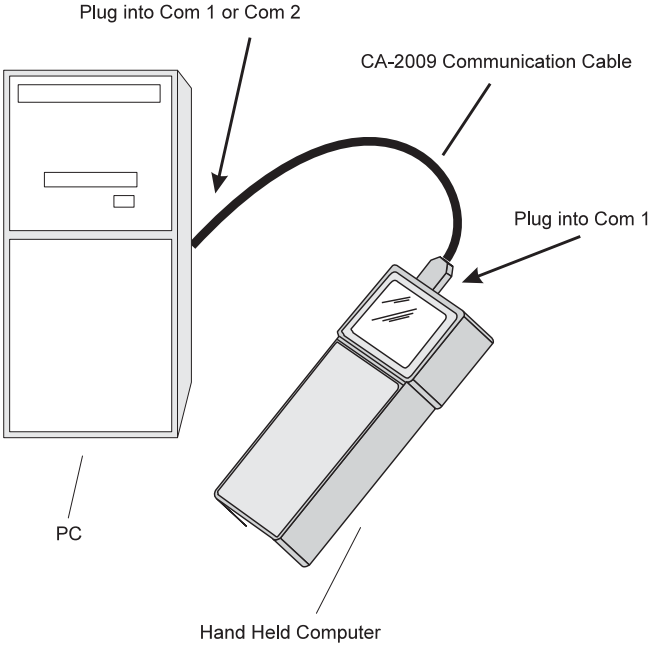
Poly Tran

Polycode language compiler for the HM-1 and HM-2 FieldBook hand held computer. Please refer to the HM-1/ HM-2 FieldBook Users Manual for operating instructions.

Note: This option is not used with DOS hand held computers such as the Pro2000 Field Computer.

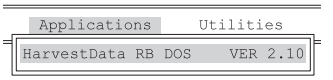
This menu option will allow you to install the software application of your choice into the hand held.

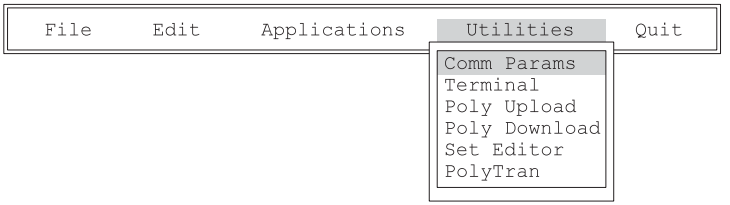
- **Connect the PC to the hand held using the communications cable. To do this, plug the communications cable into one of the serial ports on your computer (preferably port 1).**



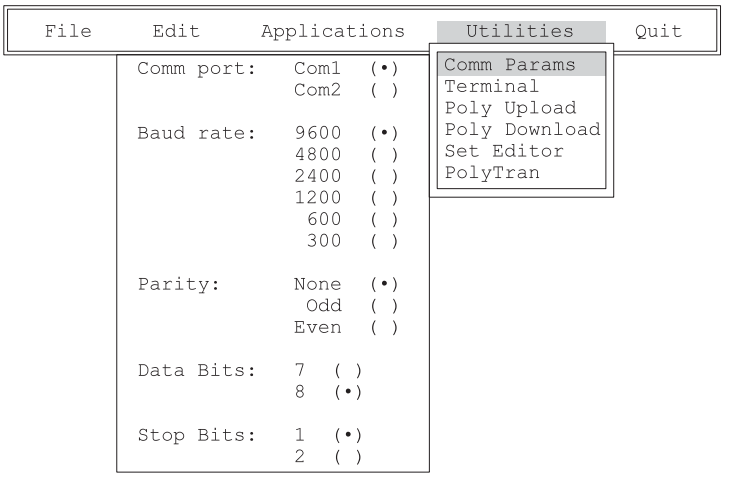
Note: DataLink automatically defaults to com municating via the PC's com1 port. Some computers may have a mouse or other external devices connected to com1. If this is the case, it will probably be easier to plug the communications cable into com2. Then, on your PC, go into the DataLink Utilities menu by using the left/ right arrow keys and pressing <ENTER>

when the Utilities menu is highlighted. A drop-down menu appears. Select the first highlighted item on the list, Comm Params (communication parameters) by pressing <*ENTER*>.





This brings up the communication parameters window:



DataLink Utilities Menu

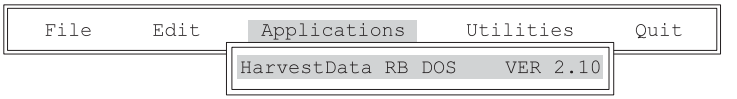
Communication Parameters Window

Now you have to tell DataLink that you're using Com2 to communicate with the hand held rather than com1. To do this, press the *down arrow*. The bullet indicator on the right will shift down to com2. Now press <*ENTER*> to save this setting. Press <*ENTER*> to scroll through the baud rate, parity, data bits, and stop bits sections, and to save those settings.

- **Use the left/right arrow keys to move the highlighted cursor to the applications menu.**

Note: You may also press the highlighted letter in a menu title move to that menu (Example: Press *A* to go to the Applications menu, press *Q* to quit, etc.).

- **Once the Applications Menu is highlighted, press <*ENTER*>. A drop-down menu appears displaying HarvestData RB DOS. This is the application to be downloaded to the hand held computer.**



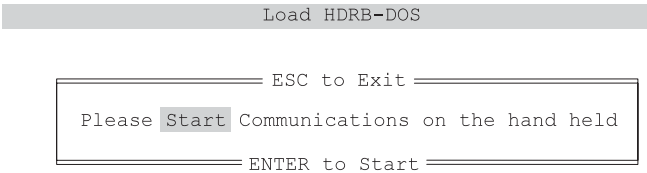
Note: Pressing <*ESC*> sends you back to the previous menu, so if you make a mistake in one menu and accidentally press <*ENTER*>, pressing <*ESC*> gets you back to the previous menu.

DataLink Applications Menu

- **Press <*ENTER*> to prepare DataLink to download the HarvestData RB DOS software.**
- **DataLink prompts you to select a language. Use the *up/down arrow* keys to highlight a language. Press <*ENTER*> when finished.**

<ENTER>

- **DataLink now displays the following message:**



Select Language
<ENTER>

To start communications we turn our attention to the hand held field computer.

- **To prepare the hand held to receive the HarvestData RB DOS software, turn it on by pressing the *ON/OFF* key.**

Turn Hand Held Computer ON

- **Follow instructions in the hand held user's manual for further instructions on transferring a file. For the Pro2000 FieldBook, you will want to type *PS* (to run PolyShell) followed by *<ENTER>*.**

PS <ENTER>

- **Press *F5* (Xfer), then *F4* (Recv) on the hand held and then immediately press *<ENTER>* on your PC. This tells the hand held that you wish to 1) Transfer information; and 2) You wish to receive (rather than send) the information being transferred. Pressing <Enter> on your PC tells the PC to transfer the information.**

<F5>
<F4>
<ENTER> (on your PC)

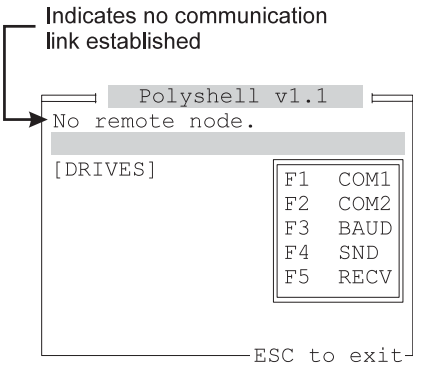
Note: After pressing <F4> (receive) on the hand held, you have 30 seconds to commence the data transfer process (by pressing <ENTER> on the PC). If you wait for more than 30 seconds, the hand held will "time out" and close down the communication channel. To re-open this channel you must press <F4> again.

■ **DataLink briefly displays a message:**

```
PCLink v.1.0  <<PC Version>>
Omnidata International, Inc.
Connected.
```

This is followed by a list of the files being sent. The hand held simultaneously displays the files being received. When the transfer process is complete, you are returned to the DataLink main menu on the PC, and the hand held is in PolyShell, displaying the newly acquired file names.

Note: If the hand held and the PC did not transfer information, the hand held will display the "no remote node" message:

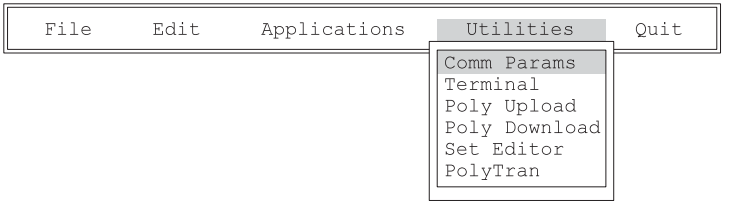


In this case, your communication parameters probably need to be changed. To do this:

1) **From the DataLink Main Menu, use the arrow keys to move to the Utilities menu.**

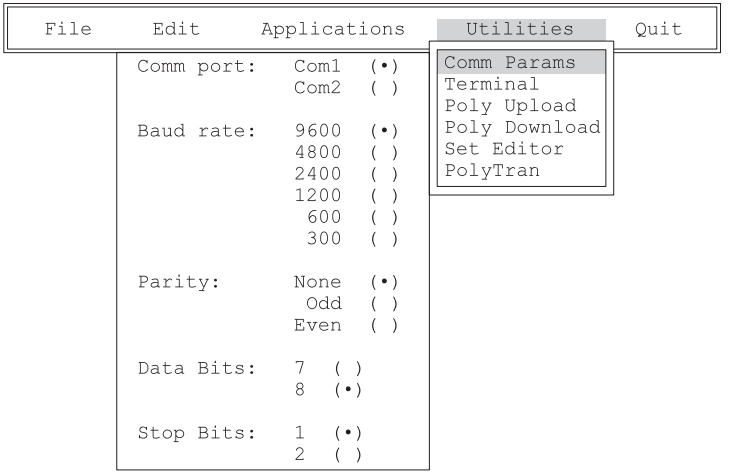
2) **When the Utilities menu is highlighted press <*ENTER*>.**

3) **A drop-down menu appears. The first item on the menu is Communication Parameters:**



The Comm Params menu is highlighted. Press <*ENTER*> to select.

4) **Now the Communication Parameters display window appears:**



The settings should be as follows:

Com Port: Either 1 or 2, depending upon which port the communication cable is connected to.

Baud Rate: 9600

Parity: None

Data Bits: 8

Stop Bits: 1

If the PC and hand held did not communicate, the setting that probably needs to be changed is the com port.

To change the com port settings, follow the instructions at the bottom of the DataLink screen. Press **<*ENTER*>** to save the settings for each section. Press **<*ENTER*>** after the "Stop Bits" section to return to the DataLink main menu. Now return to the beginning of this section (*Applications*) to download the HarvestData software.

Set the paths to the Upload and Download directories.

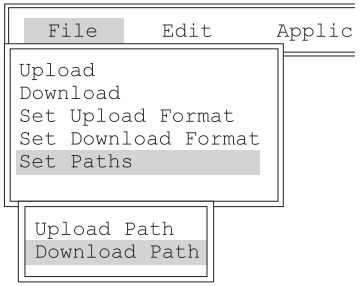
Download Path: Set the path to the directory where the file to be downloaded is located. This option allows you to store data and map files in a subdirectory you designate, so as not to merge them in the same directory as the program files.

E.g. C:\DL-DOS\DNLOAD

To create a directory, type the name of the directory you wish to create. DataLink will ask you if you would like to create it. Answer "YES" and it will create it for you.

File

Set Paths



Upload Path: Set the path to the directory where the file to be uploaded is going to be sent.

E.g. C:\DL-DOS\UPLOAD

To create a directory, type the name of the directory you wish to create. DataLink will ask you if you would like to create it. Answer "YES" and DataLink will create it for you.

Set Download format allows you to specify different formats for files to be downloaded. A format must be selected before downloading a map file to the hand held computer. This tells the HarvestData software how to interpret the file you're about to download. There are three formats to choose from:

The "NO FORMAT CHANGE" option directly transfers a file to the hand held. This is generally used when downloading setup files (rather than field map files).

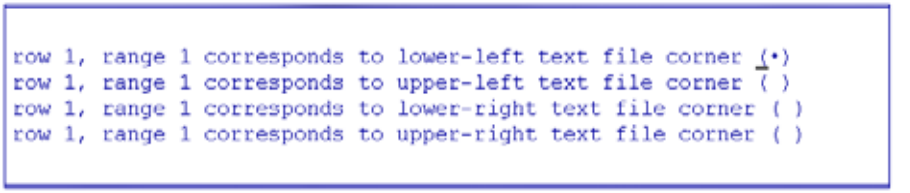
Set Download Format

A 2-D (two dimensional) text map is used for creating maps on the PC and consist of rows and columns of plot identifiers separated by spaces or tabs. The identifiers consist of up to 8 alphanumeric characters. If the identifier is more than 8 alphanumeric characters then the identifier will be broken into groups of 8 characters and placed in multiple identifier holders in the data file. There is no header information. Each row ends with an ASCII carriage return/line feed pair. Each plot may have one or more identifiers with multiple identifiers for a single plot being separated by commas. For more information on 2-D maps, see Appendix F: Field Maps.

No Format Change

When selecting "2D Text Field Map Format" in the "Set Download Format" option, you will see a box in the middle of your screen that will ask where row 1, range 1 is in your map text file:

2D Text Maps

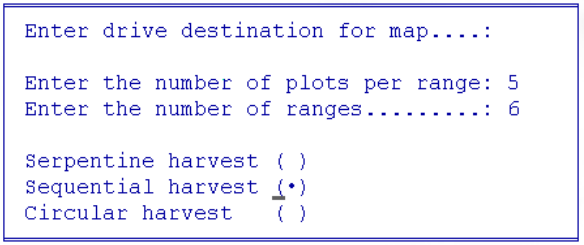


The default is in the lower-left text file corner. After selecting, the file will automatically be transferred to your hand held to the directory as specified in the "map/data drive" option in the HarvestData Software.

The second type of map file that may be generated in the DOS text editor and subsequently downloaded to the hand held is called Harvest Order space delimited format. You enter the plot numbers (and any associated identifiers) into the DOS text editor in the order in which they will be harvested. For more information on Harvest Order space delimited maps, see Appendix F.

Harvest Order Space Delimited

When selecting "Harvest Order Space Delmited" in the "Set Download Format" option, you will see a box in the middle of your screen that will prompt you for the drive destination for the map.



Note: Leave the drive destination blank to place the file in the directory where HD2.EXE resides on your hand held computer.

Now enter the plots pre range, number of ranges, and whether you map is going to be harvested as serpentine, sequential, or circular. After selecting all of the information the system will download your map and lay it out as specified.

Set upload format tells the PC how to interpret the file that you're about to upload. There are two options available:

Set Upload Format

No format change is just that. The data is transferred on to the PC in the same format as it was on the hand held. In the "NO FORMAT CHANGE", the data is essentially space delimited.

The second upload format available is a comma separated variable format (CSV format). Although both the "NO FORMAT CHANGE" and the CSV format import into spreadsheet packages, the CSV also works for software packages that only import comma delimited ASCII files.

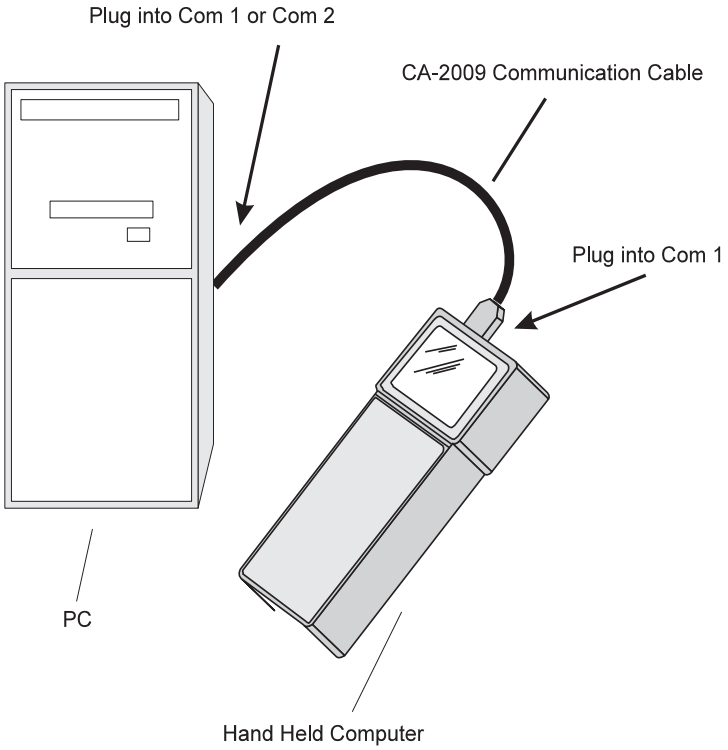
No Format Change

Comma Separated Variable Format

To initiate a file download from the computer to the hand held:

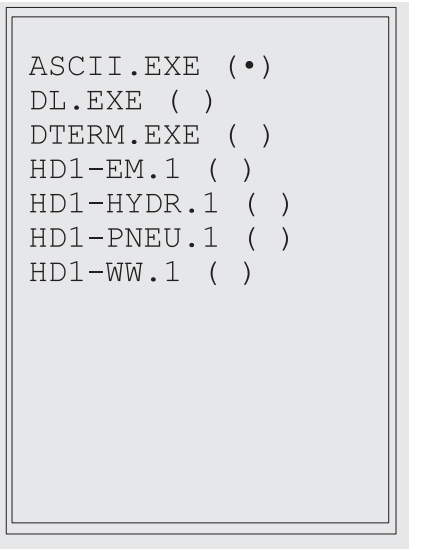
- **Connect the hand held to the computer's communication cable.**

Download



- **Turn the hand held "ON" and run the HarvestData System software program.**

- **Entering the "DOWNLOAD" option in DataLink will give a menu in the middle of your computer display that shows the files that are available for downloading:**



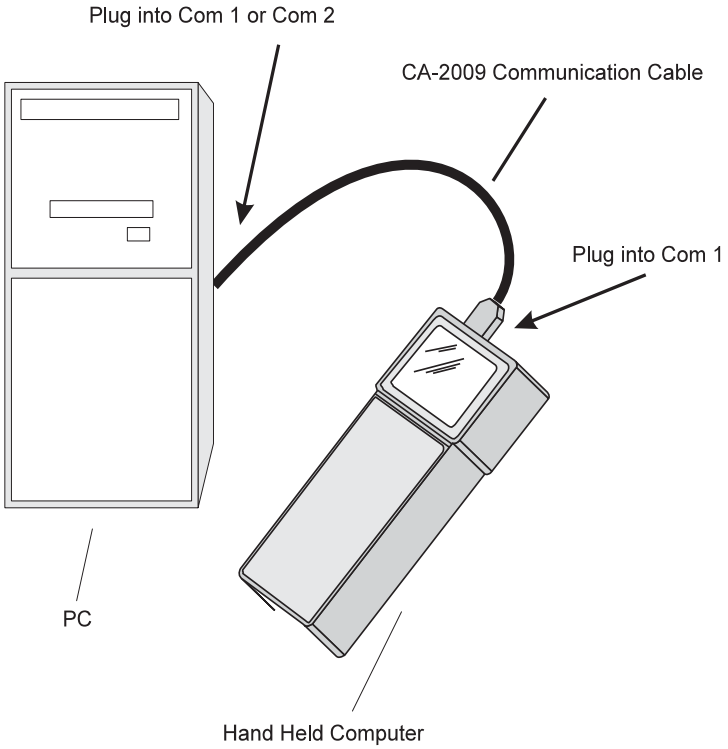
- **Use the UP and DOWN arrow keys to move the solid dot in the parenthesis to the file that is to be downloaded, then press <*ENTER*> to initiate the file transfer from the PC.**

Note: The file will be downloaded to the directory where HD2.EXE resides on your hand held computer UNLESS you have specified a different map/data drive in the HarvestData software (see the *Map/Data Drive* section in chapter 4 of this manual for details).

Upload

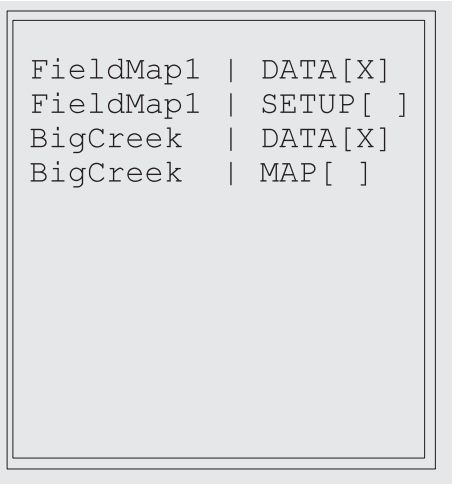
To initiate a file upload to the PC from the hand held.

- **Connect the hand held to the computer's communication cable:**



- **Turn the hand held "ON" and run the HarvestData System software program.**

- **Entering the "UPLOAD" option in DataLink will give a menu in the middle of your computer display that shows the files that are available for uploading:**



- **Use the UP and DOWN arrow keys to move the cursor to the files that are to be uploaded. Press the <*SPACE*> bar to mark the files. (Note: pressing the <*SPACE*> bar after a file has been marked will unmark the file). You may mark as many files as you wish. Once you've marked all the files you wish to upload, press <*ENTER*> to initiate the file transfer from the hand held to the PC.**

Note: The file will be uploaded to the directory on your PC that is specified under the DataLink menu option "Set Paths".

Edit Menu

The edit menu allows you to edit files using the editor specified in the **UTILITIES: SET EDITOR** sub-menu. There are no sub-menus for this option. DataLink will ask you to enter a file name. If the file that you wish to edit is in the DataLink directory (the directory that DL.EXE is in), then type in the file name with the extension.

E.g. CACHE2.DAT
If the file name is in a sub-directory of the main DataLink directory, you need not enter the full directory path. Simply enter the sub-directory and file name.

E.g. DATA\CACHE2.DAT

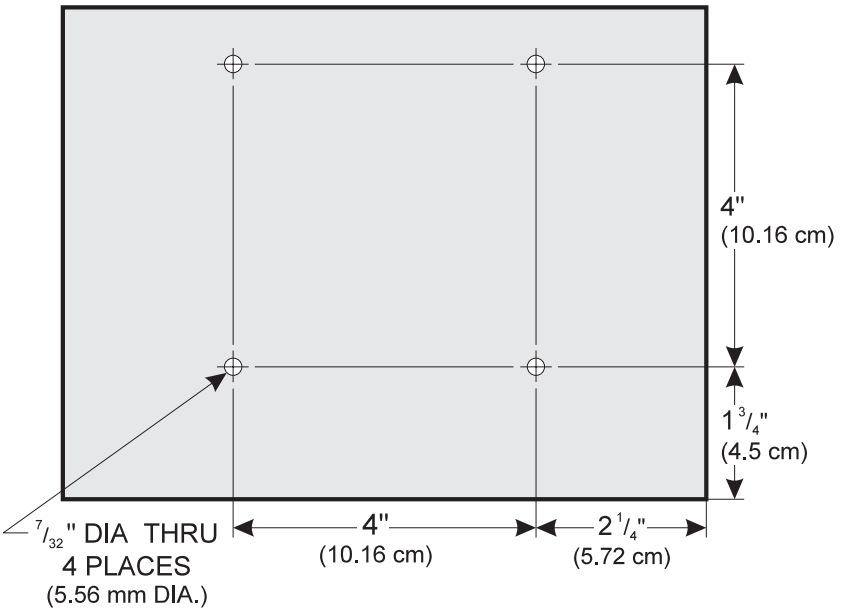
If the file is in another directory outside the DataLink directory, then the entire path will need to be specified.

E.g. C:\N-CACHE\DATA\CACHE2.DAT

Appendix C
Mounting Diagram

This drawing shows hole placement for mounting the HarvestData System console to the mounting base on a combine.

Console Mounting Diagram



Mounting Diagram C-2

Appendix D
Keyboard Commands & Menu Structure

Menu Structure

The menu presents the various processes you will use to set up your HarvestData System and acquire harvest data with it.

Keyboard Commands

The following list gives definitions of the key commands and sequences available in the HarvestData System.

ENTER: Accept individual value and move to the next item or step.

ESC: Escape to next higher menu, or back up to previous screen.

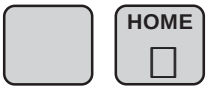
SPACE: Enter a space or blank in text.

UP ARROW: Move cursor to previous entry/selection item within a screen.

DOWN ARROW: Move cursor to next entry/selection item within a screen.

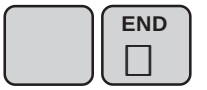
LEFT ARROW: Delete previous character or step backward through available entries for a selection item.

RIGHT ARROW: Step forward through available entries for a selection item.



BLUE, LEFT ARROW: Move to the first of the available entries for a selection item. (Press the **Blue** key once; release it, then press the **Left Arrow** key).

BLUE, RIGHT ARROW: Move to the last of the available entries for a selection item. (Press the **Shift** key once; release it, then press the **Right** Arrow key).



BLUE, UP ARROW: Move to the top of the menu item list.

BLUE, DOWN ARROW: Move to the bottom of the menu item list.

FUNCTION 1 (F1): "View Help" - provides user context sensitive help.

FUNCTION 2 (F2): "Pop-up Notes" - if a numerical or text variable is ACTIVE, but turned off (FTN 3), this key sequence allows user entry on a request basis.

FUNCTION 3 (F3): "On/Off Notes" - if numerical or text variables are "ACTIVE", this key allows the user to hide the variables temporarily if they don't need to be recorded.

FUNCTION 4 (F4): "Relocate" - when in harvest mode, this key pops up a field map and allows the user to reposition the data acquisition prompts to a new location on the field.

FUNCTION 5 (F5): "Advance Paper" - pulse the paper advance solenoid on the field printer.

BLUE, FUNCTION 6 (F6): "Retare Bucket" - when in harvest mode, selection of this function cycles the plot bucket and records a new tare weight measurement for the weigh bucket and test chamber; and a new moisture zero.

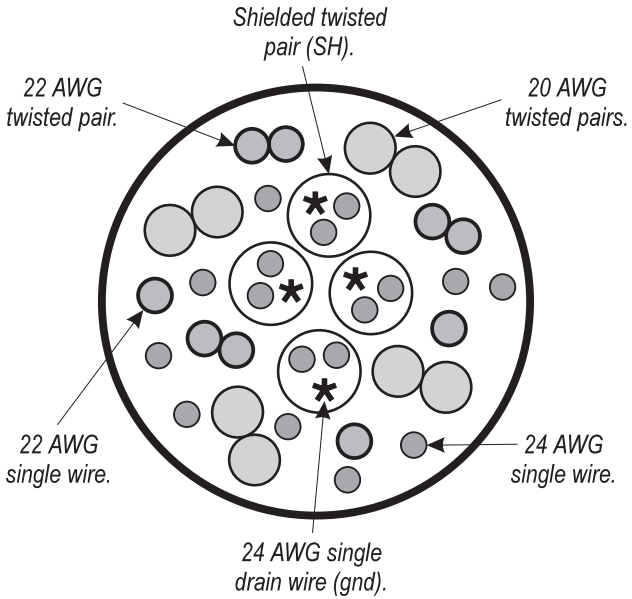
BLUE, FUNCTION 7 (F7): "Edit Data" - when in harvest mode, this key sequence allows the user to edit harvest data.

BLUE, FUNCTION 8 (F8): "Show Version" - shows current version of the HarvestData System software.

BLUE, FUNCTION 9 (F9): "Set Backlight" - allows the user to turn the backlight on or off. Key in "Y" or "N" to turn the backlight on or off.

Appendix E
System Control Cable

Standard System Control Cable



In a standard system control cable there are:

- four pairs of shielded cables,
- four 20 AWG twisted paires,
- nine 24 AWG single wires,
- three 22 AWG twisted pairs,
- four 24 AWG single drain wires for the shielded twisted pairs,
- two 22 AWG single wires.

Connector Wire Codes - Standard

Pin	Wire Name
1	plot weight bucket door actuator (+)
2	plot weight bucket door actuator (-)
3	test chamber door actuator (+)
4	test chamber door actuator (-)
5	holding hopper door actuator (+)
6	holding hopper door actuator (-)
7	plot weight bucket door “open” sense
8	plot weight bucket door “closed” sense
9	test chamber door “open” sense
10	test chamber door “closed” sense
11	moisture sensor excitation (12V reg.)
12	moisture sensor control
13	moisture sensor shield
14	test chamber load cell signal (+)
15	test chamber load cell signal (-)
16	test chamber load cell shield
17	test chamber load cell excitation (+)
18	plot weight load cell shield
19	plot weight load cell excitation (+)

Pin	Wire Name
20	auxilary actuator “open” sense
21	auxilary actuator “closed” sense
22	bucket door sense gnd
23	auxilary actuator (+)
24	auxilary actuator (-)
25	auxilary load cell excitation (-)
26	auxilary load cell excitation (+)
27	holding hopper door “open” sense
28	holding hopper door “closed” sense
29	auxilary load cell signal (+)
30	auxilary load cell shield
31	auxilary load cell signal (-)
32	moisture sensor signal (+)
33	moisture sensor signal (-)
34	test chamber load cell excitation (-)
35	plot weight load cell signal (+)
36	plot weight load cell signal (-)
37	plot weight load cell excitation (-)

Helps

- Pins 1-6 and 23-24 are 20-gauge outer wires for actuator drivers.
- Shielded pairs for sensors are on pins 14 and 15, 32 and 33, 35 and 36, and 29 and 31.

Load Cell Connector Wiring

These cables come pre-wired. The following information on wiring configurations are included for reference only.

Plot Weight Load Cell

System Control Cable Pin #	Signal Name	Break-Out Box Pin #
35	plot weight load cell signal (+)	3
36	plot weight load cell signal (-)	4
19	plot weight load cell excitation (+)	1
37	plot weight load cell excitation (-)	5
18	plot weight load cell shield	6
	no connection	2

Test Chamber Load Cell

System Control Cable Pin #	Signal Name	Break-Out Box Pin #
14	test chamber load cell signal (+)	3
15	test chamber load cell signal (-)	4
17	test chamber load cell excitation (+)	1
34	test chamber load cell excitation (-)	5
16	test chamber load cell shield	6
	no connection	2

Auxillary Load Cell

System Control Cable Pin #	Signal Name	Break-Out Box Pin #
29	aux load cell signal (+)	3
31	aux load cell signal (-)	4
26	aux load cell excitation (+)	1
25	aux load cell excitation (-)	5
30	aux load cell shield	6
	no connection	2

Moisture Sensor Connector Wiring

These cables come pre-wired. The following information on wiring configurations are included for reference only.

System Control Cable Pin #	Signal Name	Break-Out Box Pin #
32	moisture sensor signal (+)	3
33	moisture sensor signal (-)	4
12	moisture sensor control	5
11	moisture sensor excitation (12V reg.)	1
13	moisture sensor shield & ground	6
	no connection	2

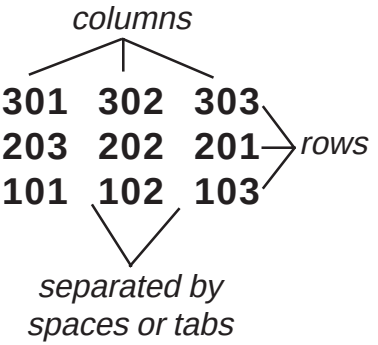
Appendix F
Fieldmaps Generated from ASCII

A field map to be downloaded to the FieldBook and into the HarvestData software consists of an ASCII file. An ASCII file is simply a DOS text file. It is created on a PC with a text editor, a word processor in a non-document mode or DOS text mode, or it may be created in a spreadsheet and saved in tab delmited, space delimited, or CSV (comma delimited) format.

The HarvestData software version 3.X accepts two distinct ASCII file formats to load as maps to the FieldBook. The first is a two dimensional text representation of the map. The second format, called Harvest Order Space Delimited format, is the same as the format accepted by version 1.9X of the HarvestMaster software. Both formats are discussed here.

Two Dimensional Text Representation

A 2-D (two dimensional) text map consists of rows and columns of plot identifiers separated by spaces or tabs. The identifiers consist of up to 8 alphanumeric characters. If the identifier is more than 8 alphanumeric characters then the identifier will be broken into groups of 8 characters and placed in multiple identifier holders in the data file. There is no header information. Each row ends with an ASCII carriage return/line feed pair. Each plot may have one or more identifiers with multiple identifiers for a single plot being separated by commas. A simple example is shown here.



310	309	308	307	306
301	302	303	304	305
210	209	208	207	206
201	202	203	204	205
110	109	108	107	106
101	102	103	104	105

The map to be downloaded would be entered into a text file exactly as shown. If you required multiple identifiers for a single plot (for example, plots which were divided into studies), the text file could contain the following:

304,study1	303,study1	302,study1	000,study2	305,study2
203,study1	204,study1	301,study1	303,study2	304,study2
202,study1	201,study1	104,study1	302,study2	301,study2
101,study1	102,study1	103,study1	204,study2	205,study2
304,study3	303,study3	302,study3	203,study2	202,study2
203,study3	204,study3	301,study3	105,study2	201,study2
202,study3	201,study3	104,study3	104,study2	103,study2
101,study3	102,study3	103,study3	101,study2	102,study2

After downloading the above map and collecting harvest data, you can upload the data file back to your PC. When viewed in the text editor on the PC, the data file would look like this:

```
[ID1     ID2       Plot     Moist   ...]
101      study3    14.2     5.4
102      study3    14.4     5.8
103      study3    12.8     4.5
101      study2    17.4     6.5
:
:
```

If there are portions of a field which have border rows, or rocks, these should be marked with an easily identified word or groups of words. Do not leave "holes" or unfinished rows in the map. For example, this map is just fine.

```
xxxx    xxxx    xxxx    xxxx    xxxx    xxxx
border  301     302     303     304     border
border  201     202     rocks   204     border
border  101     102     rocks   104     border
xxxx    xxxx    xxxx    xxxx    xxxx    xxxx
```

However, the incomplete map below would cause abnormal behavior if loaded.

```
301     304
201     202     203     204
101             103     104     border
001             003
```

When downloading a 2-D text representation of a field map, you will be asked which corner of the map corresponds to range 1, row 1 of the field. Since the HarvestData software always considers range 1, row 1 to be the lower left corner of a map, if any corner besides the lower left is chosen, the map will be rotated accordingly.

Harvest Order Space Delimited

The second type of map file that may be generated in the DOS text editor and subsequently downloaded to the hand held is called Harvest Order space delimited format. You enter the plot numbers (and any associated identifiers) into the DOS text editor in the order in which they will be harvested. Here's an example:

101
110
201
210
301
310
102
109
202
209
302
309
103
108
203
208
303
308
104
107
204
207
304
307
105
106
205
206
305
306

This is the actual harvest sequence

This sample field map file uses any variable set up on the hand held. Here is the field map that the download file on the previous page represents (assuming it was laid out sequentially):

310	309	308	307	306
301	302	303	304	305
210	209	208	207	206
201	202	203	204	205
110	109	108	107	106
101	102	103	104	105

For additional clarification, here is another example of a Harvest Order space delimited map that is comma separated. Suppose you have more than one study in a field, and wish to include the study name with the plot identifiers. For this example, we can use a field map like this:

Study 611123

304	303	302
203	204	301
202	201	104
101	102	103

304	303	302
203	204	301
202	201	104
101	102	103

Study 799971

000	305
303	304
302	301
204	205

Study 845223

203	202
105	201
104	103
101	102

The Harvest Order space delimited field map to download would, in the DOS text editor, look like the one shown on the following page.

Harvest Order space delimited map for downloading

101,799971
202,799971
203,799971
304,799971
101,611123
202,611123
203,611123
304,611123
303,611123
204,611123
201,611123
102,611123
303,799971
204,799971
101,799971
102,799971
103,799971
104,799971
301,799971
302,799971
103,611123
104,611123
301,611123
302,611123
000,845223
303,845223
302,845223
204,845223
203,845223
105,845223
104,845223
101,845223
102,845223
103,845223
201,845223
202,845223(etc.)

Study Identifier

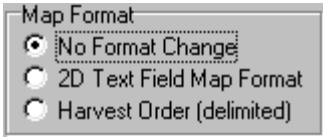
Plot# Identifer

No Format Change

The "NO FORMAT CHANGE" option directly transfers a file to the hand held. This is generally used when downloading setup files rather than field map files.

Downloading Maps

A format must be selected before downloading a map file to the hand held computer. This tells the HarvestData software how to interpret the field map file you're about to download. To select a format:



✏ **Note: The hand held must be running the HarvestData software and connected to the PC through the communication cable before you can download maps. The active variables set on the hand held (i.e. Plot Wt, Moisture, Test Wt) and any note variables will be used to set up the map file during the transfer process to the hand held. If you desire any variables to be associated with the map you will need to set them up before the transfer begins.**

To download the map:

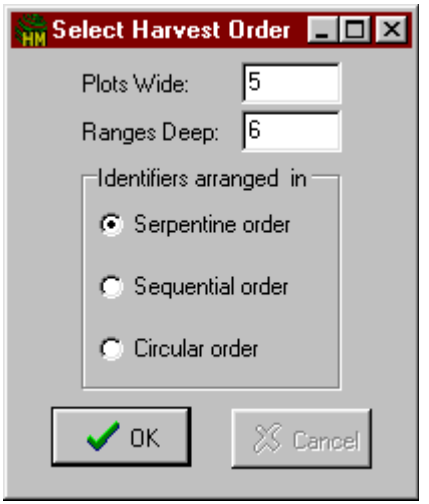
- **In the DOS text editor, type in the plot numbers (and any associated identifers with those plot numbers) in a format consistent with what you selected in the DataLink Download File format menu (either 2D or Harvest Order format) .**

- **Save the map file in the text editor and return to DataLink.**

- **Make sure your hand held computer is connected to the PC correctly and that you're running the HarvestData software on the hand held.**

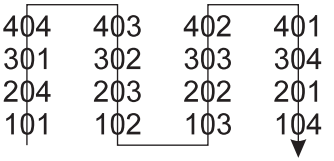
- **Click on the Transfer Files tab. Click "OK" on the Locating Remote window. Select the proper map file, then click on the RIGHT-POINTING ARROW to begin the download.**

- **If you're downloading a Harvest Order space delimited map, you will be presented with the following window (if you are downloading a 2D map, skip the next step):**

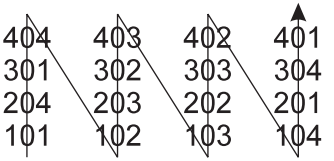


Harvest Order Space Delimited Download Screen

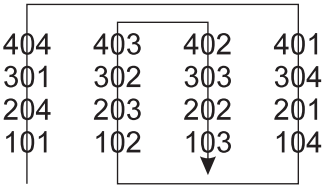
✏ **Note: When loading a Harvest Order space delimited field map, you will be asked to supply the width of the field, the number of ranges in the field and the harvest direction or route that will be taken when the field is harvested. The three available harvest routes are serpentine, sequential, and circular. (NOTE: Circular can be designated clockwise or counter-clockwise depending upon your starting position.)**



Serpentine

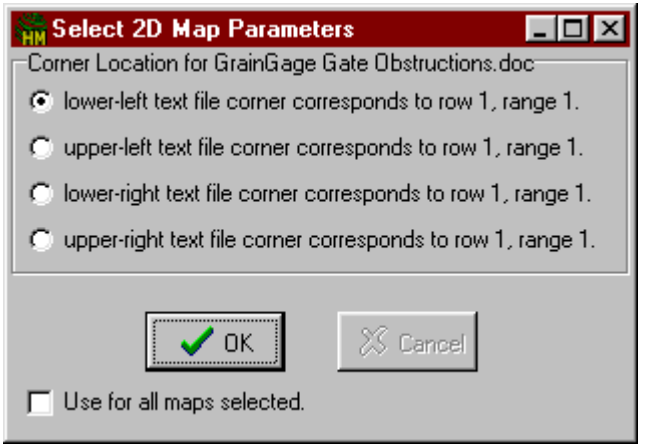


Sequential



Circular

- **If you're downloading a 2D map, you will be presented with this screen:**



- **Select the appropriate option, then click the RIGHT-POINTING ARROW.**

Appendix G
Windows 95 / 98 / NT Installation

Loading Software

The distribution diskettes (MS-DOS, IBM PC compatible format) contain the programs to install DataLink for Windows on your PC and the HarvestData software on your DOS handheld computer. The whole installation process takes 5-15 minutes, depending on your level of familiarity with computers.

- **Make sure that your handheld is adequately charged.**
- **Have your communication cable (model # CA-2009) on-hand.**

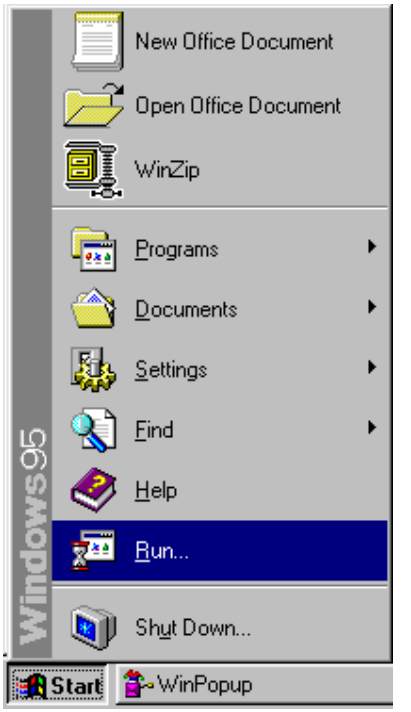
DataLink Installation

The steps to install DataLink are as follows:

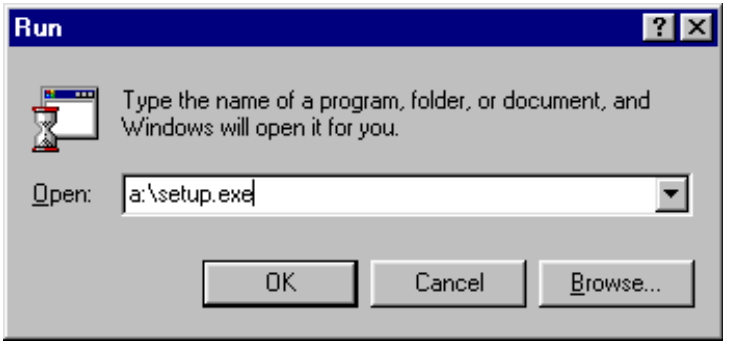
- **Turn your computer on.**
- **Insert the 3.5” DataLink for Windows diskette into your PC.**

On your PC, begin the DataLink installation by running the setup program on the diskette:

- **Go to the START menu and click on Run...**



- **In the RUN window, type in the letter of the drive containing the DataLink for Windows diskette (A:\ or B:\), followed by *SETUP.exe*, then click *OK*.**



- **Follow the instructions on the screen.**

- **The installation drive and directory is C:\PROGRAM FILES\HARVESTMASTER\DATALINK FOR WINDOWS, where C: is the letter of your hard drive.**

✏ **Note: You may change the drive and directory name where the DataLink program will be installed. To do this, click the *Browse* button. Navigate to the drive and directory you wish to install the DataLink software to.**

- **Windows alerts you when DataLink has been successfully installed.**

- **To run DataLink, go to the START menu, PROGRAMS folder, DATALINK for WINDOWS directory and click on the DataLink for Windows program.**

OR

- **Drag the DLWin application from the Explorer window to the desktop, then double click on the DL icon in the desktop area.**

Introduction to DataLink

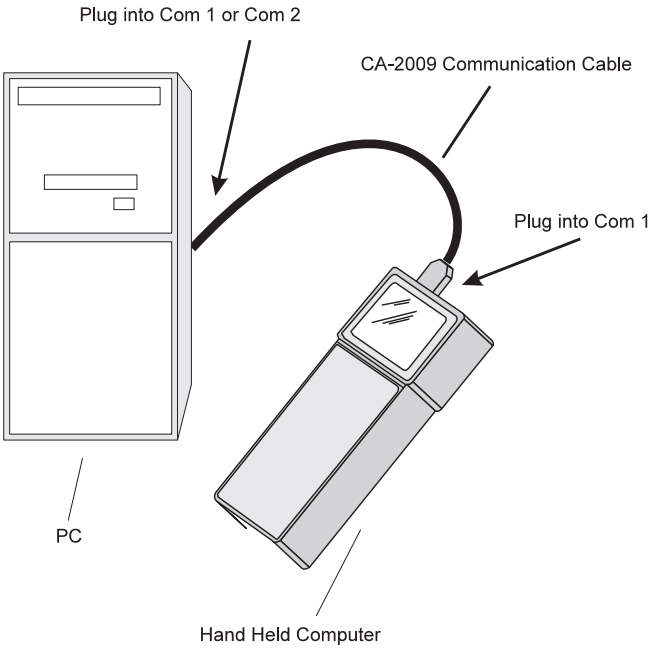
DataLink is, as the name implies, your link to the data stored on the handheld computer. You may *upload* data (transfer data from the handheld to the PC) or *download* data (transfer data from the PC to the handheld) using DataLink. DataLink lets your PC and handheld computer communicate via the serial communication cable (model # CA-2009). The communication cable connects your remote data collection unit to your desk-top PC, and DataLink is the communication software that allows the handheld and PC to communicate.

In addition to facilitating communication between the PC and handheld, DataLink is used to install the HarvestData Application software on the handheld computer. It is also useful for creating and editing maps.

Installing the HarvestData Software

The steps to install the HarvestData Software on the handheld computer are as follows:

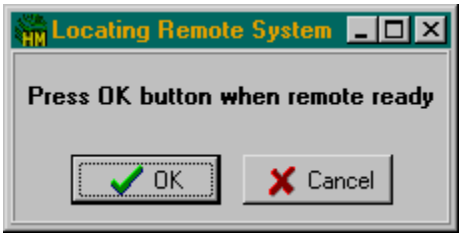
- **Connect the PC to the handheld using the communications cable. To do this, plug the communications cable into one of the serial ports on your computer (preferably port 1).**



✏ **Note: DataLink defaults to communicating via the PC's com1 port. Some computers may have a mouse or other external devices connected to com1. If this is the case, it will probably be easier to plug the communications cable into com2. Then, on your PC, go to the DataLink for Windows Comm Setup tab and change the Com Port setting. (See p.G-9 for more information on Comm Setup.)**

- **Insert the HarvestData Applications diskette into Drive A:\ or B:\.**

- **Run DataLink for Windows. Click "OK" in the Locating Remote System box if the handheld is connected and on.**



✏ **Note: Check your COM Port setting and communication cable if you are having problems with communications. For additional help on diagnosing communication problems, turn to *Chapter 5: Troubleshooting.***

- **Select the proper location to where your application diskette is located (e.g. A:\ or B:\ drive).**

- **Click on "Application Install" tab.**

- **Select "Load Application from DISK" and wait as the files are copied to your PC.**

- **Your Application should now be displayed in the "Select Application" pull down menu.**

✏ **Note: You may load more than one application if you like. Each application version will be displayed in the "Select Application" pull down menu.**

- **To prepare the handheld to receive the HarvestData GG DOS software, turn it on by pressing the *ON/OFF* key. Follow the instructions in the handheld's User's Manual.**

- **In DataLink for Widnows, make sure the application that you would like to load is displayed in the "Select Application" menu.**

- **Choose "English" language.**

✏ **Note: If you desire another language, please call HarvestMaster's Technical Support Team for further instructions.**

- **Click on "Send Application to Handheld".**

- **Wait while the software is transferred to your handheld.**

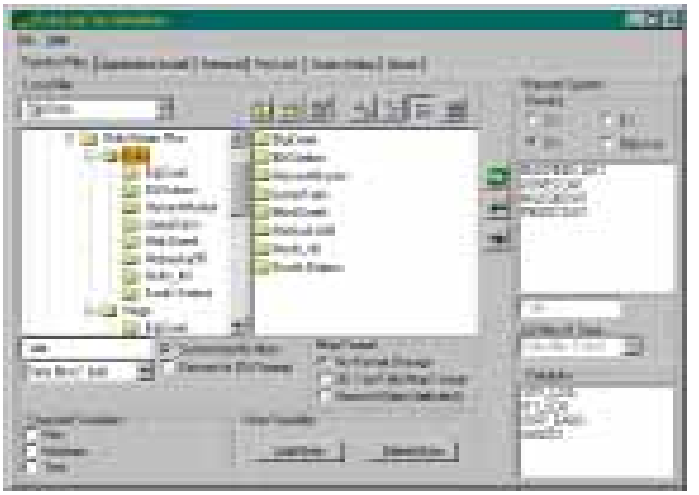
✏ **Note: Please refer to the "HarvestData System User's Manual" for software setup information.**

Transferring Files

Now that the software has been installed, you can transfer map and data files between the PC and handheld with a click of a button. To transfer files to and from the handheld:

- **Click on the "Transfer Files" tab if it is not already in the foreground.**

- **If the handheld is connected correctly and the communication setups are set correctly, the files from the handheld will be displayed in the box on the right side of the DataLink screen with the directory and files on your PC displayed on the left side.**



✏ **Note: By placing a check in the Synchronize File Filters box, any file type selected in the List Files of Type box on the PC side of the Transfer Files screen will be matched automatically on the handheld side of the Transfer Files screen. Changes *must* be made on the PC side.**

■ **If downloading a file, select the download format ("Map Format") to the type of file you are downloading, navigate to the file (or files) you would like to transfer to the handheld, highlight them, and then left click on the RIGHT-POINTING ARROW to start the download process.**

✏ **Note: Appendix F in your "HarvestData System User's Manual" explains the map download options.**

■ **If uploading a file from the handheld, highlight the file (or files) to be transferred to your PC, and then left click on the LEFT-POINTING ARROW to start the upload process.**

✏ **Note: The option, "Convert to CSV format" will convert data files to a comma-separated format which is best used when importing into programs such as Microsoft Excel.**

✏ **Note: Refer to Help in DataLink for Windows for specific information on transferring files.**

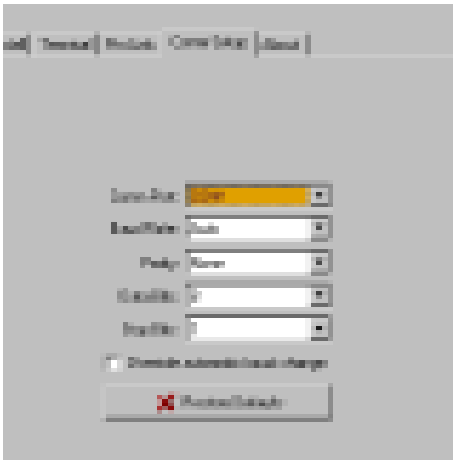
✏ **Note: To send and receive files other than those associated with the HarvestData software, use Pro Link. Refer to Help in DataLink for Windows for information on Pro Link.**

Comm Setup

✏ **Note: Do not alter these settings unless absolutely necessary.**

If the PC and handheld did not communicate, the com port setting may need to be changed.

To change the com port settings, click the Comm Setup tab in DataLink. A sample Comm Setup screen, with the default settings, is shown below.



If the handheld computer, for example, is connected to COM2, use the arrow at the right edge of the Comm Port box to reveal a pull-down menu, then select COM2.

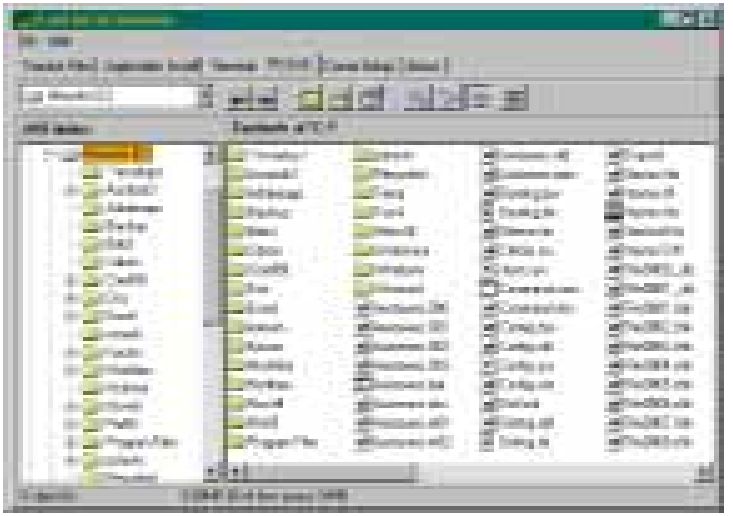
DataLink automatically sets the optimum baud rate for data and map transfers (9600) and Pro Link transfers (115k). If you must use a different baud rate, click the box beside "Override automatic baud change" so a check appears. DataLink will now exclusively use whichever baud rate you select. Use the arrow at the right end of the Baud Rate box to reveal the pull-down menu, then change the setting as needed.

✏ **Note: Use the Restore Defaults button to reset customized settings to their original values.**

✏ **Note: For additional help on diagnosing communication problems, turn to Help in Datalink for Windows and *Chapter 5: Troubleshooting* of this manual.**

Pro Link

✏ **Note: This utility can only be used with DOS handheld computers such as the Pro4000 or Pro2000. ProShell or ProLink must be running on the handheld computer.**



Pro Link is a file transfer utility generally used for files not associated with the HarvestData application software (e.g. custom DOS programs). Before using Pro Link, make sure the Baud Rate in the list of Comm Setup options is set to 115k or that the "Override automatic baud change" box on the Comm Setup screen is unchecked. Choose the Pro Link tab.

■ **To send files, follow these steps:**

1. Select the appropriate drive from the pull-down menu at the top of the screen.

2. **Navigate through the folders in the left-hand window. Double-click a folder to open it. Files within that folder will appear in the right-hand window.**
3. **Select the file(s) you wish to send. To send more than one file, highlight the first you wish to send, then hold down the Shift key and select the last, or use the Ctrl key to highlight separate files.**
4. **Click the Send button.**
5. **On the handheld, press F5 to initiate the transfer process.**
6. **On the handheld, press F4 to receive files.**
7. **On the PC, the Transmission Progress window appears. Click the Send button. The Transmission Progress window shows the current file in transit, its progress, and the overall progress. Click Cancel to stop the transfer.**

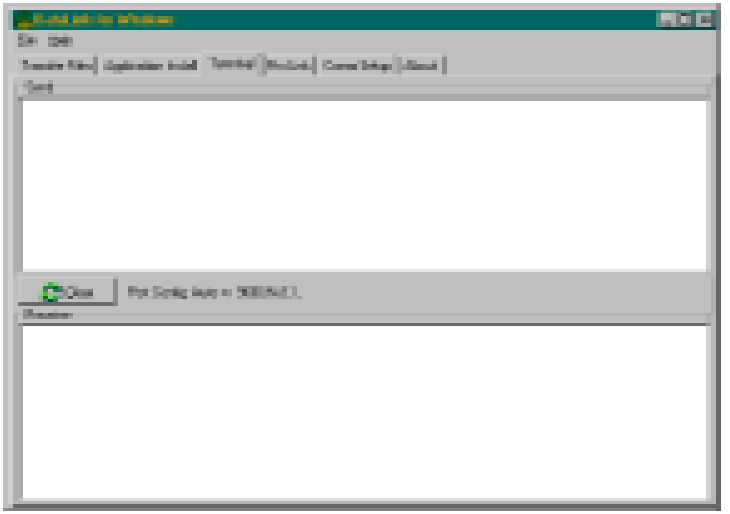
■ **To receive files, follow these steps:**

1. **Select the appropriate drive from the pull-down menu at the top of the screen.**
2. **Navigate through the folders in the window. Double-click a folder to open it A received file will be placed in the lowest-ranking open folder.**
3. **Click the Receive button.**
4. **On the handheld, select the files to be sent and press F5 to initiate the transfer process.**
5. **On the handheld, press F5 again to send files.**
4. **On the PC, the Transmission Progress window appears. Click the Send button. The Transmission Progress window shows the current file in transit, its progress, and the overall progress. Click Cancel to stop the transfer.**

✏ **Note: For this option to work, both DataLink and the handheld must be in terminal mode.**

Terminal

Terminal is a diagnostic tool used mainly for troubleshooting communication problems between the PC and the handheld unit. In DataLink, select the Terminal tab. (Refer to your handheld's manual for setting it in terminal mode.)



■ **To test communication between the handheld and the PC, follow these steps:**

1. **Connect the handheld unit to the appropriate comm port on the PC.**
2. **Set DataLink and the handheld to terminal mode.**
3. **Type a test message on your PC. The message should appear in the Send window in DataLink and in the Receive window on the handheld.**
4. **Type a test message on the handheld. The message should appear in the Send window of the handheld and in the Receive window of DataLink.**
5. **If steps 3 and 4 are accomplished successfully, then the handheld and PC are communicating.**

6. **If these messages do not appear as they should, make sure of the connections to the PC and handheld. Make sure the handheld is plugged into the same comm port as shown on the Comm Setup screen. You may also refer to the Troubleshooting chapter of the handheld's manual. Then repeat steps 2 through 4.**

Make sure the Comm Port shown is the port to which the handheld unit is connected. If DataLink has trouble locating the remote system, it may be because the wrong Comm Port is selected here.

DataLink automatically switches between 9600 for normal file transfers and 115k for Pro Link transfers. In general, do not use other settings unless you have advanced knowledge of port settings and transfer rates.

In general, use the default settings unless you have expert knowledge of port settings.

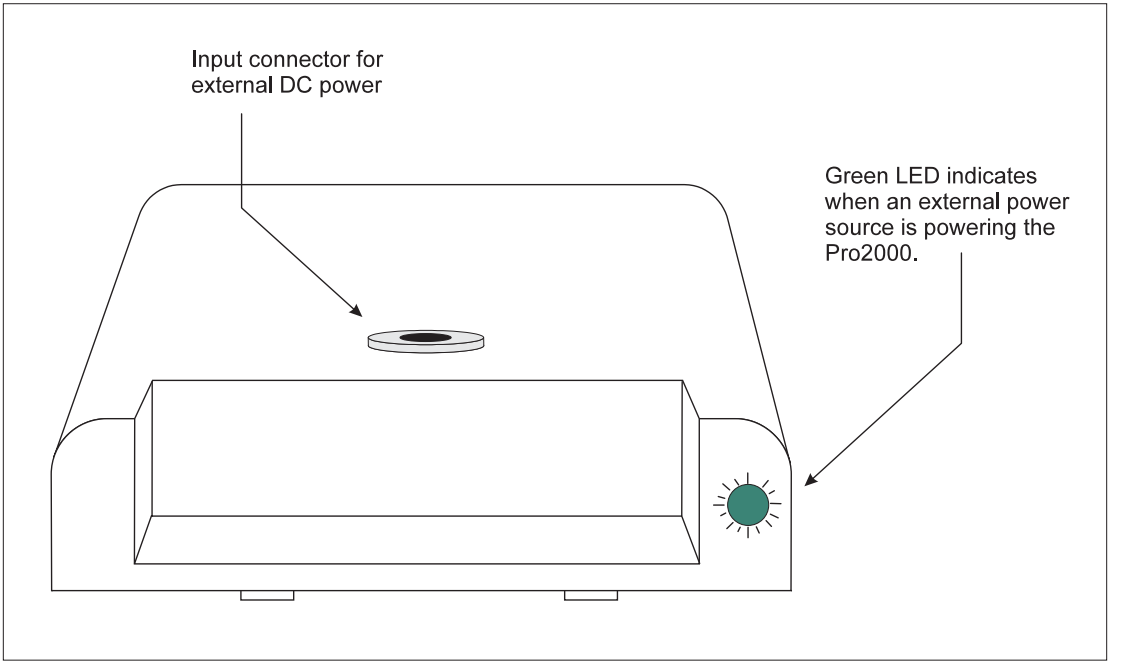
Appendix H
External Input Battery Pack

Overview

This accessory for the Pro2000 is to allow the Pro2000 to be powered continuously from an external power source. The input voltage can range from 10 volts on the low end and 27 volts on the high end. It is constructed in a standard battery pack for the Pro2000. This will power all models of Pro2000 and PC286 Field Books.

This pack contains one set of battery cells and a voltage regulating power supply circuit. The battery cells have the same capacity as the standard battery pack (model PW-2003). The power supply circuit regulates the input voltage down to the same level as a fully charged battery. This power supply circuit is a switching regulator that develops very little heat, and is thus more efficient. This means that when connected to an input voltage of 12 volts or more, the Pro2000 will appear to draw less current from the external source than stated in the manual. The current will go down proportionally as the voltage is raised above 10 volts.

The batteries in this pack are continuously trickle charged to maintain their charge. This trickle charge is at a low rate, so that the battery will never be over charged and damaged. When the battery pack is not connected to an external power source, and the batteries become drained, it takes about 24 hours to charge if you connect it back to the vehicle power. The battery can also be placed on the SmartCharger to charge the batteries in a shorter period of time without damage to the power supply section of the pack. While the pack is installed on a Pro2000 you can charge the battery overnight (12-14 hrs) using the standard wall charger.



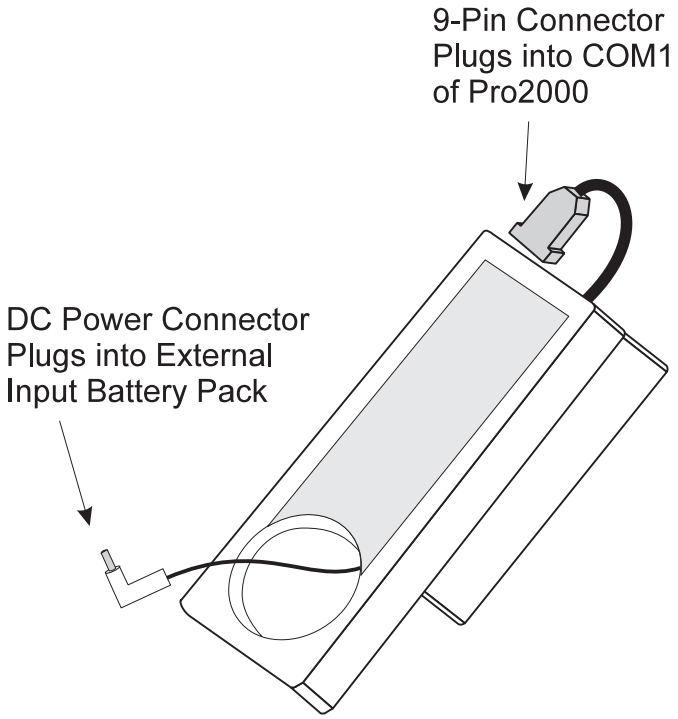
The green LED lights up when an external source is supplying power to the Pro2000. After connecting an external power source, check to see that the LED is lit.

It is normal for the External Input Battery Pack to become warm during use. It should not get hot.

Slide the battery pack on to the Pro2000 as you would a standard or heavy-duty battery pack. This pack will supply power to the Pro2000 as if it were a standard battery pack when external DC power input is not connected.

Usage

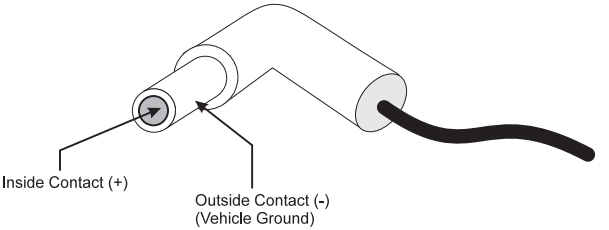
Connecting the DC Power Input



The DC power connector plugs into the battery pack and fits snugly underneath the handstrap that runs along the back of the Pro2000. The strap keeps the power connector in place, preventing accidental disconnection.

External Input Battery Pack Specifications

Input Voltage Range:	10VDC - 27 VDC
Trickle Charge Current:	Approx. 50 mA (when battery is fully charged)
Battery Charge Time:	approx. 24 hours
Input Power Connector:	DC power jack 5.5mm/2.5mm



Battery Pack Size:	6.4" x 3.7" x 0.9"
Battery Pack Weight:	13 oz.
Operating Temperature:	-22 to +130 deg F (-30 to +54 deg C)

Index

A

B

C

D

E

F

G

H

I

K

L

M

M

N

O

P

R

S

T

U

V

W