TeeJet®

Legacy 6000
Fieldware

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Legacy 6000

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CHAPTER 1 - INTRODUCTION

The Legacy 6000 system allows the control of multiple products plus GPS mapping, guidance, assisted steering, automated Boom Section Control, and data collection in a single console using CAN bus technology. Replacing multiple consoles in the cab with one robust system, TeeJet Technologies' Legacy 6000 sets a new standard for control systems of the future.

The Legacy 6000 runs Fieldware software in a Windows CE environment, an extremely dependable and stable operating system. Operation is intuitive with on-screen menu choices and prompts. An on-board Help Menu is built in.

SYSTEM FEATURES

System features include:
- Six product control
- Five guidance modes (Ignore Headland, Curved [Headland], Straight-Line [Parallel], Curved A-B, and Center Pivot)
- Single console in the cab with a single cable connection to the console
- Simplified operation of product control and GPS record keeping
- Auto boom section shutoff using Switch Function Module (SFM) or Swath Manager 5
- FieldPilot module for assisted steering on straight, circle pivot, and curved paths
- Works with TeeJet Technologies' Swath XL Lightbar
- Comes fully loaded with "Fieldware for the Legacy 6000" software
- Precise control of liquid, injection, and dry products on common delivery systems
- Flow or pressure-based liquid control with multiple sensor inputs for each product
- Handles up to 20 individual boom sections and 4 swaths
- Up to 5 application rates per product can be preset and accessed on the go
- Supports granular application control using 2 rate sensors per product
- Compatible with most sensors, valves, and D.C. driven motors
- Operates bidirectional or PWM valves
- Operator selectable gain settings for control valves

- Adding additional product control is easy
- Single high speed CAN bus cable entering the cab
- Mapper utility for mapping points, lines, and polygons using just the Legacy console
- Version 3.11 or later capable of working with Gen I and Gen II CAN modules
- External (EXT) option to operate as external computer to already installed controllers
- Multiple Product Variable Rate capable

CAN BUS - VERSATILITY AND VALUE

The Legacy 6000 utilizes CAN Bus technology, an industry standard that TeeJet Technologies uses to execute precise product control in an environment more robust than any of its predecessors. Controller Area Network (CAN) is a system comprised of independent, intelligent modules connected by a single high-speed cable known as a bus, over which all the data in the system travels. CAN was originally developed for the automotive industry to provide a cost-effective means for a large number of electronic functions or systems to be interconnected without large, expensive, and troublesome wiring harnesses.

Within a CAN system each module contains its own microprocessor. All modules share a standard protocol or communication sequence that conforms to the ISO 11898 standard. Since modules have built-in computing power, a CAN system is extremely flexible and easily expands to meet a customer's needs.

Individual modules have specific and unique functions to execute, as well as the responsibility to constantly report the functions and current status. Data on the CAN is available many times a second, allowing the operation of a quick and responsive control system.

The Legacy 6000 uses 4 types of modules, each having a unique function described in the following text. The console located inside the cab is one of the modules and serves as the user interface. The remaining modules are positioned around the chassis close to the area they influence. For instance, the Dual Control Module (DCM) connects to the actuator and sensor and controls the actual release of the product. Upgrading from two-product to four-product application (or more) is simply a matter of adding additional DCM's to the system.

System Components

Dual Control Module

The Dual Control Module (DCM) performs the control function for the CAN Bus and connects the actuator and up to 6 sensors to the system. Control outputs can be bidirectional or Pulse Width Modulated (PWM). One DCM is required for every two products to be controlled.

Figure 1-1: Dual Control Module (DCM)
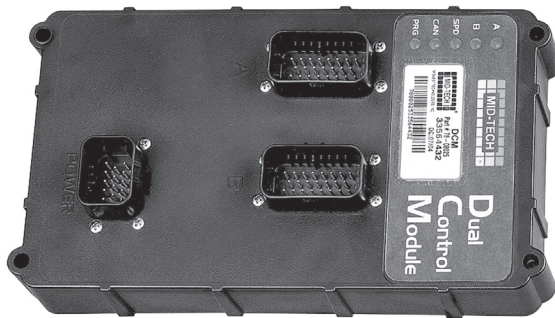
Swath XL Lightbar

The Swath XL Lightbar is required for applications using guidance (recommended for non-guidance uses). For non-guidance (data logging), the lightbar provides area and rate feedback.

Figure 1-2: Swath XL Lightbar
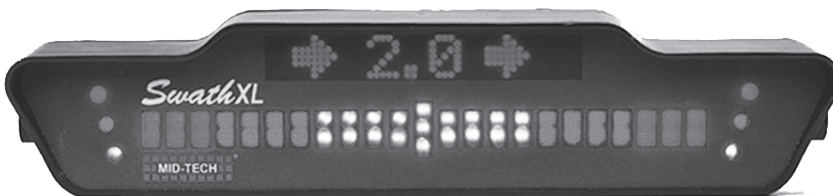
Switch Function Module

The Switch Function Module (SFM) enables manual and automated boom section control (expandable to 20).

Figure 1-3: Switch Function Module (SFM)

CAN Switchbox

The CAN Switchbox is used when existing switches are not present in the vehicle and is nearly always used in conjunction with a Switch Function Module (SFM). Each switchbox controls up to 10 sections (expandable to 20).

Figure 1-4: CAN Switchbox

Input Status Module

The Input Status Module (ISM) senses the status of existing switches on the vehicle and transforms the voltage switch state into messages on the CAN Bus. Boom valves are connected directly to these same switches, or are alternately driven by a Switch Function Module on the CAN bus.

Figure 1-5: Input Status Module (ISM)

FieldPilot Module

The FieldPilot Module performs assisted steering on straight and contour paths.

Figure 1-6: FieldPilot Module
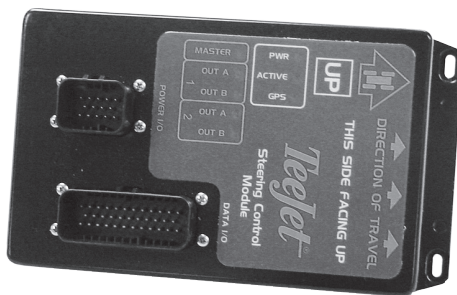
SWATH MANAGER 5 (SM5)

Swath Manager 5 is used for manual and automated boom control of up to five boom sections.

Figure 1-7: Swath Manager 5 (SM5)

NOTE: *Most systems will incorporate a Swath Manager 5 or an Input Status Module or a CAN Boom Switchbox (typically one per system).*

LEGACY 6000 CONFIGURATIONS

The following diagrams are reflective of typical Legacy 6000 configurations. Due to the variety of possible configurations, these should be used for reference purposes only.

Figure 1-8: Single Channel Liquid Flow Meter Configuration
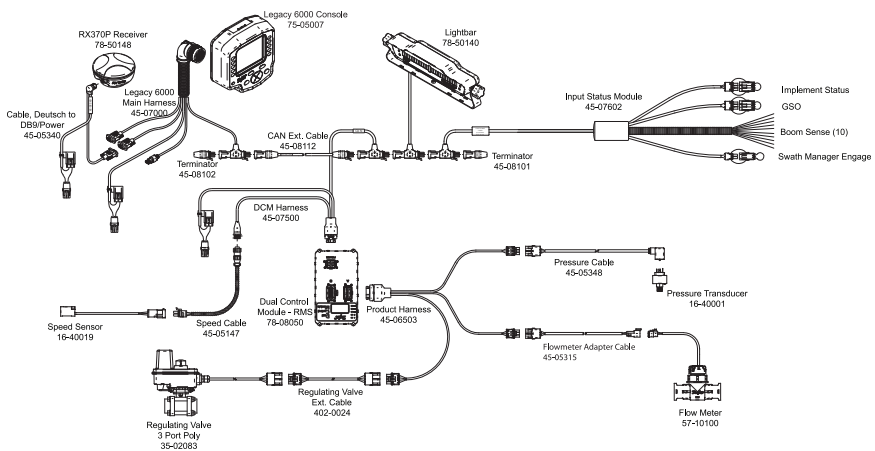
Figure 1-9: Single Channel Liquid Flow Meter Configuration w/ Swath Manager 5
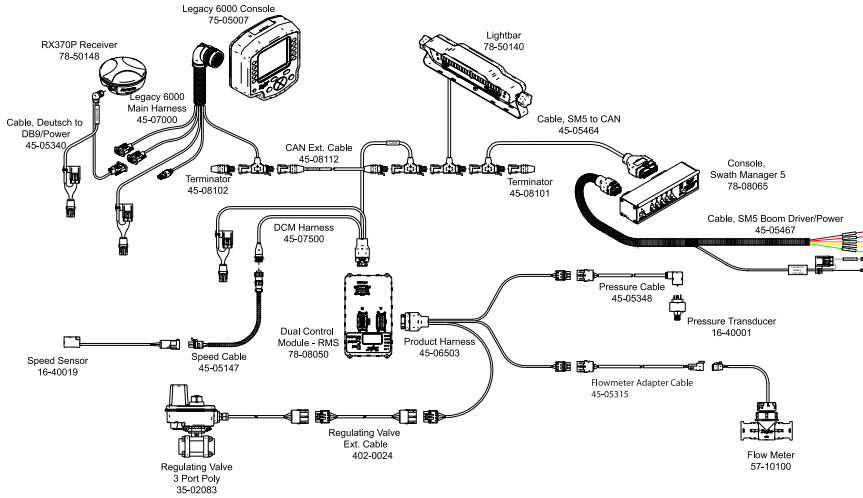
Figure 1-10: Single Channel Liquid With AutoBoom Shutoff (SFM) and Switchbox
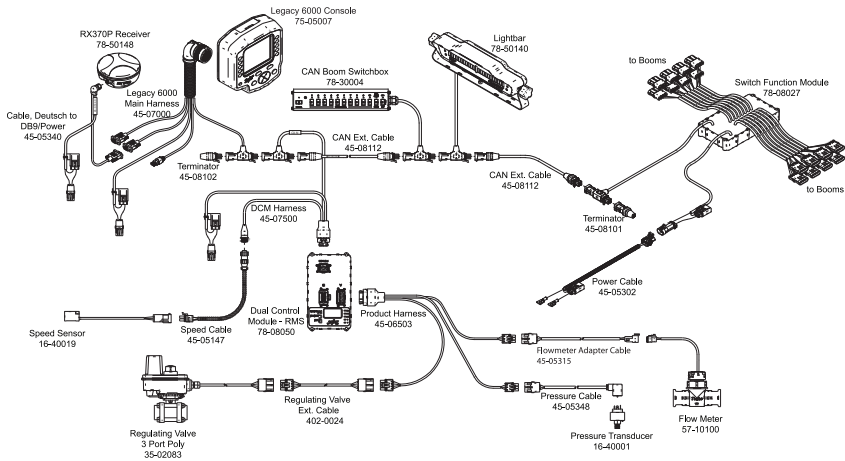
Figure 1-11: Single Channel Granular Spreader
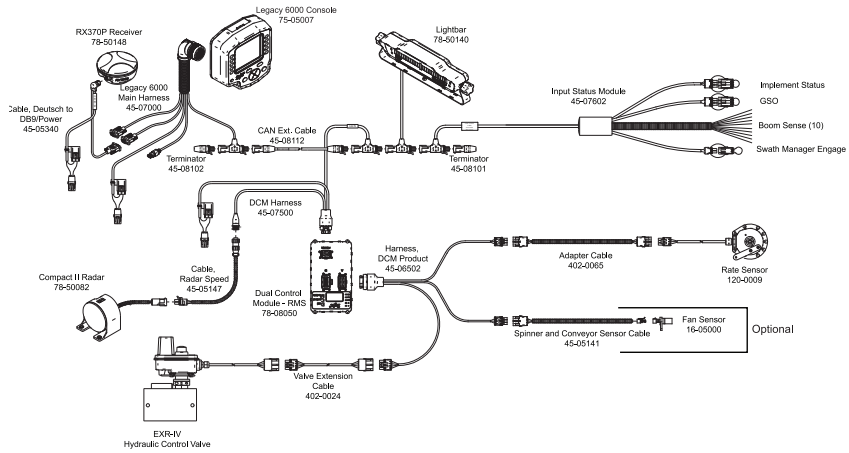
Figure 1-12: Dual Channel Granular Spreader
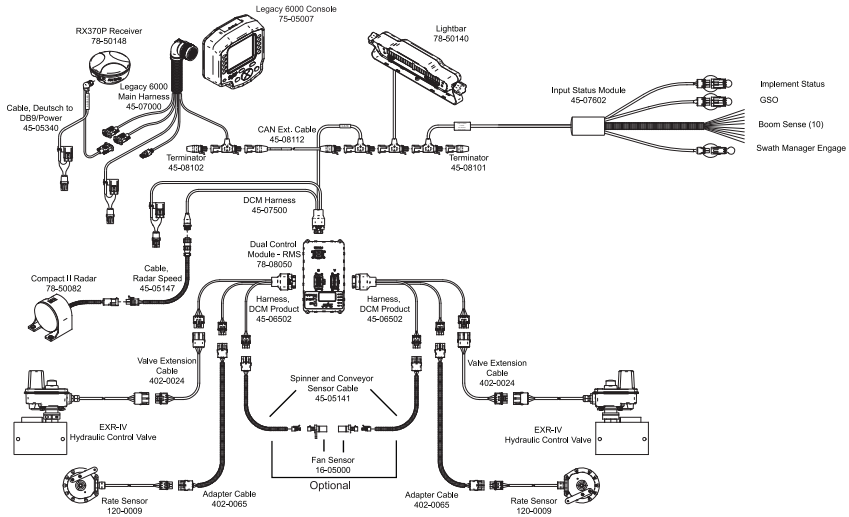
Figure 1-13: Carrier Plus Three Pump Injection System
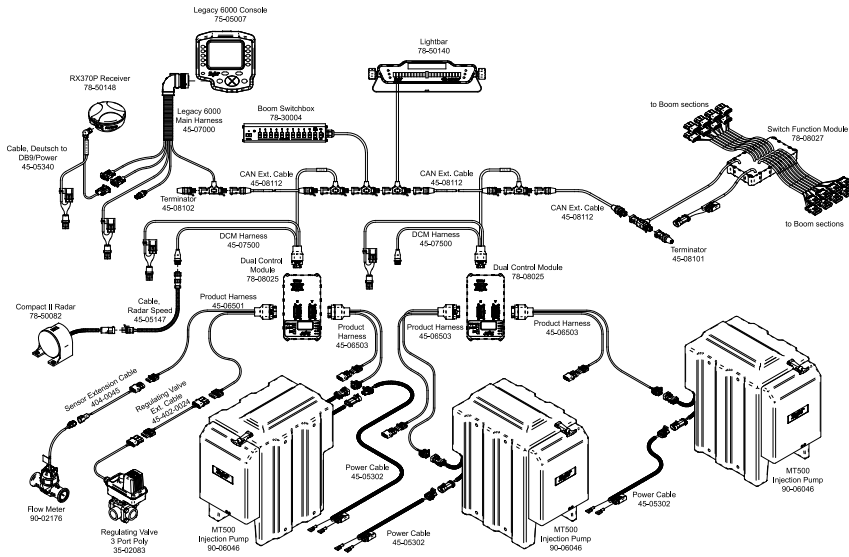
CHAPTER 2 - SYSTEM OVERVIEW

It is assumed that the Legacy 6000 hardware has been properly installed and clean, reliable power has been supplied.

Figure 2-1: Legacy 6000 Console

NOTE: *When powering the Legacy console ON or OFF, press the Power ON/ OFF button for 1-2 seconds, then release the button and wait approximately 10 seconds for the console to respond.*

Figure 2-2: (OPTIONAL) USB Keyboard Screen Navigation / Selection Buttons

The *Escape* button works the same as the *ESC* key on the computer keyboard. When pressed, the screen will back up one screen at a time until the main *Launcher* screen is reached. Note: changes are not saved when *ESC* is used before saving changes.

The ten *Function* buttons located on the left and right sides of the console are used to select the icons located next to them. This selection process takes the place of using the *Arrow* keys and *Enter* button.

The *Enter* button launches the function of the icon highlighted.

The *Arrow* keys allow the operator to move the highlighted cursor across the screen to the desired icon.

INITIAL POWERUP

NOTE: *Version 3.14 Legacy software is capable of working with both Gen I/CAN modules (PCM/PSM/SSM) and Gen II CAN modules (DCM). This User Guide is written primarily for Gen II CAN modules, although much of it still applies if used with Gen I modules. Refer to an earlier User Guide for System Tools information and other data specific to Gen I.*

If system operation is desired with Gen I CAN modules, or in EXT mode with an external rate controller, refer to *Console Setup* (page 18 in this User Guide) and select the appropriate application before proceeding.

The following steps should be performed upon initial power up of the system.

Power button

Enter button

1. Press the orange *Power* button (located on the bottom left side of the console). *Launcher*, the first page of the Legacy 6000 system, will be displayed.

2. A message indicating a CAN Bus change has occurred will be displayed. Press the *Enter* button to review the status of the module.

Figure 2-3: Initial Installation - Change Notification
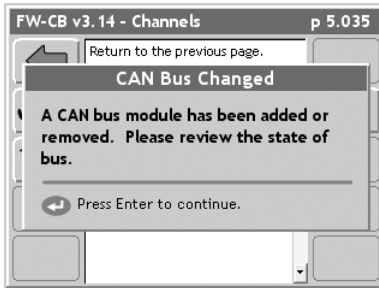
Each DCM is capable of running two products (channels). Each channel must be turned on (YES) and an ID assigned if the channel is used.

3. Highlight the desired channel in the center of the screen by using the *Arrow* keys and press the *Enter* button.
4. Turn the channel on (YES) if in use. Set a unique ID number for each channel (channel one is typically set to ID 1).

Arrow keys

Enter button

Figure 2-4: Channel Assignment
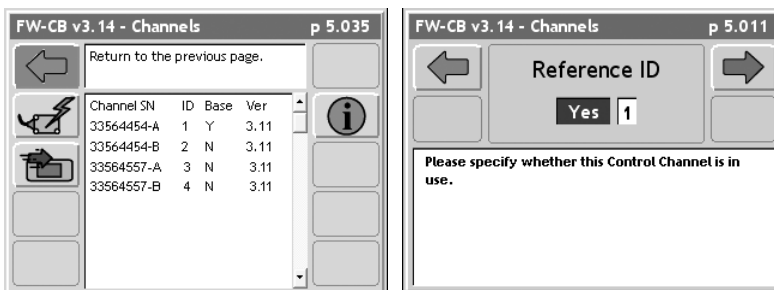
The system will guide the operator through a series of commands to establish the base channel and configure control of the other existing channels. One of the channels must be established as the base channel to handle speed input.

Figure 2-5: Establishing Base Channel
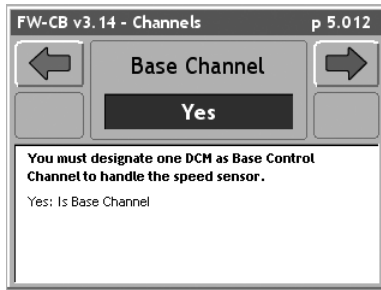
Upon initial power up, it is recommended to reset the settings to factory default. The system will prompt the operator to perform this operation for each channel by pressing the *Forward Arrow* softkey.

Forward Arrow softkey (F6)

Reset is an option for each channel. For new installations, choose YES. Reset will occur once the last channel is configured and the *Forward Arrow* softkey is executed to exit Channel Setup.

Figure 2-6: Reset CAN Bus to Factory Default
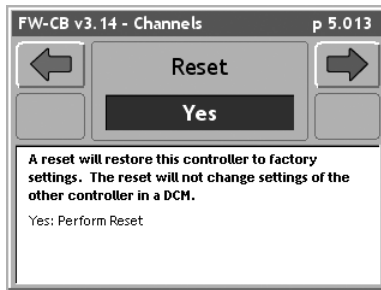
Once the CAN Bus is configured, the *Launcher* page will be displayed. The *Launcher* page is the main page of the Fieldware software. All software applications are accessed from this main page: System Setup, System Tools, Application Rate Manager (ARM), and Mapper.

System Setup softkey
System Tools softkey

ARM Bullseye softkey
Mapper softkey

PAGE LAYOUT AND NAVIGATION

There are three types of page layouts used throughout the Fieldware software: Launcher pages, Menu pages, and Parameter Setup pages.

Launcher pages provide access to multiple setup applications as illustrated in Figure 2-8.

Figure 2-8: Examples of Launcher Pages

Software Version, Page Name and Number

Help Window

Highlighted Application
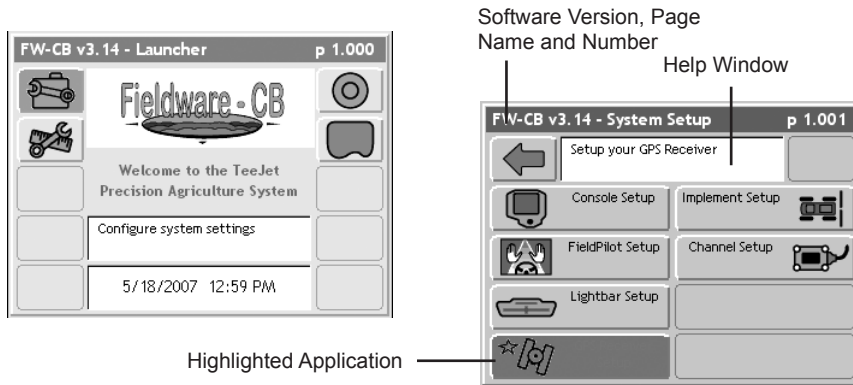
Menu pages contain setup parameters associated with a particular theme (e.g., GPS Receiver Setup). Typically a setup wizard guides the operator through the setup process for each specific topic. Sub-group buttons display only those parameters associated with the specific topic being configured.

Navigation through Menu Setup pages is accomplished by using the *Arrow* keys to scroll to the appropriate parameter and the *Enter* button to view the parameter options.

Arrow keys

Enter button

Figure 2-9: Example of Menu Page

Back Arrow softkey (**exit without saving!**)

Highlighted Setup Parameter

Forward Arrow softkey (save and exit)

Sub-group softkeys

Arrow keys

Enter button

Parameter Setup pages contain parameter information. The name of the parameter is displayed in the top center location of the window banner screen. The name of the sub-parameter is displayed below, followed by setting description information.

Navigation through Parameter Setup pages is accomplished by using the *Arrow* keys to scroll to the appropriate parameter and the *Enter* button to view the parameter options.

Figure 2-10: Example of Parameter Page

Setting description and help text window

Name of Setup Parameter
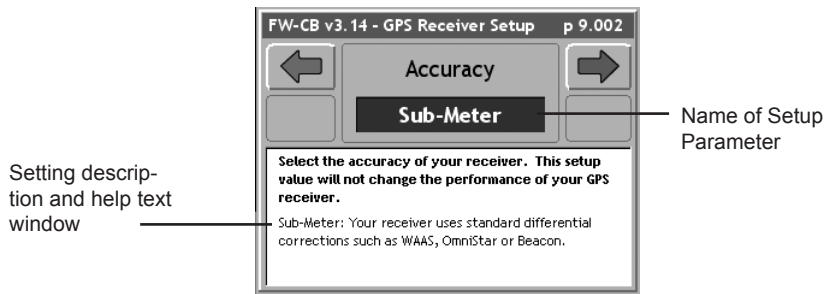
Arrow keys

Enter button

Forward Arrow softkey (F6)

Data entry on parameter pages is accomplished by the following procedures:

1. Highlight the desired character space and use the *Arrow* keys to scroll through the alphanumeric character list.
2. Press the *Right Arrow* key to move to the next character space. Continue until the entry is complete.
3. Press the *Enter* button to save the settings or press the *Forward Arrow* softkey to save and continue.

A decimal point may be used to establish the number of digits in the character set based on user requirements (e.g., 0.254, 1.00, 10.0, 100.463, etc.).

Figure 2-11: Example of Alphanumeric Data Entry

Left most character spacing in the data entry dialog box

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Implement Width

6 0 . 0   ft

This implement width is used for guidance.
Range: [1.0, 99999.0] Unit: Feet
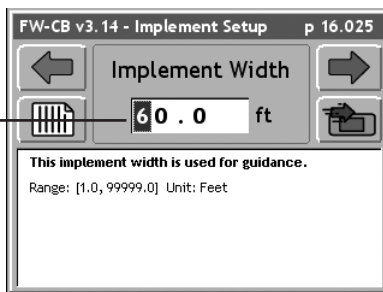
SYSTEM SETUP

System Setup allows for the configuration of the Legacy 6000. To access the *System Setup* page, press the *System Setup* softkey on the *Launcher* page.

Figure 2-12: System Setup Page

System Setup softkey

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Setup the Legacy 6000 console

Console Setup   Implement Setup

FieldPilot Setup   Channel Setup

Lightbar Setup

GPS Receiver
Setup
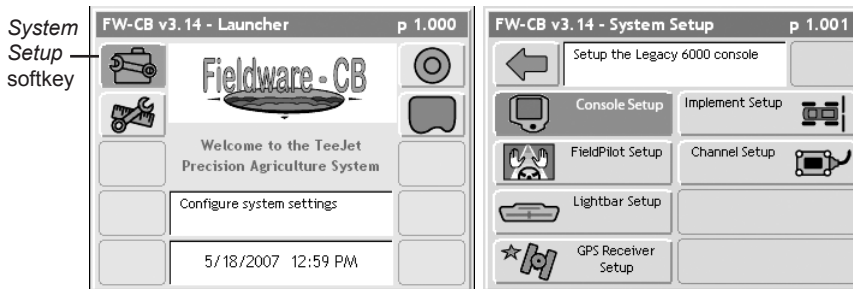
Table 2-2: System Setup Components

Component	Description
FieldPilot Setup	Allows the activation of FieldPilot assisted steering and fine-tune settings.
Console Setup	Defines system variables such as units, language, date, and time.
Lightbar Setup	Defines lightbar settings and lightbar messages.
GPS Receiver Setup	Allows the Legacy 6000 to be configured to match the GPS receiver.
Implement Setup	Defines vehicle or implement parameters including width, number of swaths, number of boom sections and width of boom sections.
Channel Setup	Configures each Channel that is connected to the system and turned on.

Console Setup softkey

Console Setup

Console Setup defines system environment settings (units, language, time) used in rate control and guidance applications. Settings that can be modified are located in the center column.

Figure 2-13: Console Setup Page
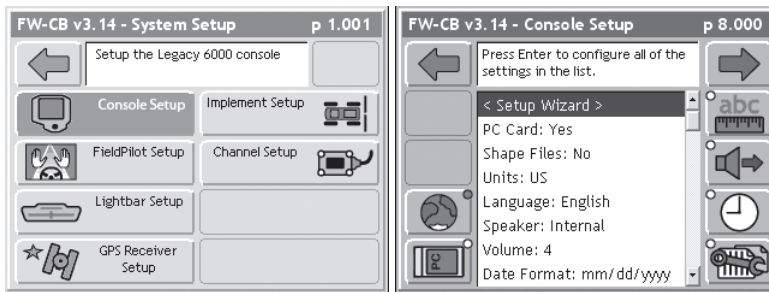
Table 2-2: Console Settings

Setting	Description
PC Card	Indicates that a PC Card is being used.
Shape Files	Indicates whether the system is creating ESRI Shape files at the end of each job.
Units	Defines the system units (US or Metric).
Language	Defines the system language (currently English, Dutch, German, French, Spanish, Italian).
Speaker	Sets the system speaker options (internal or external).
Volume	Sets the speaker volume.
Date Format	Defines the date format displayed (MM/DD/YY or DD/MM/YY).
System Date	Sets the system date.
Time Format	Defines the time format displayed on the console (12 hr or 24 hr).
System Time	Sets the system time.
Time Zone	Sets the time zone of operation.
Application	Specifies how the system controls product application. DCM Module is a CAN Bus system using a Dual Control Module - GEN II. PCM Module is a CAN Bus system using a Product Control Module - GEN I. External uses an external rate controller.

Lightbar Setup

Lightbar Setup configures the lightbar.

Figure 2-14: Lightbar Setup Page

Lightbar Setup softkey
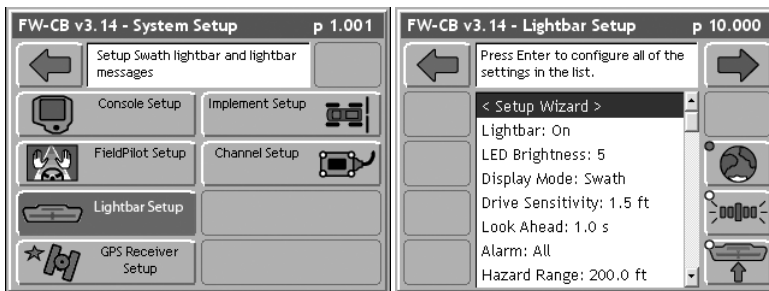
Table 2-3: Lightbar Setup Parameters

Setting	Description
Lightbar	Specifies whether the lightbar will be used (ON or OFF).
LED Brightness	Sets the brightness level of the lightbar LEDs and text window.
Display Mode	Defines how guidance information is visually conveyed via the lightbar LEDs. Swath Mode: the center lights represent the guidance path. Vehicle Mode: the center light represents the vehicle.
Drive Sensitivity	Sets the distance each LED represents on the lightbar (typically 1.5 feet).
Look Ahead	The number of seconds ahead of the vehicle at which the cross track error is calculated (typically 2.0 seconds).
Alarm	Defines the alarm situation (Off, Applied Area, Hazards, and All).
Hazard Range	Sets the distance prior to an impending hazard that the operator is notified. Hazard must have already been mapped.
Parallel MSG 1 Parallel MSG 2 Parallel MSG 3	Defines which of several lightbar messages are displayed in the #1, #2, and #3 message locations. Choices include X-Track, Application Rate, Course, Off, Area Applied, Ground Speed, Heading Error, and Swath #. Once a choice has been made, it is no longer an option for the remaining messages.
Curved MSG	Defines which lightbar message is displayed in the Curved MSG location. Curved MSG is used during Headland Guidance. Choices include Course, Area Applied, Ground Speed, X-Track, Application Rate, and Off.

GPS RECEIVER SETUP

GPS Receiver Setup softkey

GPS Receiver Setup defines the DGPS accuracy and how the GPS receiver communicates with the Legacy 6000 console. This is typically left unchanged from factory default unless using a Tilt Sensor.

Figure 2-15: GPS Receiver Page
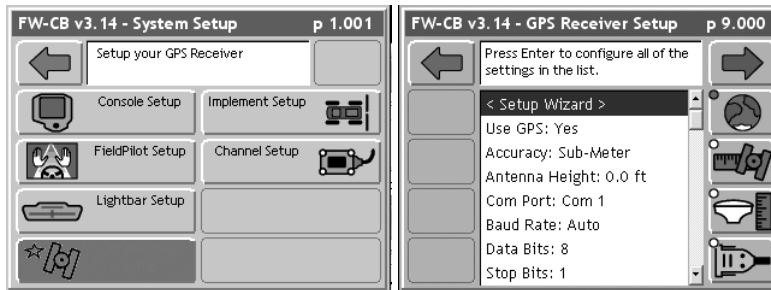
<u>*Table 2:4: GPS Receiver Parameters*</u>

Setting	Description
Use GPS	Defines if the system is using GPS (YES or NO).
Accuracy	Defines the accuracy of the DGPS receiver (RTK or Sub-meter).
Antenna Height	Height of GPS antenna (only used for Tilt).
COM Port	Defines the COM port to which the GPS receiver is connected.
Baud Rate	Defines the selected COM port baud rate.
Data Bits	Defines the selected COM port data bit settings.
Stop Bits	Defines the selected COM port stop bit settings.
Parity	Defines the selected COM port parity.

Implement Setup

Implement Setup defines the number of swaths, number of sections per swath, and the physical relationship (distance and direction) of a swath to the position of the GPS antenna.

Implement Setup
softkey

<u>*Figure 2-16: Implement Setup*</u>
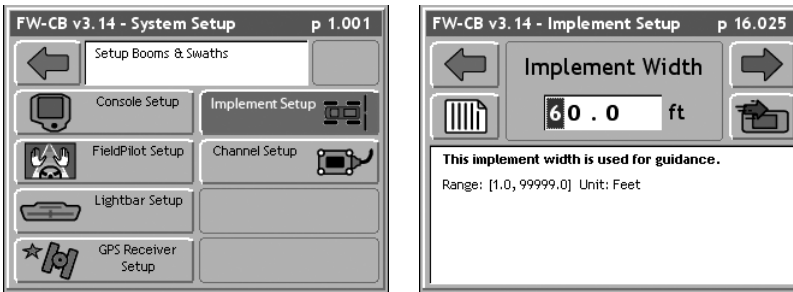
NOTE: The *Restore softkey is available on the Implement Setup window. Selecting this softkey will restore the implement to the last saved configuration.*
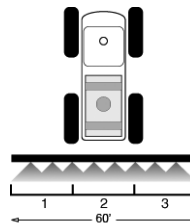
Restore softkey
(F7)

NOTE: A swath is a group of one or more contiguous boom sections that do not overlap one another.

Table 2-5: Implement Setup Parameters

Setting	Description
Implement Width	Distance between guidelines (typically vehicle swath or spread width used for guidance purposed. WIDTH FOR GUIDANCE ONLY!
Number of Swaths	Defaults to 1. For each product applied there could be a separate swath.
Sections	The number of sections that comprise a swath.
Section 1 Switch Section 2 Switch Section 3 Switch...	Indicates which boom switch controls section 1 of swath 1. If there are additional sections, Implement Setup will alternate between Switch and Boom Width setup until all sections are complete.
Boom 1 Width Boom 2 Width Boom 3 Width...	The width of each boom section. If there are additional booms, Implement Setup will alternate between Switch and Boom Width setup until all sections are complete.
Offset Direction Y	The direction (along the center line of the vehicle) from the GPS antenna to the center of the swath (FORWARD/BACK).
Offset Distance Y	Distance from the GPS antenna along the vehicle center line to the swath.
Offset Direction X	The direction perpendicular (left or right) of the vehicle center line that the center of the swath is offset.
Offset Distance X	The distance from the center of the vehicle to the swath. If the Offset Direction X was set to NONE, this screen will not appear.
Channel Assignment	Allows the assignment of channel to a swath or swaths. A swath can have a single channel or all channels assigned.

NOTE: _Swath Manager automatic boom section control can only be used with single-Swath Implement configurations. Swath Manager also dictates that the boom-to-switch assignment in Implement Setup is 1-1, 2-2, 3-3, etc., in numerical order from left to right beginning with Section 1. Any other configuration is incompatible with Swath Manager._

Figure 2-17: Implement Illustration
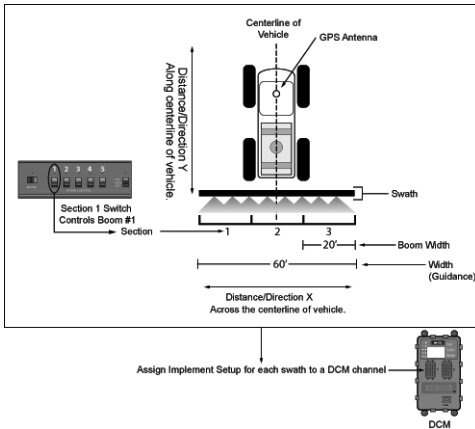
Once all swaths have been established, the final Implement Setup page is the *Finish* page. Review the configuration by pressing the *Review* softkey and confirm the setup parameters. Press the *Forward Arrow* softkey to save and apply the implement setup for the CAN system.

Review softkey (F2)

Forward Arrow softkey (F6)

Figure 2-18: Implement Setup Finish Page
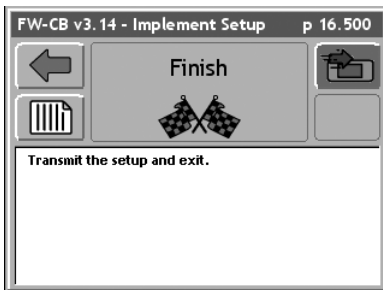
CHANNEL SETUP

Channel Setup is used to configure a Dual Control Module (DCM) connected to the Legacy 6000 CAN Bus. A DCM cannot be configured if it is not connected to the CAN Bus.

Setting up a Channel is typically required in the following scenarios:

- The initial Legacy 6000 hardware installation
- An additional Channel is added to the system
- Modification of an existing channel

Channel setup consists of ten primary headers (including Channel Setup, Favorites, Application Type, Drive Type, Units, Primary Sensor, Secondary Sensor, and Monitors 1-4). Each header contains detailed setup parameters designed to meet operator needs. Information entered during Channel Setup may affect subsequent channel settings and pages. Refer to CHAPTER 2 - PAGE LAYOUT AND NAVIGATION for additional information on navigating through these types of screens. Many parameters in Channel Setup are dependent on other parameters in Channel Setup; therefore navigating these settings via the Setup Wizard type interface is the only choice in Channel Setup.

From the main *Launcher* page, select the *System Setup* softkey, followed by the *Channel Setup* softkey. The message "Contacting Channel" will be displayed. The *Channel Setup* page will display a button for each Channel the software detects on the CAN Bus. **If there is only one Channel enabled, this page will not appear and the software will advance directly to the First Main Setup Header (named Favorite).** Each button will display the Channel Number, Serial Number, and Channel Name (as illustrated in Figure 2-19). Select the desired Channel to be configured using the *Arrow* keys and press the *Enter* button or by selecting the appropriate softkey.

System Setup
softkey (F1)

Channel Setup
softkey

Arrow keys

Enter button

Figure 2-19: Channel Setup Page
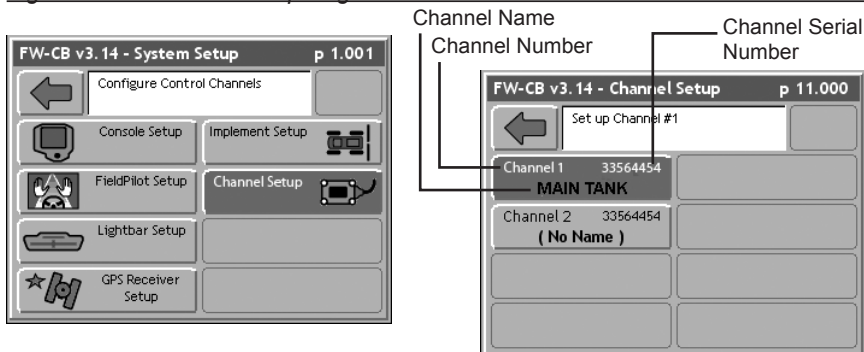
Channel Favorite

When an operator configures Channel Setup parameters, the settings can be saved as "favorites". Favorites are saved versions of Channel Setup. TeeJet Technologies has taken the time to provide some basic Channel Setups for liquid and dry applications (refer to Table 2-6). To view the default settings for pre-created favorites, refer to APPENDIX A - CHANNEL FAVORITES. These favorites may be of use in establishing a starting point and making minor adjustments as necessary. Once Channel Setup is complete, save the setup as a personal favorite. This is useful if the Legacy 6000 is used in more than one application. This feature will prevent the operator from setting up the Channel every time the application changes. Select the favorite for the application using the *Arrow* keys and press the *Finish Flag* softkey to apply the settings.

The default or last used configuration is always the current configuration and is listed as <Loaded> in the dialog pick list. When creating a new configuration, name the configuration at the end of the setup process on the *Finish* page. To view the settings of the loaded configuration, press the *Review* softkey.

Select the favorite that most closely matches the current application and press the *Forward Arrow* softkey to advance to the next page. If no other changes are required, press the *Finish Flag* softkey.

Arrow keys

Finish Flag softkey (F7)

Review softkey (F2)

Forward Arrow softkey (F6)

Figure 2-20: Channel Setup Favorites Page

Review softkey ——

—— *Finish Flag* softkey

Table 2:6 - Pre-Created Channel Favorites

Name	Description
GRANDC-A	Defines a granular application in Split-Drive with three monitors.
GRANPWM-A	Defines a granular application using a PWM valve.
GRANSERVO-A	Defines a granular application using a Servo valve with one monitor (shaft).
GRANSERVO-B	Defines a granular application using a Servo valve with no monitor.
INJ-A	Defines an injection application.
LIQFLOW-A	Defines a liquid application using a flow meter with one monitor.
SPINMOTOR-A	Defines a shaft sensor used to control spinner speed.

Application Type

The _Application Type Setup_ page allows for the selection of the required type of product application. All other setup pages are based on the type of application chosen on this page. There are five possible application types:

- Liquid
- Granular
- Seeder
- NH3
- Motor

Settings softkey (F2)

Forward Arrow softkey (F6)

Finish Flag softkey (F7)

For each application type there is an additional _Settings_ page. To access the _Settings_ page, press the _Settings_ softkey on the _Application_ page (refer to Table 2-7). If there are no changes required, press the _Forward Arrow_ softkey to advance to the next _Channel Setup_ page.

When changing application type, the _Finish Flag_ softkey may disappear. This button disappears if the change in application type caused additional changes to other Channel setup parameters. It may be necessary to continue viewing the remaining setup parameters prior to finishing the channel setup process. If no additional Channel parameter changes occurred, the _Finish Flag_ softkey will be displayed. Pressing the _Finish Flag_ softkey will activate the final _Setup_ page. From the _Finish_ page, update the channel with the new setup file.

Figure 2-21: Application Page
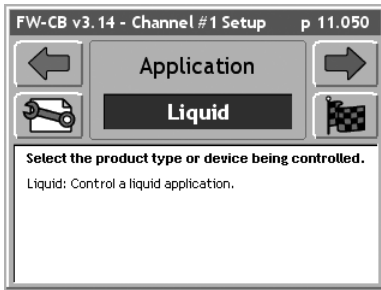
Application Type Settings

All Application Types have the same setting options when the *Settings* softkey is pressed (refer to Table 2-7 for a detailed description of the settings). Once the settings are established, press the *Forward Arrow* softkey to advance to the next Channel Setup page.

Table 2-7: Settings Details

Settings	Descriptions
Application Name	This is the channel name that appears on the Channel softkey as illustrated in Figure 2-19.
Configuration	Defines the relationship between the sensor and the product. 　Standard Liquid 　Standard Granular 　Split - Granular application. Material shaft speed does not change as booms are turned off (e.g., Left/Right chains) 　Reflow - Liquid application. Material from closed boom valve is recirculated back to tank or pump.
Channel Link	Multiple channels can be linked. Used if one product is dependent on the other for proper application. When channels are linked and the master fails, both channels shut down (e.g., an injection pump may be linked to the carrier channel so that if there is no carrier flow, the injection pump will not run).

Settings softkey (F2)

Forward Arrow softkey (F6)

Drive Type

Settings softkey (F2)

Drive Type indicates the type of drive circuit used to control product delivery. The list of available drive types depends on the application selected during *Application Type*. Some drive types have an additional *Drive Types Settings* page (refer to CHAPTER 2 - DRIVE TYPE SETTINGS) that is accessed by pressing the *Settings* softkey on the Drive Type page.

Figure 2-22: Drive Type
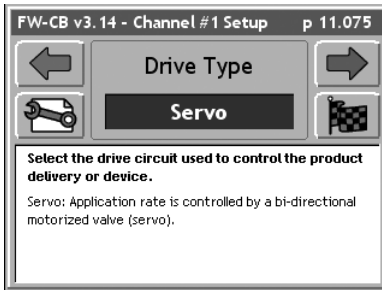
Table 2-8: Drive Type Options

Settings	Description
Servo	Application rate is controlled by a bidirectional motorized valve.
PWM	Application rate is controlled by a pulse width modulated hydraulic valve or a DC motor.
Injection	Application rate is controlled by varying the speed of a direct chemical injection pump.
No Drive	No drive circuit is in use.

Forward Arrow softkey (F6)

Settings softkey (F2)

Drive Type Settings

All three of the Drive Types have setting options. When the Drive Type settings and parameters have been selected, press the *Forward Arrow* softkey to advance to the next *Channel Setup* page. Settings are accessed by selecting the *Settings* softkey.

Figure 2-23: Servo Settings
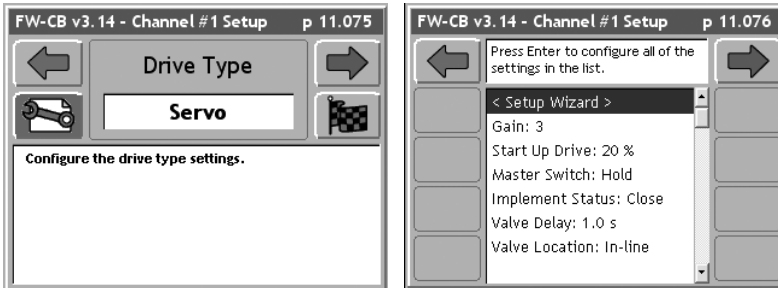
Table 2-9: Servo Settings

Settings	Description
Gain	Speed at which the Control Channel reacts to an off-target condition. Decrease to slow down the reaction; increase to speed up reaction (settings too high can result in oscillation).
Start Up Drive	Drive level used to open valve only from full closed position. Increase if valve opens too slowly and decrease if valve opens too quickly.
Master Switch	Control valve response to all booms (OFF). Master Hold - Control valve will hold in the same position. Closed - Control valve will drive full closed.
Implement Status	Control valve response to when the Implement Status switch is open (OFF). Hold - Control valve will hold in same position. Closed - Control valve will drive full closed.
Valve Delay	Delay in resuming control after turning booms ON from HOLD. When the control valve is set to close, this feature is deactivated. When Master ON, valve will delay control for the set value.
Valve Location	Location of the control valve in the plumbing (In-Line or Bypass). Combination in-line/bypass valves like the Autorange valve and most hydraulic servos use the In-line setting.

Figure 2-24: PWM Settings
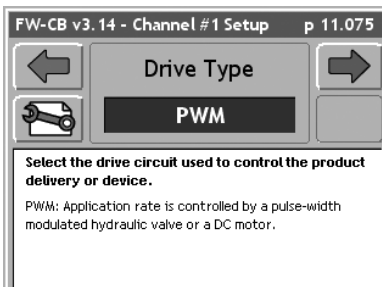
Table 2-10: PWM Settings

Settings	Description
Gain	Speed at which channel reacts to an off-target condition. Decrease to slow down the reaction; increase to speed up reaction (settings too high can result in oscillation).
Frequency	Frequency of the PWM valve drive signal (frequency typically recommended by valve or motor supplier).
Minimum Duty Cycle	Minimum duty cycle to which the valve will respond, specified by the manufacturer.
Maximum Duty Cycle	Maximum duty cycle to which the valve will respond, specified by the manufacturer.
Ramp Time	Time taken for the control to ramp from minimum duty cycle to maximum. Decrease if the valve reacts too slowly when off target. Increase if control reacts too quickly (overshooting target rate).
Dither	Prevents valve from sticking (specified by the manufacturer).
Master Switch	Control valve response to all booms (OFF). Hold - Control valve will hold in the same position. Closed - Control valve will drive full closed and start backup at minimum duty cycle. Resume - Control valve will close when booms are turned off but will resume at last used duty cycle setting when booms are turned on again.
Implement Status	Control valve response when implement status is open (OFF). Hold - Control valve will hold in the same position. Closed - Control valve will drive full closed. Resume - Control valve will close when booms are turned off, but will resume at last used duty cycle setting when booms are turned on again.
Valve Delay	Control delay after turning booms ON from Hold/Resume. When the control valve is set to close, this feature is deactivated. When Master ON, the valve will delay control for the set value.

Figure 2-25: Injection Settings
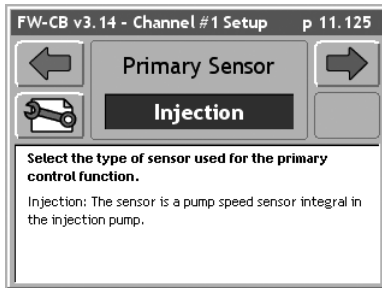
Table 2-11: Injection Settings

Settings	Description
Prime Volume	Amount of liquid required to prime the pump. This is the volume necessary to fill plumbing lines from the chemical tank to the injection point.

Calculating the Prime Value

US:

(line diameter in inches/ 2)2 x 3.1416 x line length in inches x 0.5541 = volume in fluid ounces

Metric:

(line diameter in cm/2)2 x 3.1416 x line length in cm = volume in ml

Units

Available units are based on Application and Drive Types (Liquid, Granular, Seeder, NH3, Motor, and Injection). The Control Basis determines whether the units available are Area-based, Time-based, or Distance-based. These parameters should be established prior to selecting the units of measurement.

To access the *Control Basis* page from the *Units* page, press the *Settings* softkey. The operator will then be able to scroll through the various options available using the *Arrow* keys based on previously-selected application and drive type settings. Once the appropriate units have been established, press the *Forward Arrow* softkey to save the selection and advance to the next page.

Settings softkey (F2)

Arrow keys

Forward Arrow softkey (F6)

Figure 2-26: Units - Control Basis Options

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Units

gal/ac

Select the units used for application rates. If the desired unit is not in the list, adjust the Control Basis setting.

Units: Gallons/Acre
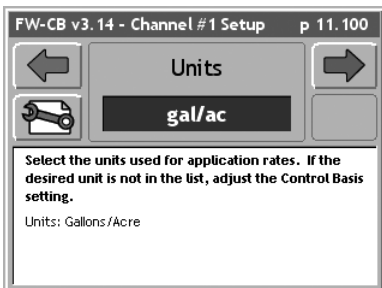
NOTE: Most applications are area-based.

Table 2-12: Units of Measurement

Settings	Description	U.S.	Metric
Liquid	Area Distance Time	gal/ac, gal/1000ft2, gal/100yd2, l/ac gal/lmi gal/min	l/ha, l/100m2 l/lkm (liters per lane km) kg/ha, kg/100m2, t/ha
Granular	Area Distance Time	lb/ac, lb/1000ft2, lb/100yd2, tn/ac, kg/ac lb/mi, lb/lmi, tn/lmi, tn/mi lb/min, tn/h	kg/ha, kg/100m2, t/ha kg/lkm, kg,km, t/lkm kg/min, t/h
Seeder	Area	100 sds/ac, 100 tb/ac	100 sds/ha, 100 tb/ha
NH3	Area	lb/ac	kg/ha
Motor	Time	rpm	rpm
Injection	Area Distance Time	fl oz/ac, fl oz/1000 ft2, fl oz/100 yd2, l/ac fl oz/lmi fl oz/min	l/ha, l/100 m2 l/lkm (liters per lane km) l/min

Primary Sensor

The Primary Sensor is used for principal control functions and is based on the type of applications selected. Each Primary Sensor type has an associated _Settings_ softkey that launches the _Sensor Settings_ page.

Settings softkey
(F2)

Each Channel has six available input sensors labeled A through F. Sensor inputs A through D are digital (frequency) and sensor inputs E and F are analog. The sensor input lines on the DCM Product harness are labeled A through F. The input lines may be set for a sensor on the _Sensor Settings_ page.

Figure 2-27: Primary Sensor Page
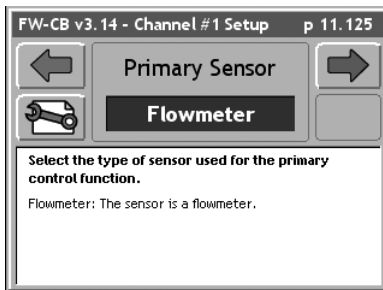
Table 2-13: Primary Sensor Options

Application	Sensor Options
Liquid	Flowmeter, Pressure Digital, and Pressure Analog
Granular	Granular
Seeder/Motor	Shaft
NH3	Flowmeter
Injection	Injection

Primary Sensor Settings

The Primary Sensors (Flowmeter, Granular, Injection, and Shaft) have the same settings (refer to Table 2-14 for descriptions). The two other Primary Sensors (Pressure Digital and Pressure Analog) have initial settings as well as sub-settings. To access the sub-settings, locate the two *Sub-Settings* softkeys on the right side of the screen. Use the two softkeys to toggle between the screens. Refer to Table 2-15 for a description of the sub-settings. When the primary settings and parameters have been selected, press the *Forward Arrow* softkey to advance to the next *Channel Setup* page.

Initial-Settings
softkey (F9)

Sub-Settings
softkey (F10)

Forward Arrow
softkey (F6)

Figure 2-28: Primary Sensor/Sub-Settings

Table 2-14: Primary Sensor Settings

Setting	Description
Input	Specifies which sensor input cable the sensor is connected to on the DCM Product harness. Sensor inputs A-D are digital (flowmeter and slot sensors) and Sensors E-F are analog (typically pressure).
Sensor Name	Used to label a particular sensor. This information is not stored in the Channel and is used for messaging to the user only.
Calibration Number	Calibration number of the sensor. This is typically found on the sensor and the units are displayed in the help text on the console. For NH3 applications, refer to APPENDIX C - NH3 APPLICATION.
Cal# Basis	Table of preset calibration numbers. Used to rapidly change calibration number nozzle constants on pressure based liquid machines, or for saving multiple calibration numbers for different Injection Pump tubes, or for creating a table of calibration numbers for use on a spreader with an adjustable gate height. Refer to APPENDIX B - CREATING CALIBRATION TABLE.
Nozzle Constant	Used for applications where a pressure sensor is being used as the primary sensor. Enter the gal/acre rating of nozzles being used at 10mph and 30psi (10 km/h - 2 bar for metric applications) regardless of the actual speed and pressure at which the machine will be operated.

Table 2-15: Pressure Digital and Analog Sub-Settings

Setting	Description
Alarm Units	Units used for minimum and maximum alarm.
Min Alarm	Minimum alarm limit.
Max Alarm	Maximum alarm limit.
Alarm Delay	Duration an alarm condition exists before triggering an alarm.
Sensor Output	Output signal type of the sensor 0-5v or 4-20 mA - refer to Sensor Specifications

SECONDARY SENSOR

NOTE: *Secondary sensors are only used on machines that have a second sensor that may be used for feedback and control of the product (e.g., a spreader with two feed chains with a sensor on each chain). If you are unsure about the use of the Secondary Sensor, please contact your local TeeJet Technologies supplier for direction.*

Settings softkey
(F2)

Secondary Sensor types are based on the Application and Primary Sensor types that were selected. Each Secondary Sensor Type has a *Settings* softkey that launches the *Secondary Sensor Settings* page. The parameters depend on the type of Primary Sensor selected. Each Channel has six input sensors labeled A through F. Sensor inputs A-D are digital (frequency) and sensor inputs E and F are analog. The sensor input cables on the DCM Product harness are labeled A-F. The

input lines for sensors are established on the *Sensor Settings* page.

Secondary Sensor options include:
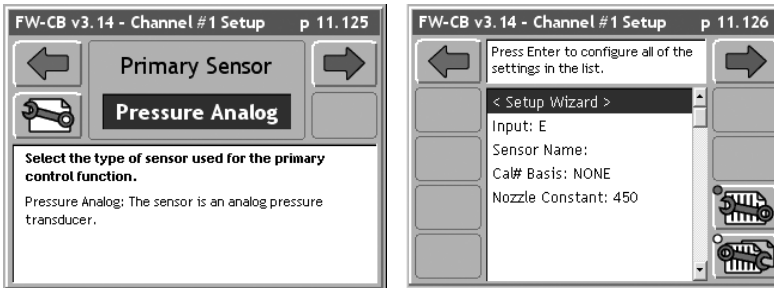- Flowmeter
- Pressure Digital
- Pressure Analog
- Granular
- Shaft
- Injection

To access the sub-settings, locate the two *Sub-Settings* softkeys on the right side of the screen. Use the two softkeys to toggle between the screens. Refer to Table 2-16 for a description of the sub-settings. When the primary settings and parameters have been selected, press the *Forward Arrow* softkey to advance to the next *Channel Setup* page.

Initial-Settings softkey (F9)

Sub-Settings softkey (F10)

Forward Arrow softkey (F6)

Figure 2-29: Secondary Sensor/Sub-Settings
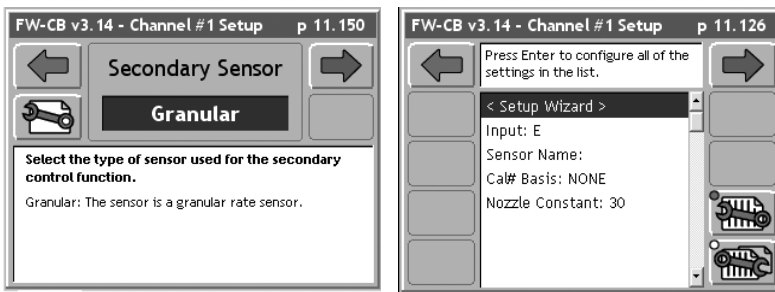
Table 2-16: Secondary Sensor Sub-Settings

Settings	Description
Input	Defines digital and analog sensors. Sensor inputs A-D are digital (Flowmeter and slot sensors) and sensors E-F are analog (pressure).
Sensor Name	Used to label a particular sensor or monitor. This information is not stored in the Channel and is used for messaging to the user only.
Dual Warning%	Defines the maximum acceptable % difference between the primary and secondary sensor outputs before the operator is warned.
Dual Warning Delay	Defines the time that the primary and secondary sensor outputs can exceed the dual warning % before initiating the alarm.

Monitor Selection

Settings softkey
(F2)

Forward Arrow
softkey (F6)

A monitor is used to observe the status of an application delivery system element (e.g., RPMs on a shaft sensor) and is not used for any control type function. Up to four monitor sensors may be used in the delivery system. The monitor types available (refer to Table 2-17) are based on the Application, Primary Sensor, and Secondary Sensor types selected. Each monitor type will have an associated *Settings* softkey that launches the *Monitor Settings* page. The Monitor Sensor parameters are dependent upon the type of Monitor Sensor selected.

Channel Setup contains four *Monitor Setup* pages (Monitors 1 - 4). It is not necessary to configure four monitors. Select the monitor(s) used and press the *Forward Arrow* softkey to save the settings. If there is no monitor, select the "None" setting and continue to the next page.

Figure 2-30: Monitor Page
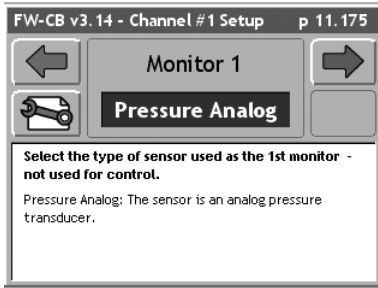
Table 2-17: Monitor Options

Settings	Description
Shaft	Monitors shaft rotation speed.
Product Detect	Monitors the On/Off Status of a product (e.g., Chemical Flow Monitor of an Injection Pump).
Low Bin	Monitors low product level.
Status	Monitors engaged or disengaged status.
Pressure Digital	Monitors pressure related or not related to application.
Pressure Analog	Monitors pressure related or not related to application.
Flowmeter	Monitors flow of liquid using a flowmeter.
Spread Switch	The sensor detects if the spread switch is on. This sensor is required for operation without a CAN Switch Box or ISM, and can only be used with a one-section implement.

Monitor Settings

Monitor Shaft, Product Detect, Low Bin, Status, Pressure Digital, Pressure Analog, and Flowmeter have the same settings. All monitors have initial settings as well as sub-settings. To access the sub-settings, locate the two *Sub-Settings* softkeys on the right side of the screen. Use the two softkeys to toggle between the screens. Refer to Table 2-18 for a description of the sub-settings. Once the sub-settings and parameters have been selected, press the *Forward Arrow* softkey to advance to the next *Channel Setup* page.
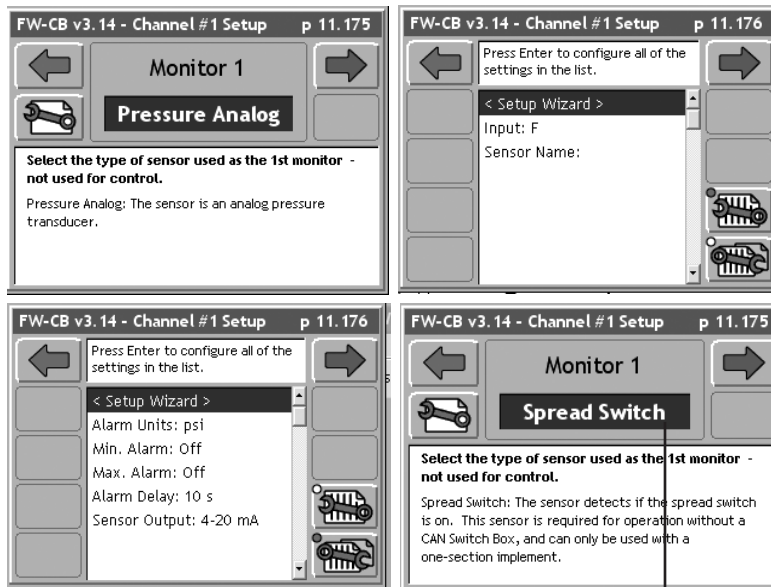
Initial_Settings
softkey (F9)

Sub-Settings
softkey (F10)

Forward Arrow
softkey (F6)

Figure 2-31: Monitor Settings/Sub-Settings

Spread Switch Setting

Table 2-18: Monitor Settings

Settings	Description
Input	Defines digital and analog sensors. Sensor inputs A-D are digital (flowmeter and slot sensors) and Sensors E-F are analog (pressure). 4-20 mA sensors can only be used on the Sensor Input E on Gen I CAN systems. Gen II systems can read 4-20 mA and -5V sensors on Inputs E and F.
Sensor Name	Labels a particular sensor or monitor. This information is not stored in the Channel and is used for messaging to the user only.
Calibration #	The calibration number in units specified (Flowmeter and Rotation sensors only). This number is typically found on the sensor. Physical calibration will further fine-tune this number.

Table 2-19: Monitor Sub-Settings

Settings	Description
Alarm Units	Pressure psi Flowmeter gal/min Shaft rpm
Min. Alarm	Minimum alarm limit.
Max. Alarm	Maximum alarm limit.
Alarm Delay	Duration an alarm condition exists before triggering an alarm.
Alarm Status	Off - disabled Low - sensor state goes low to trigger alarm. Contact the sensor or machine supplier for this information. High - sensor state goes high to trigger alarm. Contact the sensor or machine supplier for this information.

Channel Setup Completion

Review Settings
softkey (F2)

Save to File
softkey (F7)

Send to Channel
softkey (F6)

The final page in the Channel Setup process is the _Finish_ page. From the _Finish_ page, the operator can review and confirm all previously-selected options by pressing the _Review Settings_ softkey. The options can also be saved to a file for later use by pressing the _Save to File_ softkey (refer to CHAPTER 2 - SAVING CHANNEL SETUP for additional information).

Channel settings can be applied directly to the channel without saving them by selecting the _Send to Channel_ softkey. The Channel will use the changes made during application. If a new application is needed and the channel favorite or settings have not been saved, all prior settings will be lost. Saving the channel favorites takes very little time and can save time in the future.

Figure 2-32: Channel Setup Finish Page

Review Settings
softkey

Send to Channel
softkey

Save to File
softkey

Figure 2-33: Channel Setup Review Settings Page
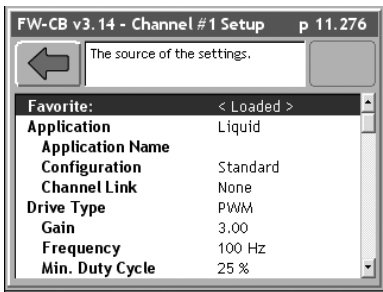
Saving Channel Setup

Pressing the *Save To File* softkey on the *Finish* page will launch the *Save As* page. The *Save As* page allows configurations to be saved for future use (e.g., My Sprayer). Names are entered using the *Arrow* keys. Use the *Up* and *Down Arrow* keys to scroll through alphanumeric characters. Use the *Left* and *Right Arrow* keys to move to the next character space. Once the name is entered, save the setting by pressing the *Forward Arrow* softkey. The name will appear as a Channel Favorite.
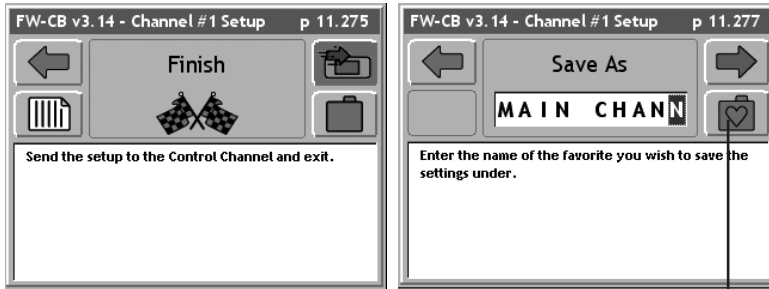

Save to File
softkey (F7)

Arrow keys

Forward Arrow
softkey (F6)

Favorite Folder softkey

Forward Arrow
softkey (F6)

Note: If updating an existing favorite and the operator wants to save the favorite as the same name, select the Favorite Folder softkey and find the favorite to be updated. Press the Forward Arrow softkey to save the settings.

FIELDPILOT SETUP

FieldPilot Setup
softkey

FieldPilot Setup defines settings used to fine-tune the assisted steering system. Settings that can be modified are located in the center column. Some of the pages and parameters on the Legacy console may be slightly different than represented in this section depending on the version of FieldPilot hardware installed on the machine.
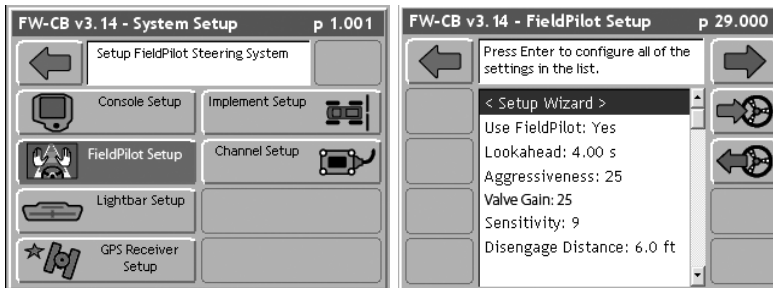
Figure 2-35: FieldPilot Setup:

Table 2-20: FieldPilot Settings

Settings	Description
Use FieldPilot	Selects whether the assisted steering system will be used (YES/NO). Default is No.
Lookahead	If vehicle drives outside a curved guideline, increase the look-ahead value. If it cuts the corners of a curved guideline, decrease the look-ahead value.
Valve Gain	Increase value if vehicle drifts off the guideline or is slow to approach the guideline. Decrease value if vehicle overshoots the guideline or oscillates rapidly over the guideline.
Aggressiveness	How aggressively to set assisted steering while operating FieldPilot on curves. Increase to make steering turn sharper. Decrease to make steering turn more gradual.
Sensitivity	Decrease the value if the steering is choppy or too responsive while close to the guide-line.
Disengage Distance	Distance from guideline when FieldPilot disengages after being online.
Apply Settings	Apply and save new settings.
Restore Settings	Restore settings to factory default.

Apply Settings
softkey (F7)

Restore Settings
softkey (F8)

NOTE: _The Forward Arrow softkey saves and applies changes to the existing settings._

Forward Arrow
softkey (F6)

FieldPilot Calibration

WARNING! Before performing the following tests, be sure the vehicle is being operated in an open area, free of any obstacles or other people.

NOTE: _Adjustments to the oil flow and settings for FieldPilot should only be completed once the hydraulic oil has reached normal operating temperatures. Failure to observe this may result in overly aggressive steering and unsatisfactory performance once the oil reaches normal operating temperatures._

NOTE: _Before starting this calibration procedure consult the FieldPilot Vehicle Kit installation instructions to see if they include recommendations on any of the following settings, in which case the recommended settings should be entered in FieldPilot Setup (refer to Figure 2-35) prior to proceeding to the following section._

System Tools
softkey (F2)

Device Manager
softkey

Arrow keys

*Tools* softkey

Adjust Oil Flow

1. From the main Launcher menu, select the *System Tools* softkey followed by *Device Manager*. Scroll through the *Device Manager* options using the *Arrow* keys and select the "FieldPilot" option. Press the *Tools* softkey (F7).

2. Perform the test rolling slowly forward in an open area at 1 - 2 mph (1.5 – 3.0 km/h). Do not exceed 2 mph (3 km/h) during the test.

Figure 2-36: FieldPilot Steering Test

Back Arrow
softkey (F1)
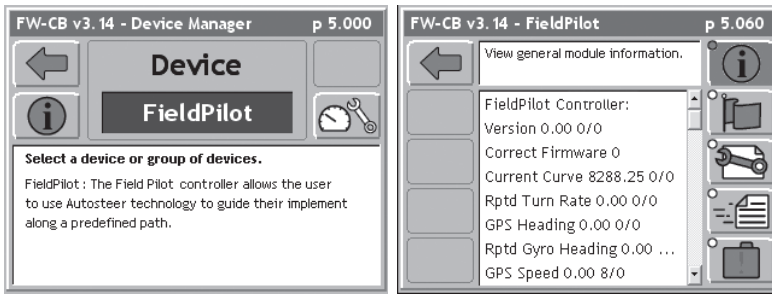
3. Scroll through the list in the Steering Test using the *Up / Down Arrow* keys. The options "Left", "Right", and "Off" are available. Once selected, the command to turn Left or Right can be executed by pressing the F7 softkey. The machine will then steer left or right at full open and will continue to do so until the operator exits the steering test. **At any time during the test, the operator can press the *Back Arrow* softkey or the *ESC* key to stop the valve test.**

Figure 2-37: FieldPilot Steering Test - Right Selection
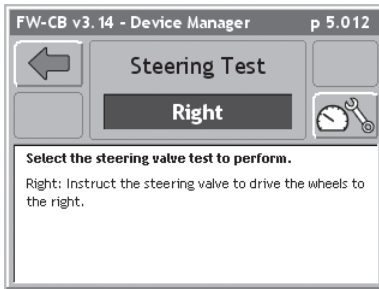
NOTE: *If significantly different times are found between Left to Right and Right to Left steering, a physical problem may be present in the steering system.*

4. Alternate running the valve test from full Left to full Right while slowly moving. If issuing a LEFT command in the valve test causes the wheels to steer RIGHT or vice versa, switch the electrical connections for "Left" and "Right" on the FieldPilot valve.

5. Loosen the hand style locking nut on the flow control valve located on the side of the FieldPilot steering valve. Adjust the oil flow using the hand screw to turn the flow up or down (clockwise = less flow).

6. Continue running the valve test and adjust the oil flow until the machine steers from lock-to-lock in the time recommended in the FieldPilot Vehicle Kit installation instructions for the vehicle.

7. After adjusting the oil flow, proceed to DRIVE STRAIGHT A-B LINE below. Do not tighten the locking nut as it may still require slight adjustment.

Drive Straight A-B Line

1. Start a new job and select the Straight-line A-B guidance mode.

2. Establish a Straight A-B guideline in an open area with at least 1/4 mile (0.4 km) of flat, smooth ground.

3. Engage FieldPilot and observe the behavior for at least 1/4 mile (0.4 km) while driving at the typical speed of operation. The system will account for variations in speed, but it is best to calibrate FieldPilot at the same speed that it will most typically be run during operation.

4. **Adjusting the oil flow is the main adjustment made when calibrating FieldPilot.** All software adjustments in the FieldPilot setup menu are secondary measures and are used for unique situations. They should only be adjusted after attempting to calibrate by varying the rate of oil flow first.

   Note: Only adjust the flow of oil when testing FieldPilot on a Straight A-B guideline. Do not attempt to calibrate oil flow on curved guidelines.

5. If the vehicle steering is too responsive (remains on course but the wheels oscillate quickly back and forth), adjust the oil flow DOWN slightly in increments of 1/8 turn on the flow control valve. After each adjustment of the oil flow, drive the vehicle and observe the behavior before making additional adjustments.

6. If the vehicle steering is not responsive enough (drifts away from the guideline or overshoots the guideline and does not correct quickly), adjust the oil flow UP slightly in increments of 1/8 turn on the flow control valve. After each adjustment of the oil flow, drive the vehicle and observe the behavior before making additional adjustments.

7. If the adjustments improve performance, find the optimal oil flow and tighten the locking nut on the flow control valve.

8. If the adjustments do not adequately improve performance, find the best oil flow position and tighten the locking nut on the flow control valve. Proceed to *ADJUST VALVE GAIN IN FIELDPILOT SETUP* below.

Adjust Valve Gain in FieldPilot Setup (If Required)

1. If the vehicle continues to drift a foot or more from the guideline before making noticeable corrections in steering or is slow to approach the guideline, INCREASE the Valve Gain setting in the FieldPilot Setup menu. The default setting is "25". The value should be increased in increments of 2-3.

2. If the vehicle continues to oscillate rapidly across the guideline, DECREASE the Valve Gain in the FieldPilot Setup menu. The value should be decreased in increments of 2-3.

Adjust Aggressiveness in FieldPilot Setup (If Required)

1. Operate the machine along a curved guideline in Curved A-B or Headland mode.

2. If the vehicle cuts the corner / curve, DECREASE the Aggressiveness value in the FieldPilot Setup menu. The default setting is "25". The value should be decreased in increments of 2-3.

3. If the vehicle runs wide on corners / curves, INCREASE the Aggressive-ness value. The value should be increased in increments of 2-3.

Adjust Lookahead in FieldPilot Setup (If Required)

1. With the console set in Straight A-B guidance mode, establish an A-B guideline and then approach the guideline at a slight angle.

2. If the machine overshoots the guideline, INCREASE the Lookahead set-tings in increments of 0.1 - 0.2 seconds.

3. If the machine approaches the guideline too slowly without overshooting the guideline, DECREASE the Lookahead settings in increments of 0.1-0.2 seconds.

Adjust Sensitivity in FieldPilot Setup (If Required)

1. Sensitivity should typically be set at 8-9 for optimum performance. How-ever, some vehicle types (tracked, articulated, etc.) or certain field condi-tions (rough or bumpy ground) may necessitate that the sensitivity level be decreased.

2. If the steering system seems to be constantly adjusting (never traveling the guideline smoothly), decrease the sensitivity level in increments of 1.

CHAPTER 3 - PRODUCT APPLICATION SETUP

Once System Setup is complete, product application setup can commence. This is accomplished by pressing the *Application Rate Management (ARM) Bullseye* softkey, located on the *Launcher* page.

Bullseye
softkey (F6)

Prior to starting product application it is necessary to follow a short setup process. The steps in the process vary based on software configuration, number of products being applied, and most importantly, whether the delivery system has been calibrated. Chapter 3 provides information about Calibration, Job Reports (weather and soil conditions), ARM Setup (data storage files), and Product Setup. Once ARM is configured properly, product application can begin. Prior to starting product application, it is recommended that CHAPTER 4 - OPERATION be reviewed

The initial setup of product application parameters is the most time consuming. Once the system has been calibrated and the file naming and product setup procedures are understood, application setup procedures are easily accomplished in just minutes. Table 3-1 outlines the setup procedures.

Table 3-1: Product Application Setup

Settings	Description
Job	Launched once the ARM Bullseye softkey is pressed. Select or creates job. A PC Card must be inserted to store jobs but the Legacy can function without one. Press the Forward Arrow softkey to continue to the ARM Launcher.
System Calibration	The system should be calibrated prior to product application. Distance calibration is also accomplished here. If the system has already been calibrated, this can be skipped.
Job Report	If an application report will be generated upon job completion, a Job Report can be completed to include weather, crop, field, and soil information.
ARM Setup	Files to be generated for the current job are named here (.BND and .RCD are automatically named). There are 5 ARM settings (Swath Manager, Speed Source, GSO Speed, Collection Rate, and System Delay). If the auto-named files are satisfactory and no changes to the settings are required, ARM setup can be skipped.
Product Setup	Allows the assignment of a product's name, density (some Product types only), and initial quantity to a Channel. If using a prescription map, the product name can be automatically extracted from the prescription file. Five preset application rates (A-E) can also be defined (cal table, layers, color).
Product Application	Once product setup is complete and the console is configured, begin product application by pressing the ARM Bullseye softkey.

STARTING JOBS

Bullseye
softkey (F6)

Pressing the *Bullseye* softkey on the *Main Launcher* page will display the Job page. If a PC Card is not being used and the Console Setup PC Card setting is "NO" (refer to CHAPTER 2 - CONSOLE SETUP), a Job Name is not requested (refer to CHAPTER 3 - NO PCMCIA CARD SETUP). A PC Card is necessary to issue job names and save files.

When jobs are created, a folder is created on the PC Card that is labeled with the same name. All files related to the job (record, guideline, boundary, and map objects) are stored in the folder upon saving in ARM.

There are three methods for entering/selecting job names

- New Job Creation
- Existing Job Selection
- Job Creation Based on Existing Jobs

Figure 3-1: Job Page
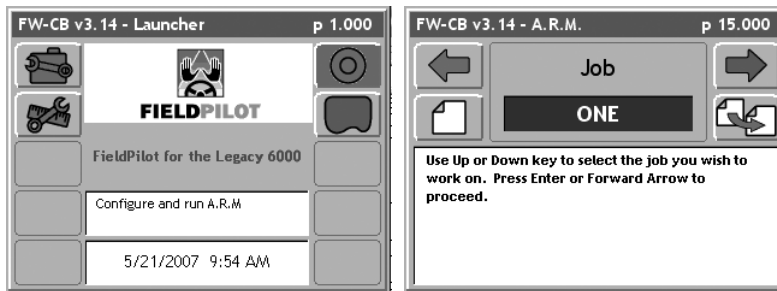
New Job Creation

Create Job
softkey (F2)

To create a new job, press the *Create Job* softkey on the Job page. This will launch the *New Job Name* page as illustrated in Figure 3-2.

Existing Job Selection

To select an existing job, use the *Arrow* keys to scroll through the list of jobs displayed in the center column of the *Job* screen. An existing job has an associated file folder located on the PC Card. The name of the job folder is the same as the job name.

Job Creation Based on Existing Jobs

A new job can also be created based on the settings of an existing job. This is a fast way to start a new job where most or all of the settings are the same as an existing job. Any of these settings can be altered in the new job as required. Select the desired job on which to base the new job. Press the *Copy Job* softkey. Create a new job name or auto name the job and press the *Forward Arrow* softkey. All settings are viewable from the ARM Launcher page and can be changed as required, or press the *Bullseye* softkey to start the application based on the last job settings.

Manually Naming Jobs

From the New Job Name page, use the *Arrow* keys and enter the name of the job. Job names may contain alphanumeric characters. When the desired job name has been entered, press the *Forward Arrow* softkey to save the name and advance to the *ARM Launcher* page.

Figure 3-2: Naming Jobs
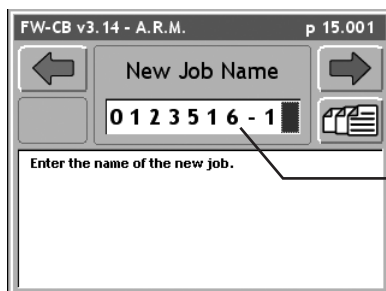
Existing job names displayed in center column or new job names entered here

Arrow keys

Copy Job softkey (F7)

Forward Arrow softkey (F6)

Bullseye softkey (F6)

Automatic Job Naming

Auto Name
softkey (F7)

Jobs can be named by pressing the *Auto-Name* softkey on the *New Job Name* page. A job is named based on the current date followed by a sequential job number in relation to the number of jobs created that day. For instance, the first job on January 31, 2006, is automatically named 01312006-1. The second job for the same day is named 01312006-2.

No PCMCIA Card

If the PC Card is not turned on during Console Setup, there is no prompt for a Job Name when starting ARM. Instead, the opportunity is presented to reset some product-related volumes and area totals.

Figure 3-3: Reset Page
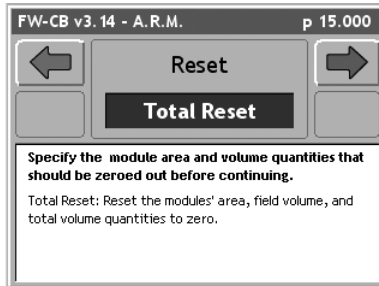
Table 3-2: Reset Page Settings

Settings	Description
None	No volume or area totals stored in the DCM will be reset.
Total Reset	Resets field area, field volume, and total volume and area stored in all DCMs to zero.
Field Reset	Resets field area and field volume stored in all DCMs to zero.

ARM LAUNCHER

Several applications are launched from the Application Rate Management (ARM) page that are required prior to starting product application.

Figure 3-4: ARM Page

Not included if PC Card is not used
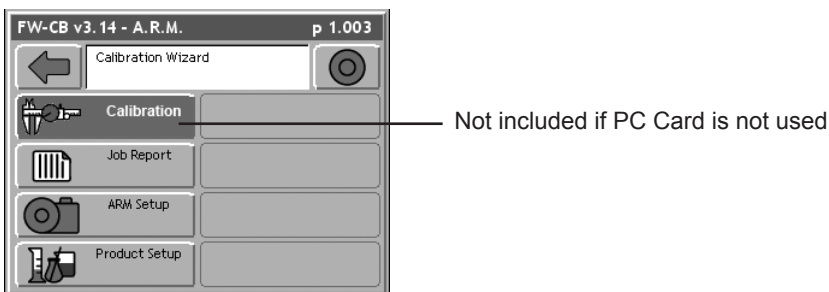
No PCMCIA Card

If the PC Card setting in Console Setup is set to "NO", the ARM Launcher will be displayed differently. Because no data is stored on a PC Card, there is no need to name files or establish reports. The Job Report application and ARM Setup softkeys will not be shown and some settings in ARM Setup will no longer be present.

Calibrations

The following calibrations are possible in the Legacy 6000 system:

- Distance/Speed
- Liquid Pressure
- Granular
- Liquid Based Flowmeter
- NH3 Flowmeter
- Seeder

All calibrations (except status monitors) result from a comparison of an actual value and reported value. Calibration units are based on the units selected during Channel Setup. Prior to calibration, the DCM must be configured using Channel Setup.
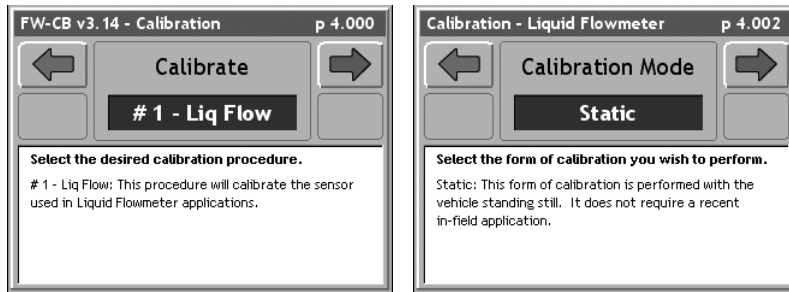
Calibration Procedure

Calibration softkey

Granular, Liquid, NH3, and Seeder calibrations share the same basic calibration steps (refer to Figure 3-6). Each has the option of performing a Static or In-Field calibration. Select the *Calibration* softkey from the *ARM Launcher* page to begin the Calibration Procedure. Select the desired Calibration type using the *Arrow* keys (Distance/Speed, Liquid, Granular, etc.), followed by the *Forward Arrow* softkey. The Legacy 6000 will navigate the operator through the necessary procedures to perform the calibration process.

Arrow keys

Forward Arrow softkey (F6)

Figure 3-5: Calibration Screen

FW-CB v3.14 - Calibration	p 4.000

Calibrate

 # 1 - Liq Flow

Select the desired calibration procedure.

1 - Liq Flow: This procedure will calibrate the sensor used in Liquid Flowmeter applications.

Calibration - Liquid Flowmeter	p 4.002

Calibration Mode

Static

Select the form of calibration you wish to perform.

Static: This form of calibration is performed with the vehicle standing still. It does not require a recent in-field application.

NOTE: Injection Calibration must be completed prior to priming for the system to prime properly.

Figure 3-6: Typical Calibration Process

Product Calibration Sequence

```
                    ┌──────────────────────────┐
                    │  Select Calibration Type │
         ┌────────┐ ├──────────────────────────┤ ┌────────┐
         │In-Field│─┤  Select Calibration Mode │─│ Static │
         └────────┘ └──────────────────────────┘ └────────┘
             │                                        │
             │                          ┌──────────────────────────┐
             │                          │  Enter Application Rate  │
             │                          ├──────────────────────────┤
 ┌────────────────────────┐             │  Enter Material Density  │
 │ View Discharged Material│            ├──────────────────────────┤
 │ in DCM                 │             │  Enter Vehicle Speed     │
 └────────────────────────┘            ├──────────────────────────┤
             │            ┌──────────────────────────┐ │ Discharge Material │
             │            │ Enter Known Amount of    │ └──────────────────┘
             └────────────│ Material                 │
                          ├──────────────────────────┤
                          │  Apply Calibration       │
                          ├──────────────────────────┤
                          │  Accept Calibration      │
                          └──────────────────────────┘
```

Distance Calibration Sequence

```
         ┌────────┐ ┌──────────────────────────┐ ┌──────┐
         │ Quick  │─│  Select Calibration Mode │─│ Full │
         └────────┘ └──────────────────────────┘ └──────┘
             │                                        │
             │                          ┌──────────────────────────┐
             │                          │  Reported Distance       │
             │                          ├──────────────────────────┤
 ┌────────────────────────┐             │  Known Distance          │
 │ Enter Calibration #    │             ├──────────────────────────┤
 └────────────────────────┘            │  Reported vs. Known      │
             │                          │  Distance                │
             │            ┌──────────────────────────┤
             └────────────│ Calibration Complete     ││ Calibrated Distance │
                          └──────────────────────────┘
```

PRIME INJECTION SYSTEM

The priming feature appears as an option only if "Injection" was selected as the "Drive Type" during Channel Setup. Priming the system takes chemicals from the supply tank directly to the injection point to ensure the chemicals are injected instantly at the start of application.

Figure 3-7: Priming System

Priming System

Injection
Point

Supply
Tank
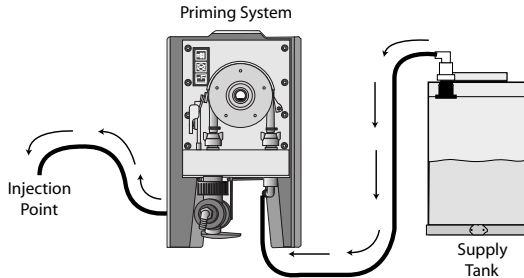
1. **Calculate Prime Value**. Calculate the prime value using the following
   formula. The value should be entered during Channel Setup - Drive Type
   Injection (refer to CHAPTER 2 - DRIVE TYPE SETTINGS).

US

(line diameter in inches/ 2)2 x 3.1416 x line length in inches x 0.5541 = volume in fluid ounces

Metric:

(line diameter in cm/2)2 x 3.1416 x line length in cm = volume in ml

Prime
softkey

Prime State
softkey (F6)

Reset Values to
Zero softkey (F7)

2. **System Setup for Priming.** Select the *Prime* softkey from the ARM
   Launcher page to display the % Prime page. The % Prime page has two
   softkeys (*Prime State* and *Reset Values to Zero*). The *Prime State* soft-
   key provides a detailed set of values for the priming process. This page is
   used to monitor pump priming progress during priming. The *Reset Values*
   to Zero softkey will reset Prime values to zero.

Figure 3-8: System Setup for Priming

ARM *Launcher* page

FW-CB v3.14 - A.R.M.   p 1.003
Injection Pump Prime
Calibration   Product Setup
Prime
Job Report
ARM Setup

% *Prime* page

FW-CB v3.14 - Prime   p 27.000
Prime state information for all pumps.
PCM 1 Primed   0 %

Prime State

FW-CB v3.14 - Prime   p 27.000
Change pump information in list.
PCM 1
Prime Volume   40 fl oz
Pumped Vol   40.4 fl oz
Primed   100 %

Reset Values to 0

FW-CB v3.14 - Prime   p 27.000
Reset pumped volume for PCM 1.
PCM 1
Prime Volume   0 fl oz
Pumped Vol   0.0 fl oz
Primed   0 %

3. **Start Prime.** While in the Prime Page of Arm Launcher, press the *Prime* button on the front of the pump (top button) and the pump will start pumping material through to the point of injection. The pump will stop automatically once the pump volume reaches the preset prime value. To view the live prime process, select the *Prime State* softkey. Repeat the process for each pump.

Prime State
softkey (F6)

Figure 3-9: Prime and Prime State Button

prime button
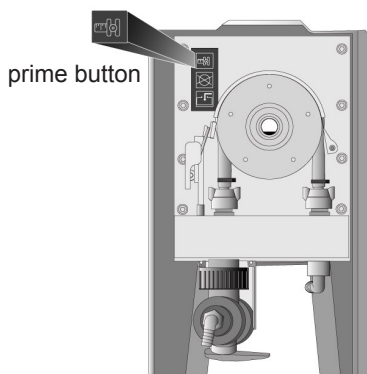
Reverse Prime Injection System

Reverse Prime is not a standard feature on the peristaltic injection pump, but may be added at any time. Contact your local TeeJet Technologies distributor to order the Reverse Prime feature (Part # 54-02015).

Reverse Prime works similarly to the priming procedure except that the pump runs backwards and moves chemical from the injection point back to the supply tank to preserve as much chemical as possible. **The priming feature appears as an option only if "Injection" was selected as the "Drive Type" during Channel Setup.**

Figure 3-10: Reverse Priming System

Prime
softkey

Prime State
softkey (F6)

Reset Values to Zero softkey (F7)
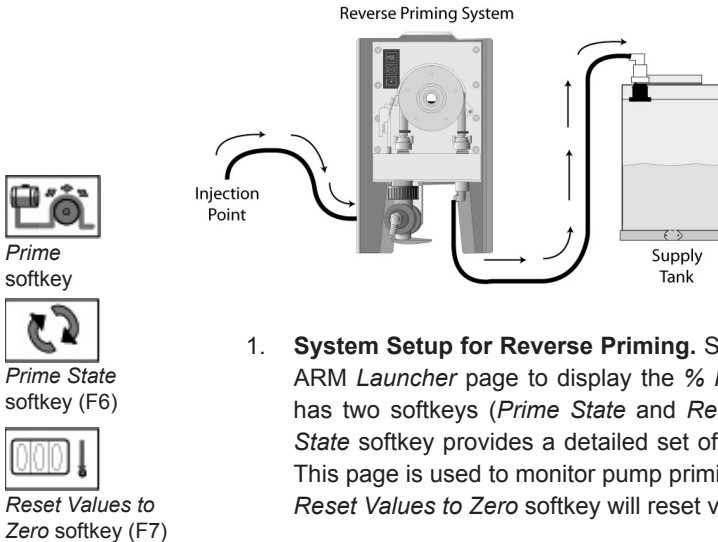
1. **System Setup for Reverse Priming.** Select the *Prime* softkey from the ARM *Launcher* page to display the *% Prime* page. The % Prime page has two softkeys (*Prime State* and *Reset Values to Zero*). The *Prime State* softkey provides a detailed set of values for the priming process. This page is used to monitor pump priming progress during priming. The *Reset Values to Zero* softkey will reset values to zero.

2. **Start Reverse Prime.** While in the Prime page of ARM Launcher, press the *Reverse Prime* button on the front of the pump (bottom button) to start the pump. The pump will start pumping material from the point of injection back to the chemical tank. The pump will stop automatically once the volume reaches the preset prime value. To view the live prime process, select the *Prime State* softkey. Repeat the process for each pump.

reverse
prime
button

NOTE: Reverse prime only works if
        check valves are not installed in
        the injection lines.

JOB REPORT SETUP

Job Report contains the information necessary to build an application report after a
job has been completed. Application reports are generated in the Fieldware Tools
Map Manager desktop program. Job Report is accessed from the _Launcher_ page.
Select the _Job Report_ softkey. Table 3-3 describes each Job Report Menu item.

Job Report
softkey

_NOTE: It is not necessary to complete Job Report information in order to begin
        product application. Job Report information should be completed if the
        operator wants this data in the Job Report._

No PCMCIA Card

If the PC Card setting in Console Setup is "NO", the Job Report tab will not appear
on the ARM Launcher page.

Job Report Wizard

The _Job Report_ page contains every setup option available in list format. From
this list each Job Report item can be edited individually, or the Job Report Setup
Wizard can be used. The top item on the setup list is the Setup Wizard. To run the
Setup Wizard, highlight <Setup Wizard> from the main list using the _Arrow_ keys
and press the _Enter_ button. Setup Wizard will navigate through the entire Job Re-
port Setup item list.

Arrow keys

Enter button
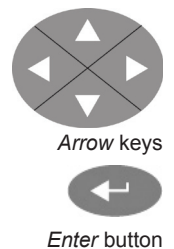
Figure 3-12: Job Report Options

Three additional softkeys are displayed on the right side of the screen. They allow the operator to toggle between the available data screens without leaving the Job Report Setup menus. The _All Settings_ softkey displays all of the options available (the main screen). The _Weather Settings_ softkey displays all of the options pertaining to weather conditions (wind speed, temperature, relative humidity). The _Soil Settings_ softkey displays all of the options pertaining to soil conditions (moisture, condition, texture, tillage, and growth stage).

All Settings
softkey (F8)

Weather Settings
softkey (F9)

Soil Settings
softkey (F10)

Table 3-3: Job Report Items

Item	Description
Wind Speed	Wind speed (units of measurement are established during Console Setup). If no wind speed is to be entered, set to "NO".
Wind Direction	Wind direction (NE, E, SE, S, SW, W, NW, N, not observed).
Temperature	Temperature (units of measurement are established during Console Setup). If no temperature is to be entered, set to "NO".
Relative Humidity	Relative humidity (units of measurement are established during Console Setup). If no relative humidity is to be entered, set to "NO".
Current Weather	Weather condition (sunny, cloudy, partly cloudy, rain, snow, not observed).
Soil Moisture	Soil moisture (dry, moist, wet, not observed)
Soil Condition	Soil condition (good, trashy, smooth, rough, plant debris, cloddy, not observed).
Soil Texture	Soil texture (fine, medium, course, not observed).
Soil Tillage	Soil tillage (no till, min till, conv till, not observed).
Growth Stage	Growth state (pre-plant, pre-emergence, post-emergence, not observed).

ARM SETUP

ARM Setup manages all named data files as well as several product application parameters. The Main ARM Setup page is accessed by selecting the *ARM Setup* softkey on the *ARM Launcher* page. When ARM is first launched, a job name will be requested (refer to CHAPTER 3 - STARTING JOBS). The job name is used to automatically name .BND and .RCD files in ARM Setup.

ARM Setup
softkey

No PCMCIA Card

If the PC Card setting during Console Setup was set to "NO", the *ARM Setup Main* page will appear differently. All ARM Setup items related to files and naming files are omitted from the Main page.

ARM Setup Wizard

The *ARM Setup* page contains every option available in list format. Each ARM Setup item can be edited individually, or the ARM Setup Wizard can be run. The top item on the setup list is the Setup Wizard. To run the Setup Wizard, highlight <Setup Wizard> from the main list using the *Arrow* keys and press the *Enter* button. The Setup Wizard will navigate through the entire ARM Setup item list.

Arrow keys

Enter button

Figure 3-13: ARM Setup
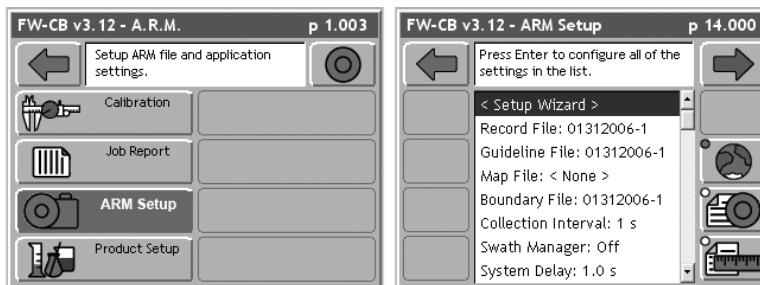
All Settings
softkey (F8)

ARM Files
softkey (F9)

All Settings
softkey (F8)

Three additional softkeys are displayed on the right side of the screen. They allow the operator to toggle between the data screens without leaving the Arm Setup menus. The *All Settings* softkey displays the options available (the main screen). The *ARM Files* softkey displays the options pertaining to file storage information (record, guideline, map, boundary files, and collection interval). The *Application Settings* softkey displays the options pertaining to the application setup (Swath Manager, system delay, speed source, and GSO speed).

Table 3-4: ARM Setup

Item	Description
Record File (.RCD)	Spray trajectory data for product application is stored in record files. They contain rate, spray on/off data, boom width, and data entered in the Job Report.
Guideline File (.GLN)	Contains all information required to view and re-use the guidelines created and used during product application.
Map File (.GMF)	Used to store field features that may be needed during application.
Boundary File (.BND)	Used to show existing or create new field boundaries.
Collection Interval	How often data is collected and written to files.
Rate Lookahead	The time ARM must look ahead of the vehicle to change variable application rates.
Swath Manager	Autoboom shut off and the technique used to stop application over previously-applied areas (Off, Boom 50%, Boom 100%, 0%, 50%, and 100%).
Off Lookahead	The time Swath Manager must look ahead of the vehicle to stop application.
On Lookahead	The time Swath Manager must look ahead of the vehicle to start application.
System Delay	Delay used before product is applied.
Speed Source	Source of ground speed (radar or GPS). If using a wheel pick up sensor, select "radar" as the speed source.
GSO Speed	Ground Speed Override (GSO) is the minimum speed used for automatic application rate control. When the vehicle speed falls below this setting, the GSO speed is used to control the application rate, rather than the actual ground speed.

Entering File Names

File names can be entered to designate the use of existing Record, Boundary, Guideline, and Map files (extensions .RCD, .BND, .GLN, or .GMF). To use an existing record file, press the *File* softkey. The *File* softkey will launch a filename dialog from which an existing record file can be selected. Once a file has been selected, press the *Forward Arrow* softkey to return to the *Record File* page. Press the *Forward Arrow* softkey again to save the selection and return to *ARM Setup*. Once the desired settings have been configured, press the *Forward Arrow* softkey on the *Main ARM Setup* page to save the settings and return to the *ARM Launcher* page.

File softkey (F7)

Forward Arrow softkey (F6)

Figure 3-14: ARM Setup
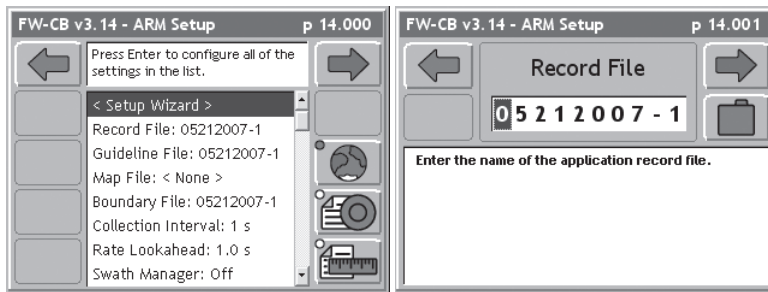
Swath Manager Automatic Boom Section Control

Fieldware for the Legacy 6000 can automatically control the On/Off state of boom sections. Swath Manager can operate in five modes (Boom 50%, Boom 100%, 0%, 50%, and 100%).

Swath Manager Lookahead

Fieldware for the Legacy 6000 has two time settings for the lookahead of the vehicle to turn boom sections on and off.

Figure 3-15: Lookahead Setup
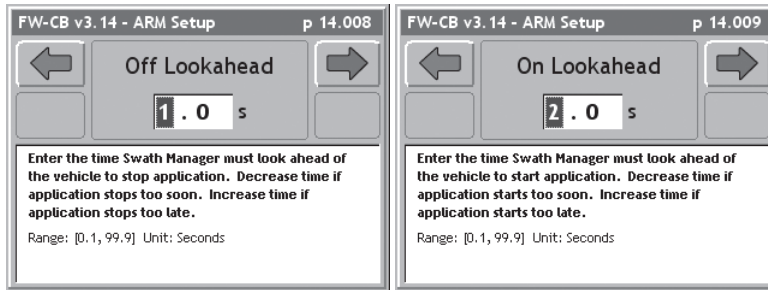
Swath Manager 0%, 50%, and 100% Settings

Boom Sections are activated and deactivated based on the percentage of the boom section in an applied area.

- Use 0% to shut off a boom section when any part of the boom section enters an applied area to minimize overlap.
- Use 50% to shut off a boom section when half of the boom section enters an applied area.
- Use 100% to shut off a boom section when the entire boom section enters an applied area.

NOTE: Switching the Master Switch or boom sections OFF will override Swath Manager and turn sections off.

Figure 3-16: Overlap Settings
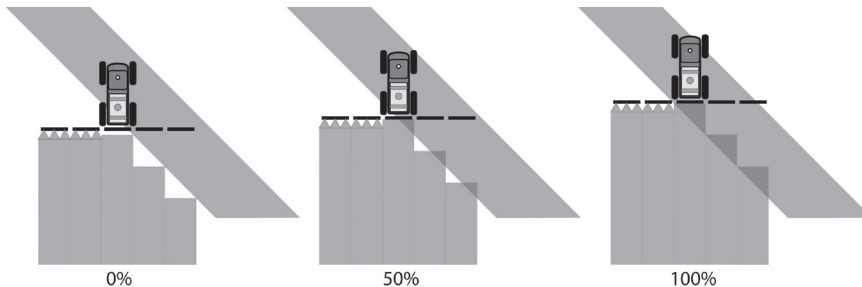
Swath Manager Boom 50% and 100% Settings

The swath or entire boom is activated and deactivated based on the percentage of swath in an applied area by turning off the regulating valve or drive mechanism - not the individual boom sections. Boom 50% and Boom 100% settings do not recognize individual boom sections.

- Boom 50% shuts off the entire boom when half of the swath enters an applied area.
- Boom 100% shuts off the boom when the entire boom enters an applied area.

main regulating valve is closed

Figure 3-17: Boom 50% and Boom 100% Settings

Boom 50%   Boom 100%
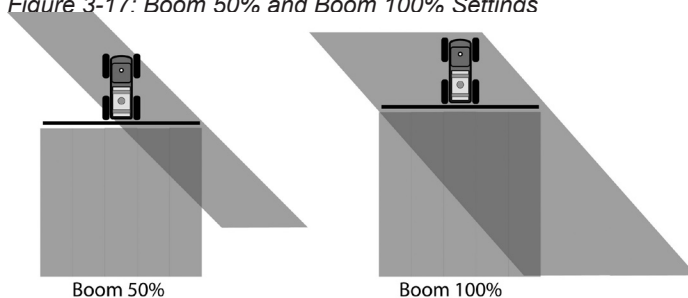
CAN Switchbox

For automatic section control using a TeeJet Technologies' CAN Boom Switchbox, the system must also contain a Switch Function Module (SFM). The following switch settings (each switch has a light to indicate the switch is in the "ON" position) are required in order for Swath manager to operate:

- Auto Boom Engage/Disengage Switch set to "Engage"
- Master Switch ON
- Active boom switches ON
- OFF/Auto/GSO switch must be in "Auto" or "GSO"

Figure 3-18: CAN Switchbox
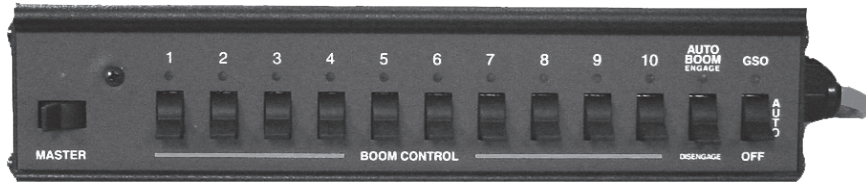
Input Status Module (ISM)

When using an Input Status Module (ISM) instead of a CAN Boom Switchbox, the system uses existing boom switches in the cab. The system must contain a Switch Function Module (SFM) and a switch (Part # 78-00028) connected to the ISM to engage and disengage auto boom capabilities. Existing wiring from the in-cab boom switches to the boom valves needs to be disconnected, and this function assumed by the SFM.

Figure 3-19: ISM
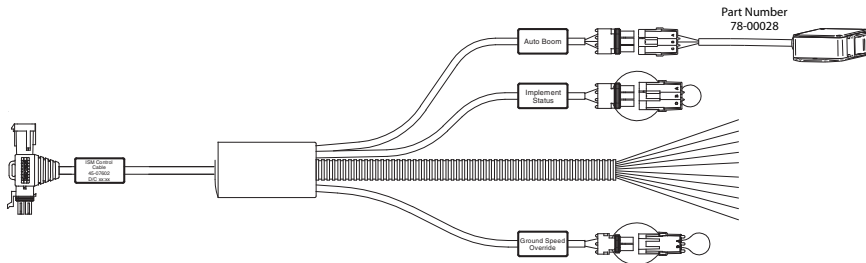
For automatic section control using existing switches, use the following switch settings:

- Auto Boom Engage/Disengage Switch set to "Engage"
- Master Switch ON
- Active boom switches ON

Swath Manager 5

Swath Manager 5 (SM5) replaces the need for the ISM, SFM, and the Boom Switchbox. It automatically controls up to five boom sections. If Swath Manager 5 is used on a machine that already has boom switches, these switches must be set as illustrated in Figure 3-21.

Figure 3-20: Swath Manager 5

Figure 3-21: Swath Manager 5 Switch Configurations

	Original Master Switch	** Original Boom Switches	SM5 Master Switch	SM5 Boom Switches	Auto Boom Switch Engage / Disengage	
Swath Manager 5 System						
Swath Manager 5 Auto Boom mode	ON	OFF	ON	ON	Engage	
Swath Manager 5 Manual Boom mode	ON	OFF	ON	ON	Disengage	**For Individual boom section control use SM5 boom switches**
** Original boom switches ON will force boom sections ON						

PRODUCT SETUP

Product Setup softkey

Product setup is used to name the product being applied by the Channel as well as configure preset product application rates. To launch *Product Setup*, select the *Product Setup* softkey on the *ARM Launcher* page.

Arrow keys

The *Product Setup* page contains every setup option available in list format. From this list each Product Setup item can be edited individually, or the Product Setup Wizard can be run. The top item on the setup list is the Setup Wizard. To run the Setup Wizard, highlight <Setup Wizard> from the main list using the *Arrow* keys and press the *Enter* button. The Setup Wizard will navigate through the entire Product Setup item list.

Enter button

NOTE: *If Job Creation was based on an existing job and no changes are needed to the Product name or rates, Product Setup can be skipped.*

Figure 3-22: Product Setup
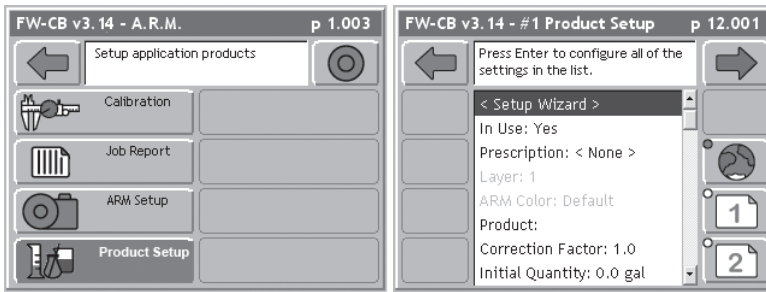
All Settings softkey (F8)

View Products softkey (F9)

View Rates softkey (F10)

Three additional softkeys are displayed on the right side of the screen. They allow the operator to toggle between the available data screens without leaving the Product Setup menus. The *All Settings* softkey displays all of the options available (the main screen). The *View Products* softkey displays all of the product information in use. The *View Rates* softkey displays all of the rate information pertaining to the product setup.

Table 3-5: Product Setup

Item	Description
In Use	Defines whether the Control Channel will be used to apply product.
Prescription	If using Variable Rate product application, select the prescription file (.ARM) that contains information for that channel. The (.ARM) file must be on the root of the PC Card, and the PC Card must be inserted into the L6K. If not using variable rate, leave this setting at <None>.
Layer	Some prescription files (.ARM) can contain several products in a single file. A single product is associated with a single channel. In a multiple product prescription file it is necessary to establish which product layer is associated with the selected channel. If there is only one product layer in the (.ARM) file, this setup item is automatically set to Layer 1 and this page is skipped in the Product Setup wizard process.
ARM Color	Allows the operator to select a color scheme for the prescription file map shown on the Legacy Map page.
Product	Product Setup contains a database with approximately 4000 product names and their associated EPA numbers. Products can be selected from this database. If using a prescription map (.ARM), product setup automatically extracts the product name from the (.ARM) product layer or user can enter product name.
Correction Factor	Factor for solutions heavier or lighter than water with pressure based applications (only for Pressure Based liquid applications).
Product Density	The density of the product being applied in Granular or NH3 applications (refer to AP-PENDIX C - NH3 APPLICATION).
Calibration Table Value (e.g., Gate Height)	If a Calibration table was established in Channel Setup (refer to CHAPTER 2 - PRIMA-RY SENSOR), and has been populated either manually or by calibration procedures, the appropriate values can be selected here for use in the job.
Initial Quantity	The initial quantity of the product loaded in the tank, bin, etc.
Rates A - E	The ARM software allows 5 preset application rates to be selected.

Product Name Selection

If variable rate product application will not occur, the product being applied can be selected from the Fieldware Products database. To use variable rate application, the product name can be extracted from an existing (.ARM) file.

Figure 3-23: Product Selection
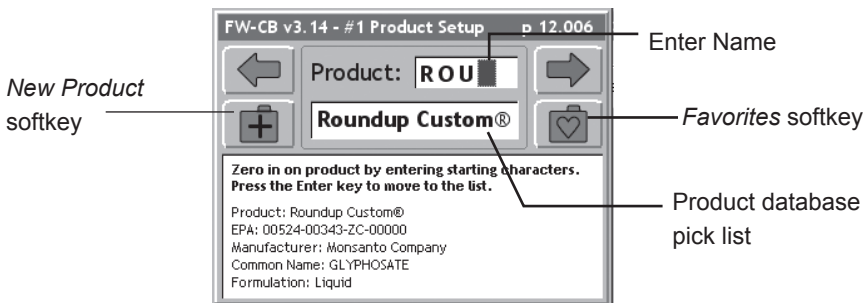
Product Setup
softkey

Arrow keys

Enter button

Forward Arrow
softkey (F6)

Favorites softkey
(F7)

New Product
softkey (F2)

To select a product from the database, scroll to the "Products" option on the *Product Setup* page using the *Arrow* keys and press the *Enter* button. Enter alpha characters to spell the product name by using the *Arrow* keys (the fastest method for product selection). As characters are entered, the database will display the closest entry to the character typed. If close, choose the *Enter* button and scroll through the list by name. Once the desired product name has been located, press the *Forward Arrow* softkey to save the entry and continue to the next page.

Favorites

Product Setup saves a list of the product names that are most frequently used. The ten most used products are saved in a "Favorites" folder. To access a product from the Favorites folder, press the *Favorites* softkey to open the list. The product names will be displayed and can easily be selected using the *Arrow* keys and the *Enter* button.

New Products

If a product does not exist on the database, it can be added by pressing the *New Product* softkey and entering the product name by using the *Arrow* keys. The system will request information about the product to be entered. Once the information is entered, the product will be stored in the database for future use.

Variable Rate Application

Prescription maps contain geo-referenced product rate information and a product name. The file format accepted is .ARM. A shape file can be converted to .ARM using the Fieldware Tools desktop software. The .ARM file must be placed on the root directory of the PC Card.

Prescription Map Selection

Prescription maps are loaded by selecting "Prescription" on the Product Setup page and pressing the *Enter* button. Use the *Arrow* keys to scroll through the list of available prescriptions. Once the desired prescription is highlighted, press the *Enter* button or the *Forward Arrow* softkey to make the selection.

Figure 3-24: Prescription Map Selection
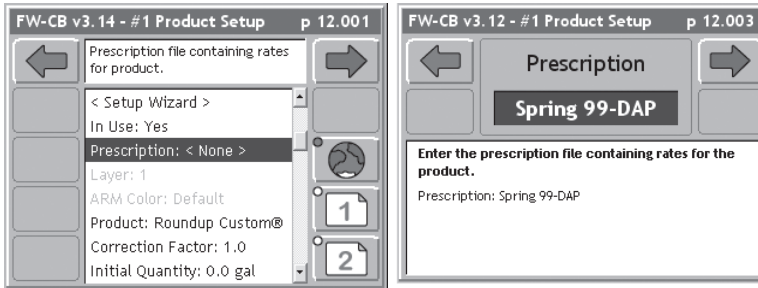
Variable Rates for Multiple Products

There are two ways of creating prescriptions to perform variable rate application for multiple products. The first way is to create a separate prescription map for each product. The second way is to create one prescription map with a file that contains all of the products.

To use a prescription map for each product:

1. From the *ARM Launcher* page press the *Product Setup* softkey.
2. Use the *Arrow* keys to select the desired Channel to be configured. If only one channel is established on the system, this screen will not appear.
3. Select "Prescription" from the *Product Setup* screen. Press the *Enter* button.
4. Select the appropriate prescription map by using the *Arrow* keys to scroll through the prescription options. "None" is the default setting. Press the *Forward Arrow* softkey to continue to the next page.
5. If the prescription has a product name stored in the file, it will automatically appear once the prescription map is selected.
6. Manual or Straight rates can be entered as well.
7. Repeat for each channel.
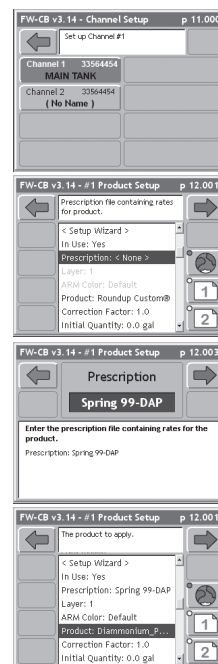
Product Setup softkey

Arrow keys

Enter button

Forward Arrow softkey (F6)

Product Setup softkey

Arrow keys

Enter button

Forward Arrow softkey (F6)

To use one prescription map for all products:

Repeat the following process for each product, selecting the same prescription map. Make sure to change the "Layer" to distinguish which product is assigned to each Channel.

1. From the *ARM Launcher* page, press the *Product Setup* softkey.
2. Use the *Arrow* keys to select the desired Channel to be configured. If only one channel is established on the system, this screen will not appear.
3. Select "Prescription" from the *Product Setup* screen. Press the *Enter* button.
4. Select the appropriate prescription map by using the *Arrow* keys to scroll through the prescription options. "None" is the default setting. Press the *Forward Arrow* softkey to continue to the next page.
5. Select "Layer" from the *Product Setup* screen. Press the *Enter* button.
6. Select the layer that matches the product and Channel selected. The operator must know which product is assigned to each layer in the map. (Layer 1 for Product 1, Layer 2 for Product 2, etc.)
7. To help verify that the correct layer and product has been selected, the product name should appear.

ARM Color (Skip if not using Variable Rate)

ARM color is used to select the color scheme that best represents the change in rates across a prescription map. To select the ARM Color option, scroll to "ARM Color" on the *Product Setup* page using the *Arrow* keys and press the *Enter* button. The *Left* and *Right Arrow* keys are used to highlight the Lo and Hi Colors. The *Up* and *Down Arrow* keys are used to change the colors.

NOTE: The Legacy 6000 area applied is represented by a solid swath or hash marks representing the boom width.

Figure 3-25: Color Settings

Tilt Sensor Functions

The Legacy 6000 must be loaded with Fieldware software version 3.10 or later to be compatible with the Tilt Compensation Module (TCM). When operating the TCM, position data originating from the GPS receiver will be compensated for vehicle tilt errors. Correct information will be sent to the console.

There are three LEDs visible on the Tilt Sensor that indicate the following:

- Blue - blinks two times per second when the unit is powered and running
- Green - steady ON when tilt correction is enabled; otherwise OFF
- Yellow - Blinks one time per second when valid GPS location data is being received (NMEA-0183 GGA)

Figure 3-26: Tilt Compensation Module
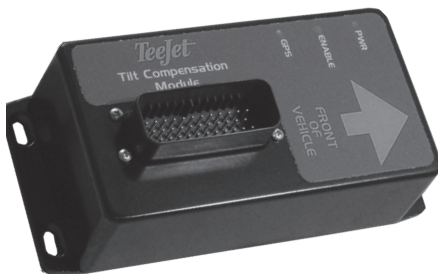
Tilt Compensation Module Installation

- Mount the Tilt Compensation module as close to the center of the vehicle side as possible.
- Mount the module on a plain parallel to the GPS antenna so that both the antenna and the sensor tilt the same degree.
- Mount the module so the sensor is level and the connector is pointing upward.
- The module should be mounted rigidly to minimize vibration. Vibration will degrade the ability to sense tilt.
- It is recommended that nuts and bolts be used or self-tapping screws be used through the two mounting holes on each end of the module.
- The arrow on the module decal must be pointing toward the front of the vehicle.
- DO NOT mount the module near extreme temperatures, upside down, or on its side.

Guidance information is affected when the vehicle experiences a sideways tilt. For example, if the GPS sensor is 12 feet (3.65 meters) above the ground, a 10 degree tilt gives a 2 foot (0.61 meter) positioning error.

Figure 3-27: Tilt Sensor Example
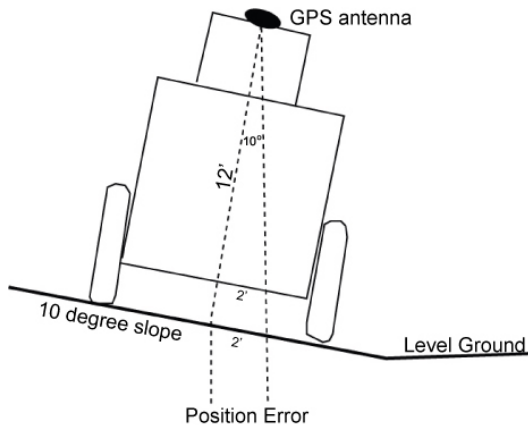
Figure 3-28: Tilt Sensor System
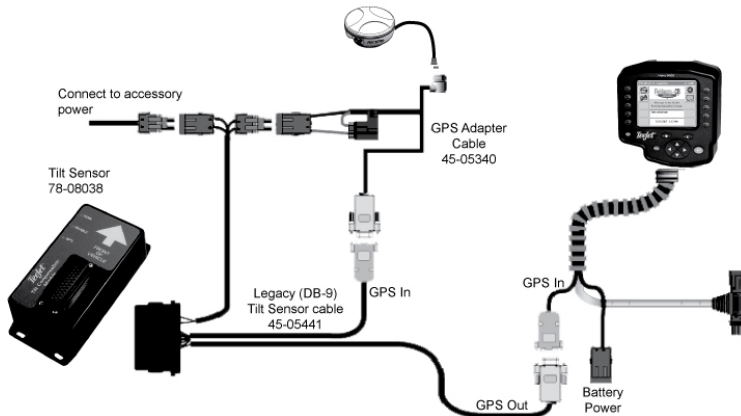
Once the Tilt Sensor is installed and connected to the Legacy 6000, two initial setup steps must be performed:

- Antenna height entry
- Calibration (level) of the tilt sensor

To perform these steps, the vehicle should be situated on level ground.

Antenna Height

To access Antenna Height, select the *System Setup* softkey from the *Main Launcher* page. Select the *GPS Receiver Setup* softkey. Select the "Antenna Height" option on the GPS Receiver Setup menu and press *Enter*.

System Setup
softkey (F1)

GPS Receiver
softkey (F5)

Enter button

Figure 3-29: Establishing Antenna Height
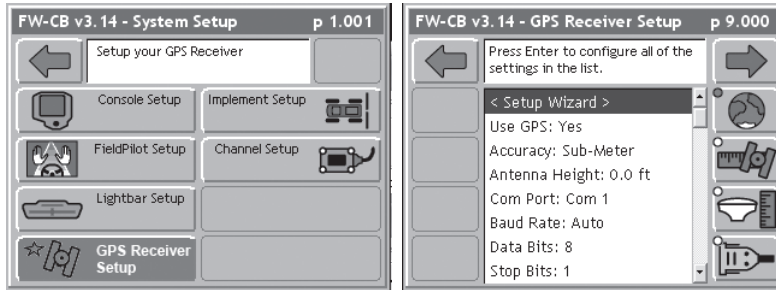
Enter button

Enter the height of the GPS antenna above the ground. The initial value in the L6K system is 0.0 feet. After changing the antenna height, the user will be prompted to restart the Legacy 6000. Press the *Enter* button to continue the setup process. Restart the Legacy 6000 when finished by cycling the power.

Figure 3-30: Establishing Antenna Height
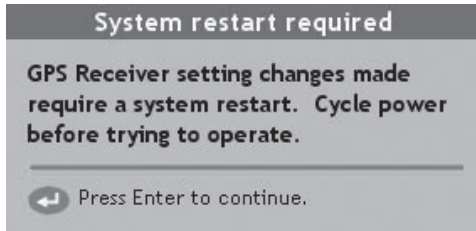
Tilt Sensor Calibration

System Tools softkey

Once the antenna height has been entered and the vehicle is situated on level ground, the tilt sensor must be calibrated (leveled). To access the level feature:

Device Manager softkey (F2)

1. Park the vehicle on a level surface.
2. Select the *System Tools* softkey from the *Main Launcher* page.
3. Select the *Device Manager* softkey. Select the "GPS Receiver" option.
4. Press the *Level* (F7) softkey to calibrate the Tilt Sensor. The message "Drive to a level spot and stop completely. Press the *Next* button" will be displayed. Press the *Next* button once the vehicle is stopped at the level location. Choose a location where the vehicle can easily be turned.

Level softkey (F7)

5. Turn the vehicle around and park it in the same location. Press the *Next* softkey once the vehicle is parked in the same location. The message "Completing Calibration" will be displayed.

Next softkey (F6)

Figure 3-31: Tilt Sensor Calibration
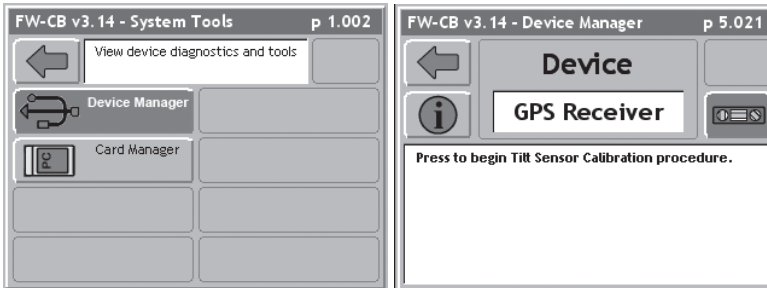
Figure 3-32: Tilt Sensor Calibration
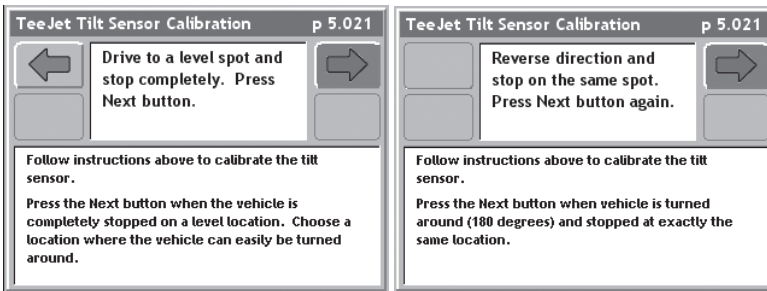
Figure 3-33: Tilt Sensor Calibration Completion
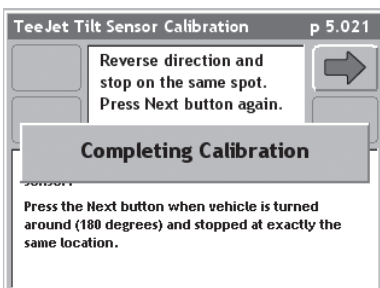
CHAPTER 4 - OPERATION
PRODUCT APPLICATION

Once Application Setup is complete, product application can begin. Product application is accomplished by pressing the *ARM Bullseye* softkey, located on the *ARM Launcher* page. When the *Bullseye* is pressed, settings are loaded onto the DCM along with implement setup information, control parameters, and data files. Once the information is loaded, the *Rates* page will be displayed (refer to Figure 4-2).

ARM Bullseye
softkey (F6)

Figure 4-1: ARM Launcher Page

— *ARM Bullseye* softkey
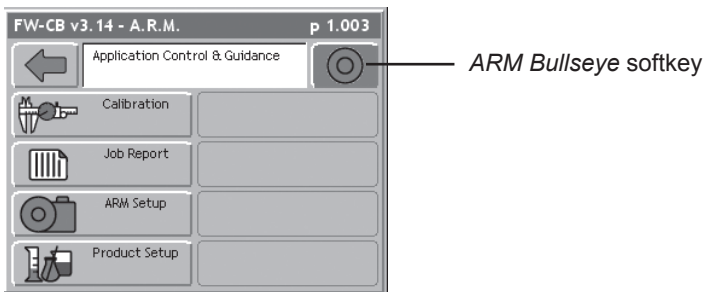
NOTE: *During OPERATION, more softkeys may be available on the right side of the screen than can be displayed at one time. Additional softkeys can be accessed by highlighting a softkey with the Right Arrow key and scrolling up or down with the Up and Down Arrow keys.*

Arrow keys

Rates Pages

The *Rates* pages display the product name at the top of the page as well as the current application rate, speed, material applied, acres applied, and remaining amount of material and acres. To view the amount of remaining product, the initial volume of material must be entered during Product Setup. For each product there is also an alternate *Rates* page. To access the alternate *Rates* page, press the *Additional Information* softkey. Information displayed on the alternate page will vary based on Channel Setup. The page typically displays distance traveled, active swath width, target rate, and actual rate.

Additional Information softkey (F6)

Figure 4-2: Main/Alternate Rates Pages

Product Name

Live Rate
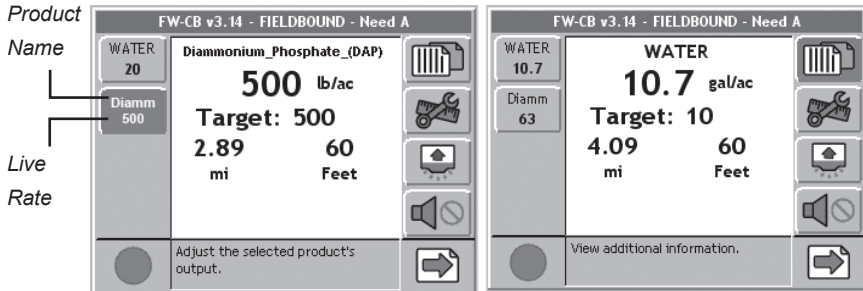
System Tools softkey (F7)

Reset Initial Quantity softkey (F8)

Alarm Silence softkey (F9)

Next softkey (F6)

Arrow keys

Exit softkey (F10)

Four additional softkeys are displayed on the right side of the screens. The _System Tools_ softkey allows the operator to monitor the devices in use without exiting out of the _Rates_ pages. The _Reset Initial Quantity_ softkey allows the operator to reset the amount of product remaining for application. The _Alarm Silence_ softkey allows the operator to silence audible alarms. The _Next Page_ softkey allows the operator to toggle between the _Rates_ page and the _Map_ page.

If the system is running more than one channel, you can change the channel information being displayed by using the _Left Arrow_ key to highlight the channels on the left side of the screen, then use the _Up_ and _Down Arrow_ keys to change the channel being displayed.

Located at the bottom left side of the screen is the _Exit_ softkey. This allows the operator to exit the _Rates_ pages and return to the main _ARM Setup Launcher_.

GPS/BOUNDARY PAGE

From the _Additional Information_ page, press F6 to go to the _GPS Boundary_ page. This page displays the current latitude and longitude, antenna height, speed, course in degrees (North 0º), and bounded acres.

Figure 4-3: GPS/Boundary Page
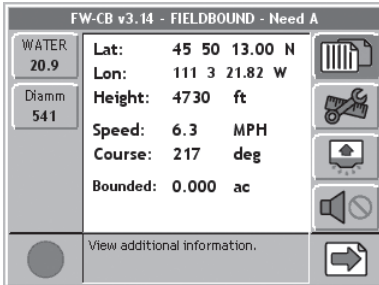
Rate Adjustment

Rate selection information is accessed by selecting the softkey corresponding to the product in question. Pressing the softkey adjacent to the product will launch a menu. Pre-determined rate selections can be applied, or the opportunity to manually control the valve will be presented. To manually control the valve, use the *Arrow* keys to select "Manual" and press the *Enter* button. *Valve Open* and *Valve Close* softkeys will be displayed on the right side of the screen. Press either of these softkeys to manually open or close the valve. The rate page will display the actual rate highlighted in black to indicate manual control of the valve.

NOTE: *Once manual is selected, the system will no longer control product rates accurately if booms are turned On/Off or the ground speed changes. Select one of the pre-programmed rates to return the system to automatic control.*

Arrow keys

Enter button

Valve Open softkey

Valve Close softkey

Figure 4-4: Rate Adjustments

product
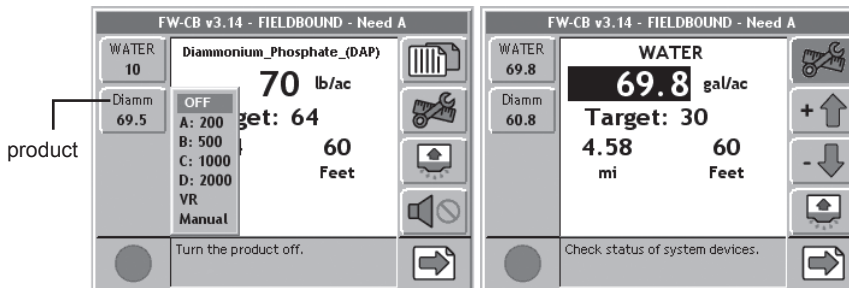
Test Speed

System Tools softkey

Test Speed can be used to simulate speed without movement. Test Speed is accessed by pressing the *System Tools* softkey. Scroll through the Device Manager options using the *Arrow* keys and select the "Speedometer" option. Press the *Test Speed* softkey. Turn Test Speed "ON" by using the *Arrow* keys and enter the speed for simulation. Apply the settings by pressing the *Forward Arrow* softkey. Press the *Back Arrow* softkey to return to the rate page and start using test speed. If the boom and pump are on, the system will begin product application. The rate page will display the speed highlighted black to indicate Test Speed is active.

Arrow keys

Test Speed softkey

NOTE: Once settings are applied, the system will start to operate at the entered
        test speed.

Figure 4-5: Test Speed

Forward Arrow softkey (F6)

Back Arrow softkey (F1)
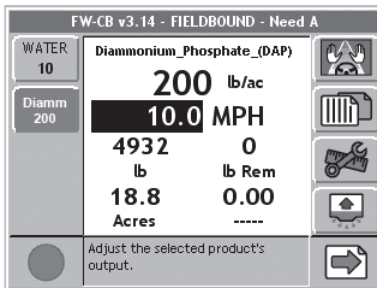
Reset Initial Quantity

Reset Initial Quantity softkey

Resetting the initial quantity is a feature used to monitor the amount of product remaining for application. To reset the value, press the *Reset Initial Quantity* softkey and accept the default value by pressing F6, or use the *Arrow* keys to set the appropriate value and then press F6 to apply the settings. Initial Quantity is established during Product Setup.

Figure 4-6: Resetting Initial Quantity
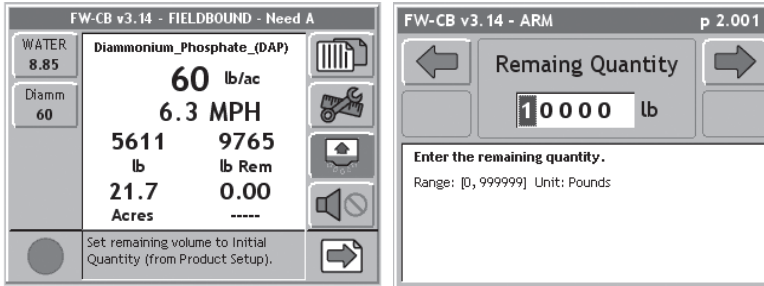
FieldPilot Adjustments

Adjustments to the FieldPilot system allows the operator to fine-tune the system without backing out of the current screens. Information that can be adjusted includes lookahead, aggressiveness, sensitivity, and disengage distance. Refer to CHAPTER 2 - FIELDPILOT SETUP for settings.

FieldPilot softkey

Figure 4-7: FieldPilot Adjustments
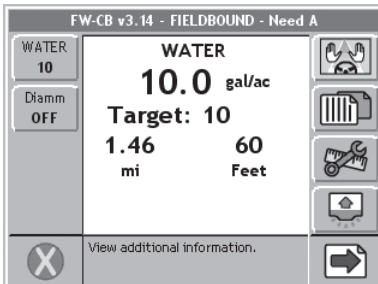
Table 4-1: Operation Softkeys

Softkey	Description
	Exit. Exits out of OPERATIONS and returns to the Main Menu.
	Next Page. Switches between the Map page and the Information page.
	Additional Information Page. Displays additional product information and GPS information such as latitude, longitude, speed, course, and bounded acres.
	Alarm Silence. Silences an alarm.
	Manual Valve Open. Opens the control valve.
	Manual Valve Close. Closes the control valve.
	System Tools. Used to monitor system devices without exiting out of the Rates pages. Also used to access Test Speed.
	Reset Initial Quantity. Used to monitor the amount of product remaining for application. When pressed, the value will be reset to the Initial Quantity established during Product Setup.
	FieldPilot. When this softkey is visible, FieldPilot is active. Allows the operator to adjust the FieldPilot system without exiting operations.

The Map Page

The *Map* page allows the product application process to be viewed. The page displays the vehicle's current location, implement status, and application trajectory. If utilizing variable rate application using a prescription map, the prescription map is also displayed in the background. The *Map* page is associated with the highlighted product control softkey, located on the left side of the screen.

Next Page
softkey (F10)

To access the *Map* page from the *Product Application* pages, select the *Next Page* softkey. All guidance-related softkeys will be displayed on the right column of the *Map* page. Table 4-2 provides a description of each softkey displayed on the *Map* page.

Figure 4-8: The Map Page

Product Control
softkey
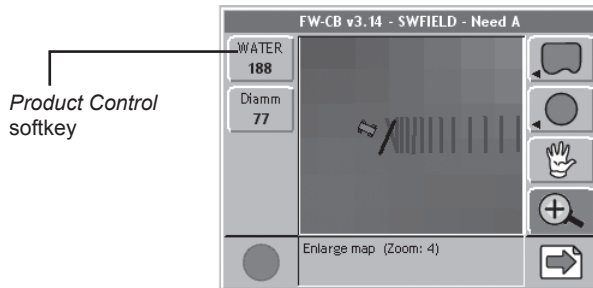
Table 4-2: Map Page Softkeys

Softkey	Description
	Exit. Exits out of the operation process and returns to the ARM Setup page.
	Next Page. Switches between the Map page and the Rates page.
	Zoom In. Decreases the area displayed on the page (5 zoom levels).
	Zoom Out. Increases the area displayed on the page view (5 zoom levels).
	Full Screen. The entire Map page is replaced by the map view. Used to view more vehicle trajectory. Press any key to return to normal page view.
	Partial Screen. Once the Full Screen softkey is pressed, the softkey changes to Partial Screen. When pressed, the display area will contain the map view and the mapping softkey column once again.
	North Up View. Ensures North consistently remains at the top of the page view. Once pressed, this softkey changes to the COG View softkey.
	Course on Ground (COG) View. Ensures the vehicle's heading (course) is pointing to the top of the page view. When pressed, this softkey changes to the North Up View softkey.
	Center Vehicle. Centers the vehicle on the map page.
	View Options. Prompts the operator to select the display of the applied area. Solid Pattern - Marks a solid path to indicate the applied area. Boom Pattern - Applies hash marks to indicate the boom width and applied area.
	Pan. Allows the operator to focus in on a specified area of the map without the necessity of traveling to the area to look for gaps in application.

(A)	Mark A. Used with Parallel and Curved A-B patterns. Pressed to mark the first point of the initial guideline. When pressed, changes to the Mark B softkey.
(B)	Mark B. Used with Parallel and Curved A-B patterns. Pressed to mark the end point of the initial guideline. When pressed, changes to the New Guideline softkey.
A-B	New GuideLine. Displayed after the initial guideline has been created. When pressed, changes to the Mark A softkey and guidance is disabled until a new guideline is created by pressing Mark A followed by Mark B.
	Switch Guideline. Displayed when more than one guideline has been created.
(A)+	A+ Shift A-B Guideline. Displayed when a guideline has been created. Use this button to shift the A-B line to the current vehicle position.
	Straight-Line Parallel Guidance. Indicates current guidance pattern is straight-line parallel. Initial guideline is defined by marking Points A and B. When pressed, launches menu to select different guidance mode (e.g., Headland, Circle Pivot).
	Curved A-B Guidance. Indicates current guidance pattern is Curved A-B. The initial guideline is defined by marking Points A and B. When pressed, launches a menu to select a different guidance mode (e.g., Headland, Circle Pivot).
	Headland Guidance. Indicates the current guidance pattern is Headland mode. When pressed, launches a menu to allow the selection of a different guidance mode such as Straight-line or Circle Pivot.
	Ignore Headland Guidance. When pressed, data identified using the Headland On and Headland Off softkeys are excluded from vehicle guidance.
	Headland On. When pressed, any applied data collected is considered part of the field headland.
	Headland Off. When pressed, any applied data collected is not considered part of the field headland.
	Circle Pivot Guidance. Indicates the current guidance pattern is Circle Pivot. The initial guideline is defined by marking Points A and B along a circle. When pressed, launches a menu to allow the selection of a different guidance mode such as Headland or Straight-Line.
(A)	Circle Mark A. Used with the Circle Pivot pattern. Pressed to mark the first end point of the initial circle guideline. When pressed, changes to Circle Mark B.
(B)	Circle Mark B. Used with the Circle Pivot pattern. Pressed to mark the end point of the initial circle guideline. When pressed, changes to New Circle Guideline.
(B)	Circle Mark B Wait. Appears when Circle Mark A has been pressed and the software is collecting enough points (approximately 12 seconds) to describe a circle. After approximately 12 seconds, this is replaced by the Circle Mark B softkey.
	Switch Circle Guideline. Appears when the guidance mode is Circle Pivot and there is more than one circle guideline created. Allows the selection of a different existing circle guideline.
	Map Field Boundary Off. When displayed, the field boundary is not being mapped. When pressed, changes to Map Field Boundary On.
	Map Field Boundary On. When displayed, the field boundary is being mapped and stored to a file. When pressed, changes to Map Field Boundary Off.

●	Point. Point map object. When pressed, a point is placed at the vehicle location.
⚠	Hazard. Hazard map object. When pressed, a hazard is placed at the vehicle location.
🛞✋	Engages FieldPilot. For FieldPilot to engage, the GPS antenna must be within 1/3 of the boom width from the established guideline.
🛞	Displays to show that FieldPilot is engaged. If pressed, FieldPilot will disengage. If the machine is equipped with the optional steering wheel sensor and the steering wheel is turned while FieldPilot is engaged, FieldPilot will automatically disengage and manual steering will be required.

Solid and Boom Patterns

Applied areas can be viewed as solid painted areas or as hash marks that represent the spray boom. The solid pattern is used to assist in locating skipped areas of application. The hash marks (boom pattern) is used to show overlaps. To switch from one view to the other, press the *View Options* softkey. Use the *Arrow* keys to toggle between Solid and Boom patterns. Press the *Enter* button to accept the selection.

View Options softkey

Arrow keys

Enter button

Figure 4-9: Solid and Boom Patterns
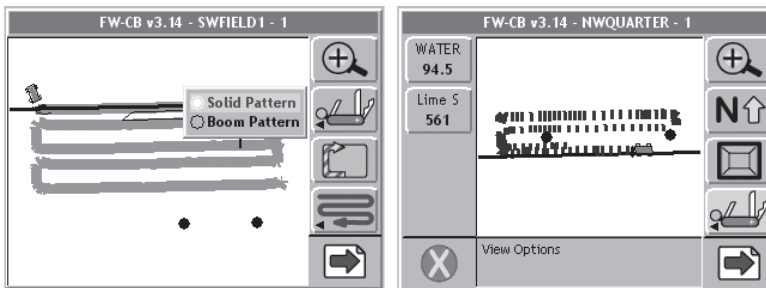
SYSTEM, WARNING, AND ERROR MESSAGES

Fieldware for the Legacy 6000 provides feedback in the form of system messages, warnings, and error messages. This sample information is displayed in the banner bar of the affected page. In addition, some messages are displayed on the lightbar (refer to CHAPTER 4 - LIGHTBAR INDEX for additional information).

System Messages

System messages do not obstruct operation. The most common system messages are "system ready" messages that occur when the system is operating properly.

Figure 4-10: System Message

Indicates what is occurring during normal system operation
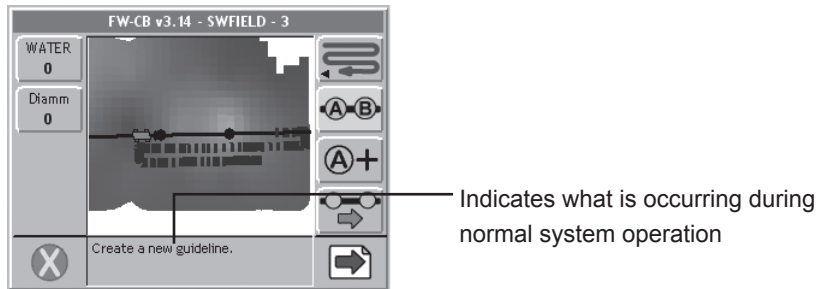
Warning Messages

Alarm Silence softkey (F10)

Warning messages do not obstruct operation (e.g., product application rates, speed). An alarm will sound when a warning message is displayed. The alarm can be muted by pressing the *Alarm* Silence softkey. The warning message will remain until the situation is resolved. The alarm will not sound again unless a new warning is issued (for example, low bin or pressure if these are monitored).

Figure 4-11: Warning Message

Warning Message
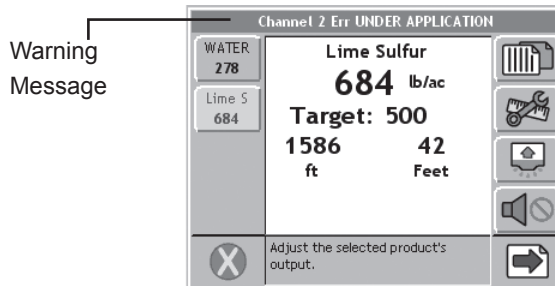
Error Messages

Error messages halt operations until resolution. An alarm will sound and an error message will be displayed until the operator responds (typically acknowledgement of the error or Master Off).

Figure 4-12: Error Message
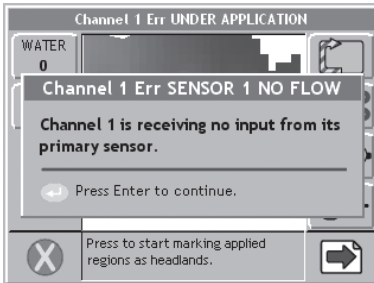
Figure 4-13: Corrected Error Message
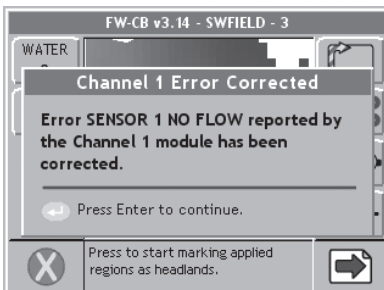
VEHICLE GUIDANCE

Fieldware allows product application and vehicle guidance to be performed simultaneously.

A DGPS or GPS (autonomous) receiver should be connected to the Legacy 6000 console and should be running properly. It is beneficial to verify that the DGPS or GPS receiver is running and communicating with the console prior to travelling to the field. Verify that the receiver is working properly by running the system diagnostic as described in CHAPTER 5 - GPS RECEIVER.

![TeeJet Technologies logo]

ARM Bullseye
softkey (F6)

If an external rate controller is being used, that controller should be connected to the appropriate COM port (Port 2) on the console and should be running properly. Vehicle guidance is enabled once the *ARM Bullseye* softkey is pressed. The initial guidance pattern is set to Headland mode. It is possible to switch between any of the five guidance modes (Straight-Line, Curved A-B, Headland, Ignore Headland, and Circle-Pivot) at any time during operation. **THIS IS NOT AN OPTION IF THE LIGHTBAR IS TURNED OFF.**

Figure 4-14: Guidance Pattern Selection

Guidance Pattern softkey

available guidance patterns
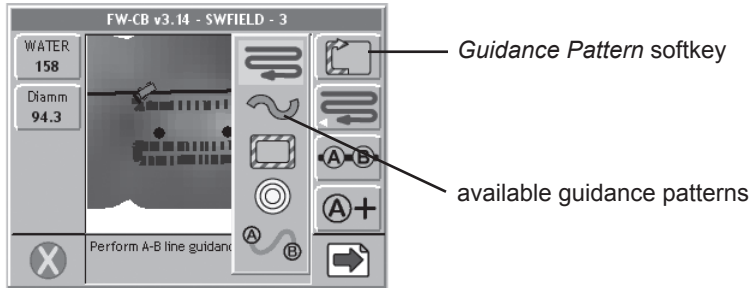
Changing Guidance Patterns

Guidance Pattern softkey

To change from one guidance pattern to another during operation, press the *Guidance Pattern* softkey (the softkey will display the current pattern selection). Pressing the softkey will launch a sub-menu which will display the other guidance patterns available. To select another pattern, highlight it using the *Arrow* keys and press the *Enter* button. The guidance pattern will change to the selected pattern.

Arrow keys

Enter button

Straight-Line A-B Guidance

Straight-Line Guidance provides guidance along straight lines based on an initial A-B reference line. The initial step is to establish the A-B guideline. This A-B guideline is used to calculate all other parallel guidelines.

Mark A

Mark A softkey

To mark the initial Point A, drive along the first swath path. Typically this is the straight edge of a field boundary. While the vehicle is moving along the initial swath, the lightbar will display "MARK A". The message will be displayed until Mark A is

established. To establish Mark A, press the *Mark A* softkey. Once pressed, the Mark A softkey will automatically change to the *Mark B* softkey. The lightbar will display "MARK B".

Mark B

To establish Point B, press the *Mark B* softkey and Point B will be displayed on the *Map* page. The initial swath baseline has been established. The lightbar will begin displaying the user-defined messages selected during the setup process. A new A-B line can be created by pressing the *New Guideline* softkey and repeating the process. Typically, Points A and B are marked at opposite ends of the field.

Mark B softkey

New Guideline softkey

Figure 4-15: Established A-B Line
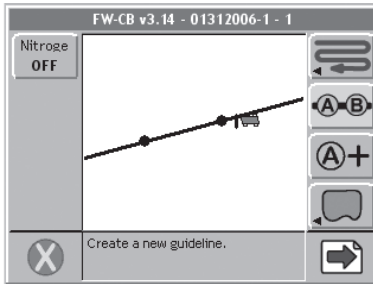
When navigating a turn at the end of the field, the lightbar will display the distance to the next swath.

Figure 4-16: Example of Turn
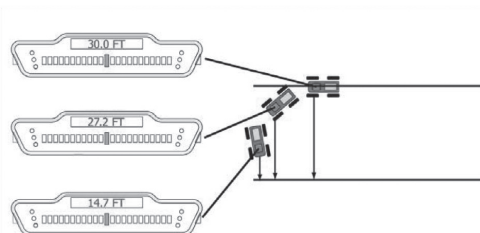
Curved A-B Guidance

Curved A-B Guidance provides guidance along curved lines based on an initial A-B reference line. The first step is to establish the initial A-B guideline. This initial baseline is used to calculate all other guidelines.

Mark A

Mark A softkey

Mark B softkey

New Guideline softkey

To mark the initial Point A, drive along the first swath path. Typically this is the chosen curve of the field. While the vehicle is moving along the initial swath, the lightbar will display "MARK A". The message will be displayed until Mark A is established. To establish Mark A, press the *Mark A* softkey. Once pressed, the Mark A softkey will automatically change to the *Mark B* softkey. The lightbar will display "MARK B".

Mark B

To establish Point B, press the *Mark B* softkey. The initial swath baseline has been established. The lightbar will begin displaying the user-defined messages selected during the setup process. A new A-B line can be created by pressing the *New Guideline* softkey and repeating the process.

Figure 4-17: Curved A-B Line
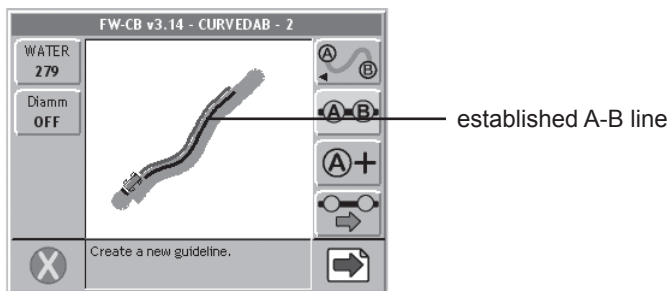
established A-B line
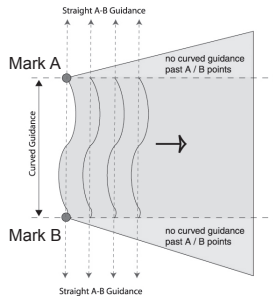
The Guidance pattern outside of the established A-B points will be straight line guidance. This is the reason for starting on the longest curve of the field.

Headland Guidance

Headland Guidance is used when the operator completes several circuits around the field and wants to be guided around all circuits afterward (last pass guidance). Once several circuits have been completed, the operator has the choice of switching back to Straight-Line Guidance.

Figure 4-19: Headland Guidance
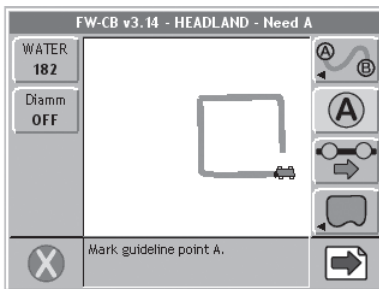
While using Headland Guidance, the operator has the option to Mark A and B Points for Straight-Line Guidance (if the operator chooses to use this as a "fill method" for the field located inside the Headland later). It is always best to mark the A and B points for the Straight-Line Guidance while traveling the straight edge of a field. Points A and B are only required for Straight-Line Guidance if it is to be used for future application (Headland Guidance does not require an A-B line). The operator will remain in Headland Guidance until the pattern is changed by pressing the *Guidance Pattern* softkey.

Guidance Pattern softkey

Mark A

Mark A softkey

To mark Point A, drive along the desired path. Typically this is the longest edge of a field. To establish Mark A, press the *Mark A* softkey. Once pressed, the *Mark A* softkey will automatically change to the *Mark B* softkey.

Mark B softkey

Mark B

Point B will be displayed on the lightbar. To establish Mark B, press the *Mark B* softkey. An A/B line has been established for later use.

Figure 4-20: Marking Points A and B During Headland Guidance
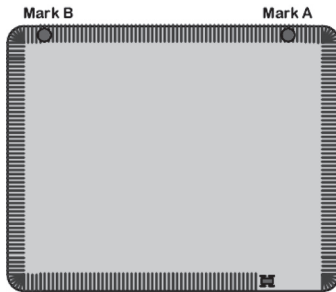
Switching from Headland to Straight-Line A-B Guidance

Guidance Pattern softkey

Once the operator has completed the desired number of headland circuits, guidance can be switched to Straight-Line to apply the remainder of the field if desired. Press the *Guidance Pattern* softkey and select *Straight-Line Guidance*. If the operator is being guided along a curved path when the pattern is switched, the lightbar will no longer provide guidance information.

Straight-Line Guidance softkey

If Points A and B were marked while in Headland Guidance, the system will automatically guide the vehicle along the closest parallel line as soon as the operator switches to Straight-Line Guidance. If Points A and B were not marked during Headland Guidance, the operator must mark them at this time. The lightbar will display "MARK A", indicating that no initial A - B line exists.

Figure 4-21 illustrates a completed field. There are several areas of the field where the operator turned the spray off to avoid the over-application of previously applied areas.

Figure 4-21: Completed Field Application
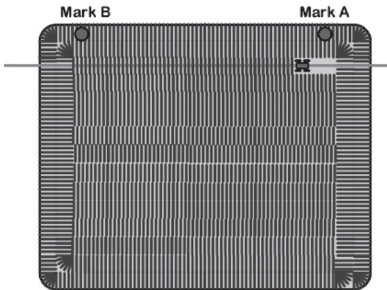
Ignore Headland Guidance

Ignore Headland Guidance allows the operator to apply the headlands and then ignore the headland data when applying the interior of the field. Using this option improves guidance to the start of the next pass. If Ignore Headland is not used, the lightbar may attempt to guide the system along the headland pass as the vehicle travels through it.

Figure 4-22: Ignore Headland Guidance

Ignore Headland Guidance Off

Ignore Headland Guidance On
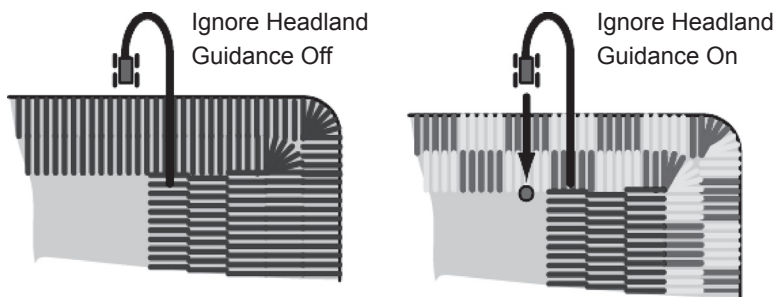
Table 4-3: Headland Guidance Softkeys

Softkey	Description
	Selects a guidance pattern (typically Headland).
	Headland On. Begins Headland application. Make as many headland passes as desired. The operator can establish a boundary map and Mark Points A and B during first pass application.
	Headland Off. When the last headland pass is complete, press this softkey. The operator then applies the first interior pass using the Headland pattern for guidance.
	Ignore Headland. Once the first interior pass is complete, switch from the current guidance pattern to the Ignore Headland pattern. Continue to apply the remainder of the field.

Ignore Headland softkey

To use Ignore Headland Guidance mode after the completion of the initial Headland passes, begin the application process for the interior of the field. Press the Ignore Headland button to initiate the Ignore Headland Guidance mode. This will indicate to the vehicle that headland passes exist so they won't be used for guidance purposes.

If the operator forgot to turn headland off after turning it on:

Headland Off softkey

- consider all sprayed passes so far as part of the headland
- complete the current pass
- press the *Headland Off* softkey
- make a pass guiding along the headland (last pass)
- switch to Ignore Headland mode
- continue making passes

If the operator forgot to mart the headland:

- complete the current pass
- press the Headland ON softkey and make another pass along the Headlands in the field.
- switch the guidance pattern to Ignore Headland mode and spray the remainder of the field.

Circle Pivot Guidance

Circle Pivot Guidance is used for product application in a center pivot field while being guided along a circular guideline that matches a center pivot irrigation system radius. Circle Pivot Guidance is similar to Straight-Line Guidance in that the operator marks Point A, travels along the arc that the pivot would create (a wheel track is a good guide), and then marks Point B. Once Point B is marked, a circular guideline will be displayed on the *Map* page. As the operator completes one circular pass and moves in either direction (left or right) to the next guideline, the system automatically creates the next circular guideline.

Figure 4-23: Circle Pivot Pattern

Mark A

To mark Point A, while driving along an existing wheel track, press the *Mark A* softkey. Once pressed, the *Mark A* softkey will automatically change to the *Mark B* softkey.

Mark A softkey

Figure 4-24: Marking A in Circle Pivot Pattern
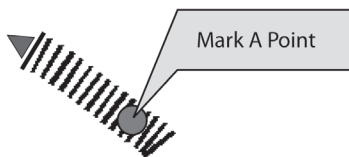
Mark B

Mark B softkey

To establish Point B, the operator should travel along the pivot circle until the circle is as detailed as possible. Fieldware does not allow the operator to mark Point B within 12 seconds of marking Point A. Once 12 seconds has passed, the *Mark B* softkey will become active and the operator can mark Point B by pressing the *Mark B* softkey.

*Figure 4-25: Marking B in Circle Pivot Pattern*
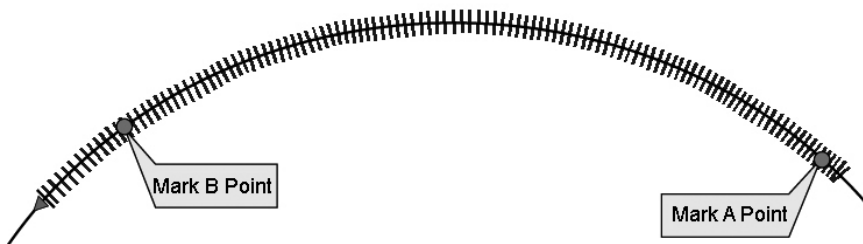
Circle Pivot Guidance Navigation

Once the points are established, the circle guideline will be displayed on the Map page and the lightbar will provide guidance instructions. It is not necessary to drive the entire circumference of the center pivot in order to initiate guidance. As illustrated in the following example, the operator travelled only a portion of the circumference, marking Points A and B, and then used the guideline to continue driving the remainder of the circle.

Circle Pivot Guidance works similarly to Straight-Line Guidance in that the software will automatically guide the vehicle based on the original swath guideline. When applying in Circle Pivot Guidance, the lightbar will display the curved path in the text display (top section of the lightbar). Cross track error information is conveyed via the cross track LEDs.

Figure 4-26: Circle Pivot Guidance

completing headland circuit

continued operation

guidance along headland

completed field
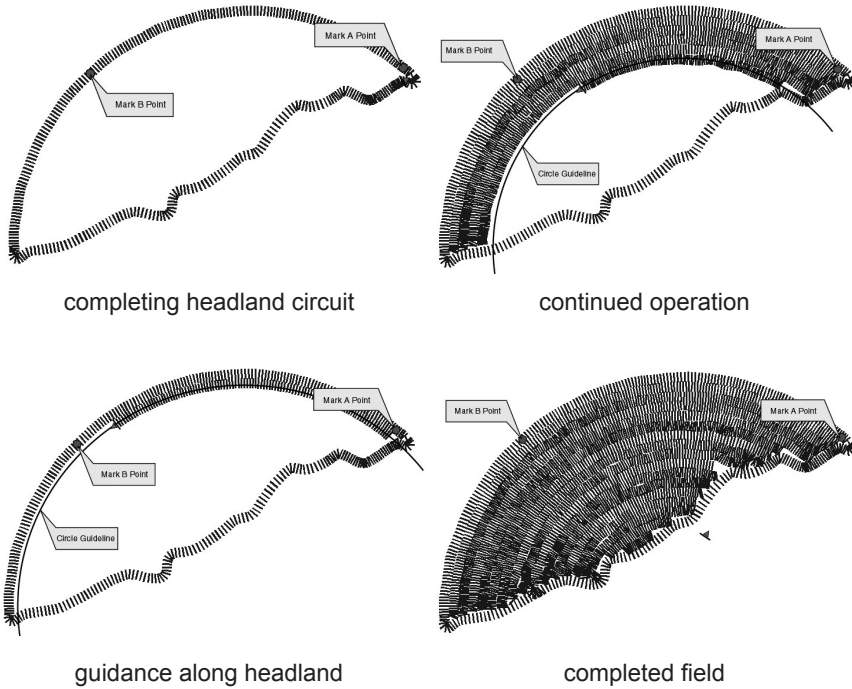
FIELDPILOT

System Setup softkey

FieldPilot Setup softkey

FieldPilot is TeeJet Technologies' assisted steering system that also includes optional product control and Swath Manager. FieldPilot relies on positioning from a DGPS receiver and provides autosteer capabilities for precision application and control. A DGPS system must be installed in order to use FieldPilot. FieldPilot Setup is accessed by pressing the *System Setup* softkey on the *Launcher* page, followed by the *FieldPilot Setup* softkey. Setting adjustments include lookahead, aggressiveness, sensitivity, and disengage distance.

Figure 4-27: FieldPilot Access
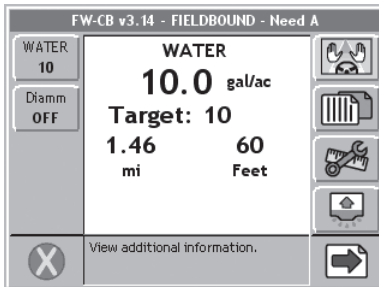
Table 4-4: FieldPilot Settings

Apply Settings softkey

Restore Settings softkey

Setting	Description
Lookahead	Increase if the vehicle is oscillating; decrease if the vehicle is having trouble getting online.
Aggressiveness	Increase to sharpen steering if vehicle consistently tracks outside of curves. Decrease to loosen steering if vehicle consistently tracks inside of curves.
Sensitivity	Decrease if the steering is choppy or too responsive.
Disengage Distance	Distance from guideline when FieldPilot automatically disengages after being online.
Apply Settings	Applies and saves new settings.
Restore Settings	Restores settings to factory default.

The *Engage/Disengage* buttons are used to activate and deactivate the FieldPilot system. A foot switch is available to engage and disengage FieldPilot with ease.

	Engage FieldPilot. Engages FieldPilot. For FieldPilot to engage, the GPS antenna must be within 1/3 of the boom width from the established guideline.
	Disengage FieldPilot. Shows that FieldPilot is engaged. When pressed, FieldPilot will disengage. If the steering wheel is turned while FieldPilot is engaged, FieldPilot will automatically disengage and manual steering will be needed if steering sensor is installed properly.

LIGHTBAR

Curved Guidance

The lightbar displays graphics to assist the operator when navigating along curved swaths. The X-Track LED method used during Straight-Line Guidance is also used during Curved Guidance.

The projected swath path is displayed in the graphics area of the lightbar. The projected path is comprised of four horizontal bars. The bottom bar indicates the nearest proximity to the vehicle; the top bar indicates the furthest away. The width of the bars decrease as the distance from the vehicle increases to add perspective to the view. The projected distance of the first bar from the front of the vehicle is based on vehicle speed. A straight lightbar display indicates that there are no turns approaching. A skewed lightbar display indicates that a turn is approaching in the direction the bars are skewed. The X-Track LEDs indicate the vehicle's position in relation to the guideline configured during Swath mode. The X-Track LEDs do not provide information relating to the curved path ahead of the vehicle; they simply indicate the vehicle's location in regard to the established guideline.
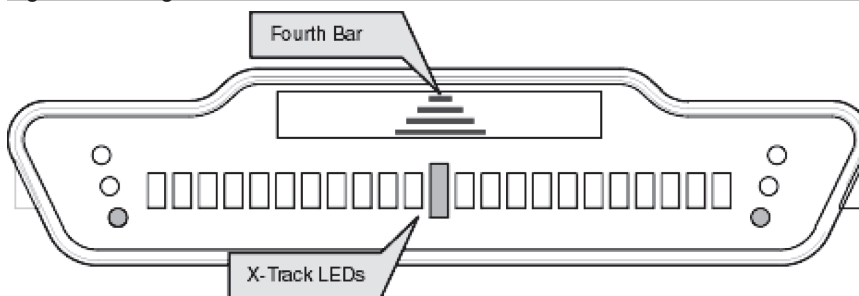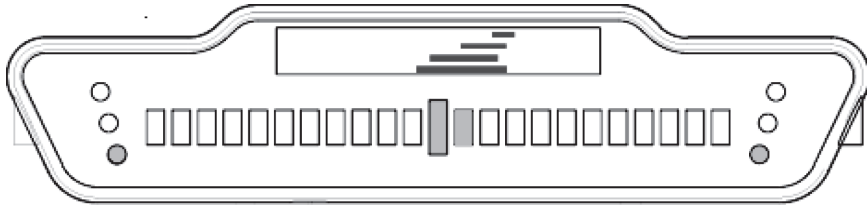
Figure 4-28: Lightbar Curved Guidance

Figure 4-29: Right-hand Approaching/Vehicle Tracking Slightly Right of Guideline (Swath Mode)

Applied Area Detection

Fieldware detects when the vehicle has entered a previously-applied area and can also be configured to notify the operator when approaching a previously marked hazard. To use applied area detection, the "Lightbar Setup - Alarm" menu field must be configured prior to starting guidance. Refer to CHAPTER 2 - LIGHTBAR SETUP for additional information.

Previously Applied Area Detection

As a vehicle enters a previously applied area, the lightbar will display the message "APPLIED" and the red stoplights will illuminate. If the vehicle continues product application while driving in the applied area, the console alarm will sound. If product application is terminated while in the applied area, the alarm will not sound. Once the vehicle exits the previously-applied area, the red stoplights will turn off or change to green once product application is resumed. The green illuminated stoplight indicates that the vehicle is completely outside an applied area and product application can commence.

Figure 4-30: Applied Area Detection

Neighboring Swath Detection

Applied area detection does not notify the operator if the vehicle crosses into a previously-applied neighboring swath or overlaps up to 25% of the swath width. When the edge of the vehicle swath overlaps 25% or more into a neighboring swath, the lightbar will display "APPLIED" and the red stoplights illuminate.The alarm will sound only if product application continues. No yellow warning lights occur in this situation.

Figure 4-31: Neighboring Swath Detection
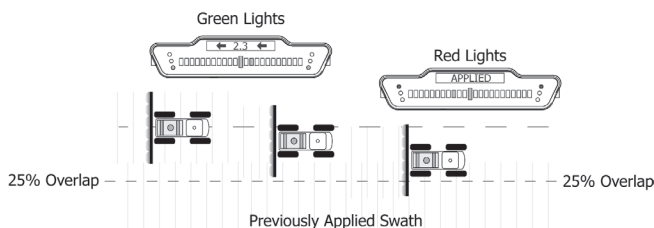
MAPPING FIELD BOUNDARIES

Fieldware for the Legacy 6000 allows the creation of field boundaries during product application. Field boundaries can be created during all five guidance options: Straight-Line, Curved, Headland, Ignore Headland, and Circle Pivot. Field boundary data is stored in a file automatically named during ARM Setup (refer to CHAPTER 3 - ARM SETUP for additional information).

During product application, the *Map Boundary* softkey is available on the *Map* page. To start mapping a field boundary, align the edge of the vehicle swath with the edge of the field boundary and press the *Map Boundary* softkey. Select which side of the swath will be used to trace the field boundary. Operators are given the choice of creating an outer boundary or of creating an inner boundary within an outer boundary. Multiple inner and outer boundaries can be created in the same job and boundary file. When the vehicle begins to move, a line representing the field boundary will be drawn at the end of the swath. Once the boundary mapping process begins, the lightbar will display "MAP BND" as well as an arrow indicating which side of the vehicle is being used to create the boundary. Product is typically applied and the initial guideline established while driving the field perimeter.
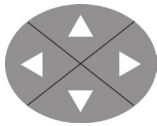
Map Boundary softkey

Figure 4-32: Establishing A Field Boundary
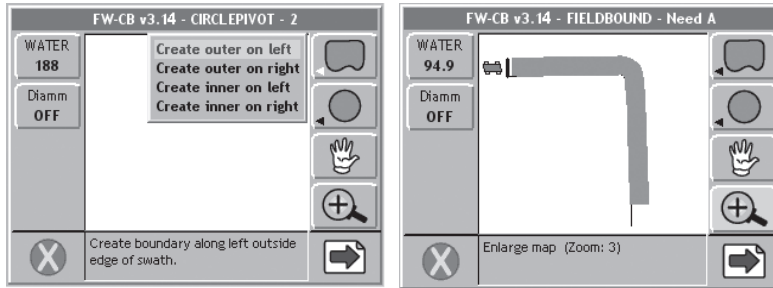

Close/Pause Boundary Map Process

Map Boundary softkey

Arrow keys

To close or pause the map boundary process, press the *Map Boundary* softkey. A menu will be displayed with the choices "Close" or "Off". Select "Close" to end the map boundary process. This will draw a line between the starting point and the vehicle location where the boundary was closed. Select "Off" to allow boundary mapping to be temporarily stopped. To begin boundary mapping again, press the *Map Boundary* softkey and select *Create on Right* or *Create on Left* with the *Arrow* keys. This will begin the mapping process again and will draw a line between where the mapping stopped and where it started again.

Figure 4-33: Map Boundary Process
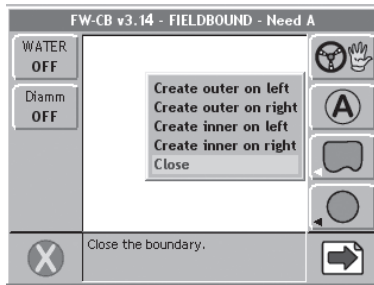
MAPPING POINTS AND HAZARDS

Mapping points and hazards during product application is another feature of Fieldware for the Legacy 6000.

Points Mapping

Points mapping allows a point to be marked at the vehicle location (must have a .GMF file name established). To map a point, navigate the vehicle to the location of the object or feature to be mapped. Press the *Point* softkey to launch a menu that includes the point and hazard symbols. Select the *Point* symbol to map a point. Press the *Enter* button and the *Naming Dialog* screen will be displayed. Enter the name of the point using the *Arrow* keys and press the *Enter* button to accept the point name and return to the *Map* page.

The Point Name screen will retain the 10 most recent entries. To select a recent entry, scroll through the dialog window using the *Arrow* keys and select the desired point name. To add a new name, press the *New Name* softkey. A name input dialog will launch that will allow a new name to be entered using the *Arrow* keys. Press the *Enter* button to save the new name.

Point softkey

Enter button

Arrow keys

New Name softkey

Figure 4-34: Mapping and Naming Points
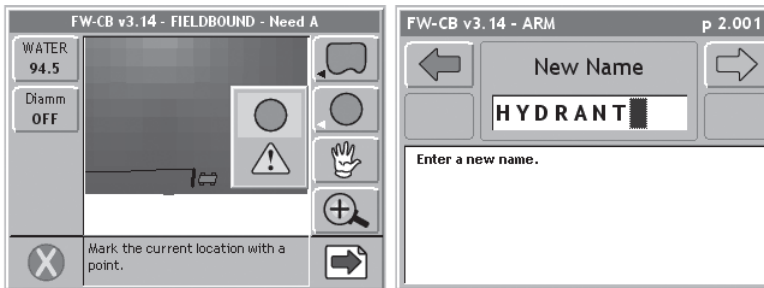
Hazard Mapping

Hazard mapping allows hazards to be mapped at the vehicle location (must have a .GMF file name established). The hazard mapping feature can be used to notify the operator of potentially hazardous objects or features within the field.

Hazard symbol

To map a hazard, navigate to the location of the object or feature to be mapped. Press the *Point* softkey to launch a menu that includes the point and hazard symbols. Select the *Hazard* symbol to map a hazard. Press the *Enter* button and the Naming Dialog screen will be displayed. Enter the name of the hazard using the *Arrow* keys and press the *Enter* button to accept the hazard name and return to the *Map* page.

Arrow keys

The *Hazard Name* screen will retain the 10 most recent entries. To select a recent entry, scroll through the dialog window using the *Arrow* keys and select the desired hazard name. To add a new name, press the *New Name* softkey. A name input dialog will launch that will allow a new name to be entered using the *Arrow* keys. Press the *Enter* button to save the new name.

New Name softkey

Enter button

Figure 4-35: Mapping and Naming Hazards
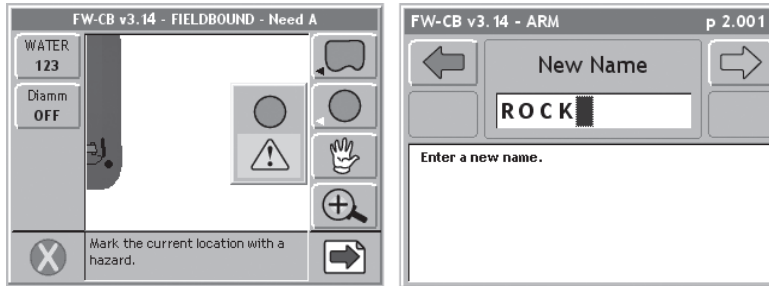
Object Name Files

Simple text files can be created for commonly used application files (e.g., "weeds"). For additional information about file names, refer to the Fieldware Tools/Map Manager User's Guide. Once names file are established, they can be loaded onto Legacy 6000 console memory. To load files, place the names in the /sys/names folder on the root of the PC Card. Go to System Tools - Device Manager. Select "Console" as the device and run "Update Console Using System Files Located On The PC Card". Select "Object Names" from the Update Files list. Press the Enter button to update the names files.

EXITING OPERATION

Exit softkey

Press the *Exit* softkey (located on the bottom left corner of the screen) to exit OPERATIONS. If data is being stored to the PC Card, the exit process may take a few minutes.

SHAPE FILES

The 3.14 software release for the Legacy 6000 allows for the generation of shape files. Shape files are useful tools as many of TeeJet's customers use third party GIS software to plot, store, and analyze data collected by TeeJet products. To remain compatible, 3.14 software now allows for the generation of shape files in the standard formats of .SHP, .SHX, .DBF, and .PRJ.

To enable shape file generation, select the *System Setup* softkey followed by the *Console Setup* softkey. Use the *Arrow* keys to scroll down to "Shapefile" and press the *Enter* button. The following selections are available:

- No - no shape files will be generated at the end of the job, only RCD files are stored.
- Yes - shape files and RCD files are generated.
- Prompt - the user determines if shape files are generated before exiting the job.

Shape files are generated at the end of each job. If a job is being resumed, new data is appended to the end of the old shape files.

Figure 4-36: Shape Files

System Setup
softkey (F1)

Console Setup
softkey

Arrow keys

Enter button
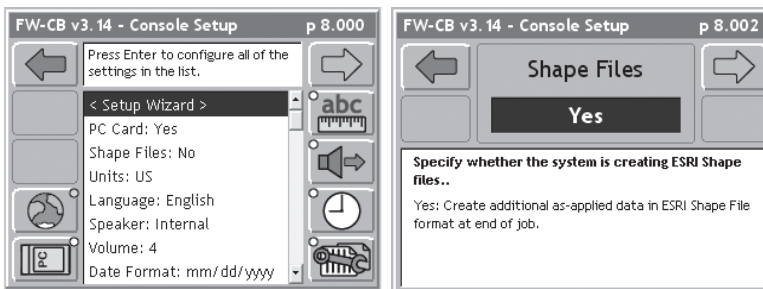
FIELDWARE MAP MANAGER

Some Legacy 6000 system kits include Fieldware Tools for an office computer or laptop. Fieldware Map Manager Tools can be used to view applications as "as-applied" or "where applied" maps. Figure 4-37 illustrates an "as-applied" map (.RCD) and field boundary (.BND) in the *Map Manager* view. To view "as-applied" or "where applied" maps, copy the job folders from the PC Card to C:/FW/Data/. Review 98-05048 Fieldware Tools User Guide for information on generating application reports from the data.

Figure 4-37: As-Applied Data Viewed in Map Manager
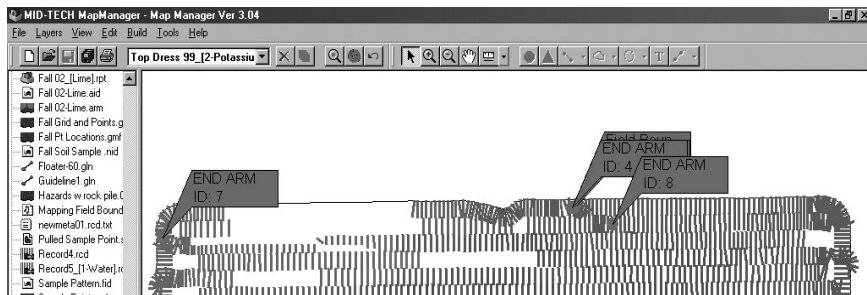
LIGHTBAR INDEX

The Swath XL Lightbar is capable of displaying a considerable amount of information. This information can be represented as text in the display window, illuminated lights on the stoplights, cross track LEDs, or a combination of text and lights. Information displayed on the lightbar depends on both user-defined settings and system warnings not controlled by the user. Table 4-5 describes each possible lightbar scenario and information that could be displayed.

Figure 4-38: Swath XL Lightbar

eight-character text display window

SWATH XL

red
yellow
green

cross track error LEDs

warning
stoplights
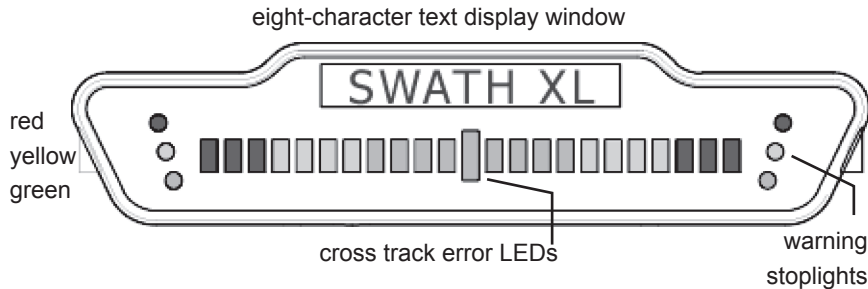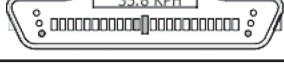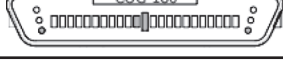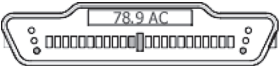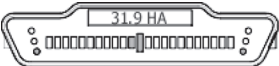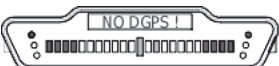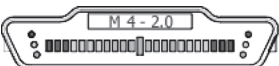
Table 4-5: Swath XL Lightbar Index

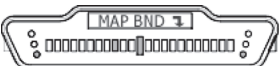| Setting	Description
MARK A	Mark A Displayed when establishing Point A of an initial guideline.
MARK B	Mark B Displayed when establishing Point B of an initial guideline.
R #3	Swath # A user-selected message. Indicates the distance left or right of the initial guideline.
→|←	X-Track A user-defined message. This message is displayed when the vehicle is on the guideline and there is no error.
← 2.3 ←	X-Track Error A user-defined message indicating the operator is off track and needs to adjust guidance to the left 2.3 ft. (assuming the system is set to US and lightbar is set to Swath mode.)
H 1.5 →	Vehicle Heading Error A user-defined message indicating the error between vehicle heading and the guideline in degrees. The arrow indicates steering direction.
22.4 MPH	Ground Speed A user-defined message indicating the vehicle speed in miles per hour (MPH). System unit is set to US.
35.8 KPH	Ground Speed A user-defined message indicating vehicle speed in kilometers per hour (KPH). System unit is set to Metric.
COG 180	Course on Ground (COG) A user-defined message indicating the vehicle's heading in degrees 0 to 359. The vehicle's course on ground is due South (180 degrees).

78.9 AC	Area Applied A user-defined message indicating the current amount of area applied in acres. System unit set to US.
31.9 HA	Area Applied A user-defined message indicating the amount of area applied in Hectares. System unit set to Metric.
APPLIED	Applied Area Detection This message is displayed when the vehicle is in a previously applied area. The red stoplights are illuminated and an alarm will sound.
(Curved guidance graphic)	Curved Guidance Information Graphics. The four horizontal bars represent a perspective view of the swath ahead of the vehicle. The bars skew left or right to represent a curved path ahead.
HAZARD	Hazard Detection The name of the hazard is displayed when the vehicle is approaching an existing hazard. The yellow stoplights are illuminated indicating an initial warning.
HAZARD	Hazard Detection The name of the hazard is displayed when the vehicle is approaching an existing hazard. The Red stop lights are illuminated indicating the final warning.
↲ MAP BND	Mapping Boundary This message is displayed when the user is mapping a field boundary. The arrow symbol indicates the field boundary is on the left side of the vehicle.
MAP BND ↳	Mapping Boundary This message is displayed when the user is mapping a field boundary. The arrow symbol indicates the field boundary is on the right side of the vehicle.
NO DGPS !	System Warning The message is displayed when there is loss of GPS differential corrections. Guidance calculations are stopped until differential corrections resume. GPS type is set to DGPS.
NO GPS	System Warning This message is displayed when there is a complete loss of GPS signal to the GPS receiver. Guidance calculations are stopped until DGPS signal resumes. GPS type is set to DGPS.
M 4 - 2.0	Lightbar Version Message This message is displayed when the user runs the Lightbar Test. M 4 indicates lightbar model and 2.0 indicates lightbar protocol version number. This number varies based on lightbar version and model.

CHAPTER 5 - SYSTEM TOOLS

System Tools allows basic system diagnostics to be performed. The *System Tools* page is accessed from the *Launcher* page by pressing the *System Devices* soft-key.

System Devices
softkey (F2)

Figure 5-1: System Tools Access
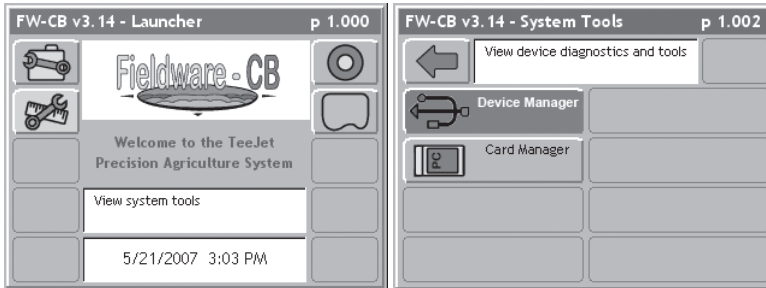
Table 5-1: System Tools

Settings	Description
Device Manager	Allows viewing of all components including CAN Bus and GPS receiver.
Card Manager	Allows basic file manipulation. Runs in conjunction with the PC card. The Card must be inserted and turned on in Console Setup in order to run this application.

DEVICE MANAGER

Device Manager allows the viewing of all components connected to the Legacy 6000 system. In Fieldware the CAN Bus, Console, GPS Receiver, Lightbar, Channels, FieldPilot, and Swath Manager are available for diagnostics. Scroll through the connected devices by using the *Arrow* keys and review the current status of the devices by selecting the *Information* softkey. Detailed information is available about each device.

Arrow keys

Information
softkey

Arrow keys

Enter button

Console

The Console Information page is accessed by using the *Arrow* keys to scroll to "Console" on the *Device Manager* page and pressing the *Enter* button. The *Console* page displays the serial number of the console, the version number of the software, and the applications loaded.

Table 5-2: Console Icons

Softkey	Description
	Backup Files. Backup the console's system files to the PC Card.
	Update Files. Update the console using system files located on the PC Card.
	Import Files. Imports files placed on the PC Card by Map Manager.
	Erase Files. Erases removable system files.

Backup Files

Legacy 6000 system files can be backed up to a PC Card. This will allow the system to be restored at a later date or transferred to another Legacy 6000 console as necessary. To backup console system files, a 20 Mb (or larger) ATA Flash PC Card is required.

CAUTION: Always ensure the console is powered off before inserting or removing a PC Card.

1. With the console powered OFF, insert a PC Card into the Legacy 6000 console.
2. Power the console ON.
3. From the *Launcher* page, select System Tools / Device Manager / Console / Backup Console System Files.
4. The message "Performing Console Backup" will be displayed.
5. When the backup operation is complete, exit to *Launcher*.

Restoring System Files

1. With the console powered OFF, insert the PC Card containing the system files in the Legacy 6000 console.
2. Power the console ON.
3. From the *Launcher* page select System Tools/Device Manager/Console/ Update Files.
4. The message "Update Files" will be displayed.
5. Select "ALL" or the desired entry and press the *Enter* button.
6. The message "Updating Console" will be displayed.
7. When the restoration is complete, exit to *Launcher*.

Enter button

Importing Files

Fieldware allows Object Name Files to be imported. An Object Name File is a simple text file that contains a list of Point and Hazard object names commonly used during product application and mapping. Using an Object Name File helps store, select, and name mapping objects during operation. File names can be named for specific tasks or themes, such as "Field Mapping" or "Weeds". It is possible to access Object Name Files when mapping Points or Hazards during the mapping process (refer to CHAPTER 4 - MAPPING POINTS AND HAZARDS).

Object name files are stored as ASCII text files (.txt). Files can be created in several editors, spreadsheets, and word processors. A single column of names typed into an Excel spreadsheet can be copied to the Windows clipboard and pasted into any database file. The versatility of the format makes it easy to move attributes information into the names database file format. It may be easier to type name attributes (one name per line) into a word processor or editor and save the file as a text file with the extension (.txt). Object name files can also be created in the Fieldware Map Manager software.

To load a names file into the L6K:

1. Copy the names file to a PC Card and place it in the /sys/names/folder. If the folder does not exist, create it prior to moving the names file.
2. Place the PC Card in the L6K console and power the unit ON.
3. From the *Launcher* page, select System Tools / Device Manager / Console.

Update Files softkey

Enter button

4. Press the *Update Files* softkey.
5. Select "Object Names" as the update file and press the *Enter* button. This will place the names file, located in the /Sys/Names folder into system memory.

Speedometer

Test Speed can be activated and set from the *Speedometer* page. Refer to CHAPTER 4 - TEST SPEED for additional information.

NOTE: *If test speed is activated, it will override the speed input when trying to apply during application.*
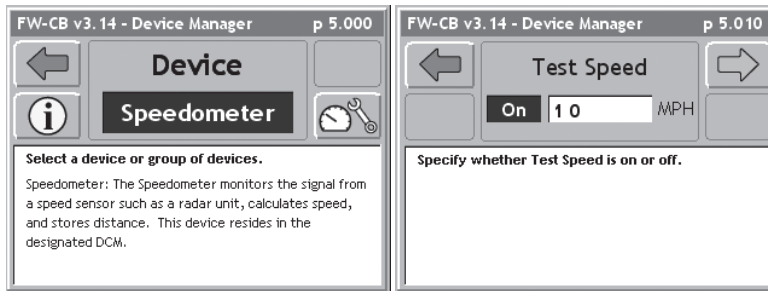
Figure 5-2: Speedometer Page

FW-CB v3.14 - Device Manager	p 5.000
← **Device**	
ⓘ **Speedometer**	⏱🔧

Select a device or group of devices.

Speedometer: The Speedometer monitors the signal from a speed sensor such as a radar unit, calculates speed, and stores distance. This device resides in the designated DCM.

FW-CB v3.14 - Device Manager	p 5.010
← **Test Speed**	→
On 1 0 MPH	

Specify whether Test Speed is on or off.

Table 5-3: Speedometer Settings

| Softkey	Description
ⓘ	Information. Displays general module information including serial number and software version.
🚩	Module Flags. System diagnostic tool that identifies the active functions.
🔧	Settings. Displays current configurations.
✉	Messages. Displays messages currently being sent by the module
⚠	Error Log. Displays the error log from this module.

Swath Manager LED Brightness

The LED brightness is adjusted by selecting the *Adjust LEDs* softkey on the *Device Manager* page with "Swath Manager" selected. Options range from 1 (low) through 8 (high).

Figure 5-3: Swath Manager LED Brightness
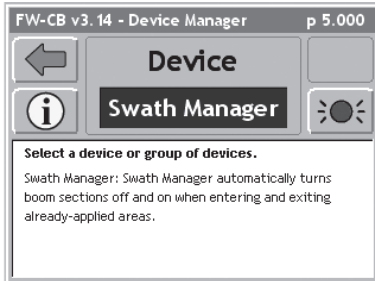
Diagnostic information regarding the system's CAN switchboxes, Switch Function Module or Swath Manager 5, and software versions is also available by selecting the *Information* softkey. The *Update Flash* softkey can be used to update firmware in the CAN modules. Do not use this function unless directed to do so by your TeeJet Technologies supplier or TeeJet Technologies Customer Service personnel.
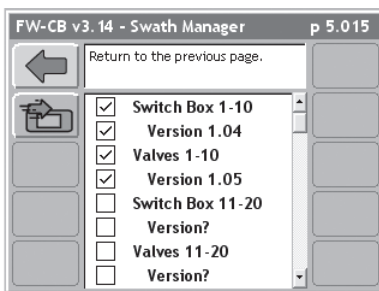
Information softkey

Update Flash softkey (F2)

Figure 5-4: Module Information

Channels

The status of each channel on the CAN Bus can be viewed under Device Manager - Channels. Each channel is assigned a Serial Number and an ID Number. One of the channels must be assigned as the base channel. The base channel will receive the ground speed input if provided by other than a GPS receiver.
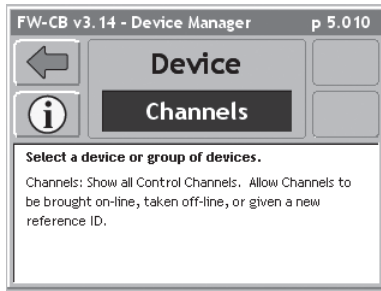
Figure 5-5: Channels Setup

Table 5-4: Channels Settings

Softkey	Description
	Module Reset. Resets all modules to factory default or each channel can be reset.
	Update Flash. Updates the module's flash. Software must be loaded on the PC Card for the module to be updated.
	Information. Displays general module information, serial numbers, and software version.

Channel Setup

Arrow keys

Enter button

When using a Dual Control Module (DCM), the operator has the ability to use two channels on each DCM connected to the CAN Bus. Each channel must be turned on (YES) and a unique ID number must be assigned if the channel will be used.
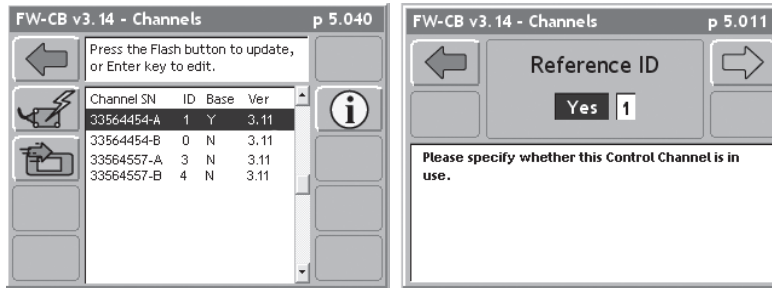
1. Highlight the desired channel in the center of the screen using the *Arrow* keys and press the *Enter* button.
2. Turn the channel on (YES) and set an ID number. Typically channel one will be set to ID 1.

Figure 5-6: Channel ON and Assigning ID

Press the _Forward Arrow_ softkey to advance to the _Base Channel_ page. One of the channels must be set as the base channel. This channel will handle the ground speed input. Use the _Arrow_ keys to toggle to the desired selection (YES/NO) and press the _Enter_ button to make the selection.
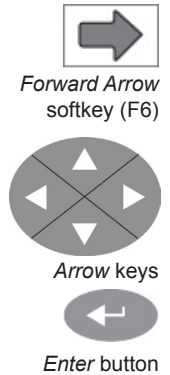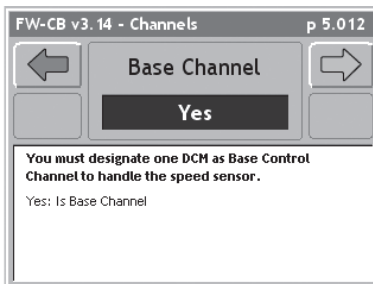
Figure 5-7: Setting the Base Channel

Press the _Forward Arrow_ softkey to advance to the _Reset_ page. Upon initial power-up it is recommended to reset the settings to factory default per channel. Use the _Arrow_ keys to toggle to the desired selection (YES/NO) and press the _Enter_ button to make the selection.

Forward Arrow
softkey (F6)

Arrow keys

Enter button

Figure 5-8: Reset CAN Bus To Factory Defaults
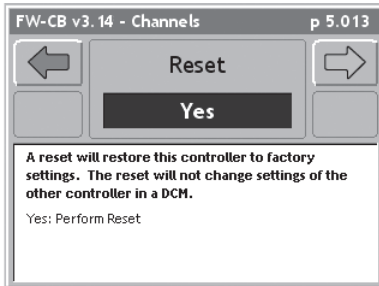
GPS Receiver

The GPS Receiver provides position information. This screen provides information about status, Serial Data, last position, and position rate information. It is recommended this diagnostic be run the first time the GPS receiver is connected to the Legacy 6000 console.

Figure 5-9: GPS Receiver Diagnostic Page
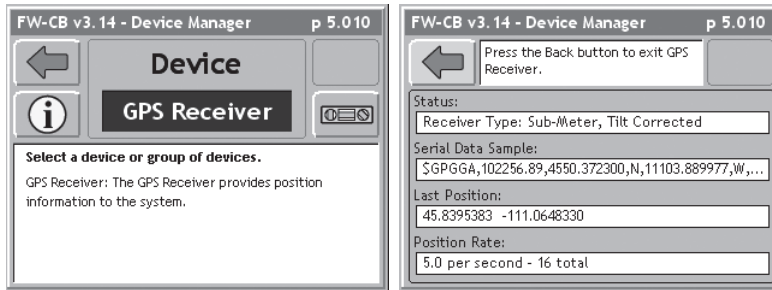
LightBar

Lightbar Test
softkey (F2)

The *Lightbar Information* page displays the lightbar version number. Press the *Lightbar Test* softkey to perform a test on the lightbar to ensure LED functionality and communications.

Figure 5-10: Lightbar Information
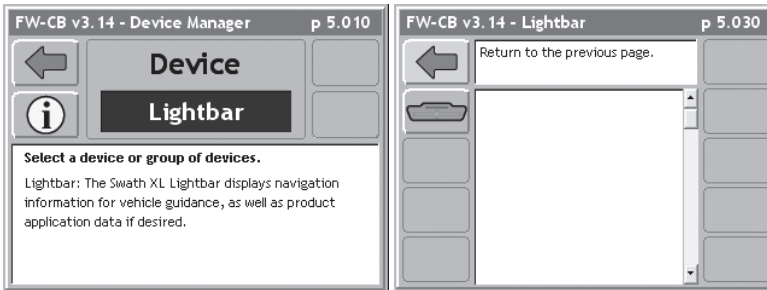
Channels 1,2,3....

Channels 1, 2, 3, etc. pages display general module information including module serial number and version number. Control Channel Diagnostics mode is entered or exited on this page by selecting the *Control Channel Diagnostics* softkey. **DO NOT USE THIS OPTION UNLESS UNDER THE DIRECTION OF TEEJET TECH-NOLOGIES STAFF.**
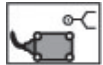
Control Channel Diagnostics softkey (F7)

Figure 5-11: Channel Information Page
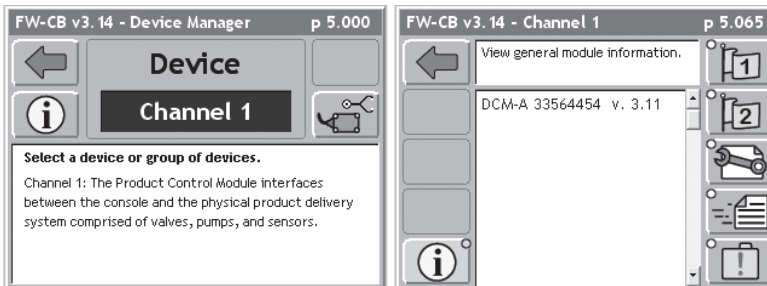
Table 5-5: Channel Softkeys

Softkey	Description
	Information. Displays module serial numbers and software version.
	Module Flag 1. System diagnostic tool that identifies the active functions on the DCM.
	Module Flag 2. System diagnostic tool that identifies the active functions on the DCM.
	Settings. Displays module's current configuration.
	Messages. Displays the messages currently being sent by the module.
	Error Log. Displays the error log from the module.

CARD MANAGER

Card Manager
softkey

Card Manager allows the operator to manage the contents of the PC Card. The PC card must be inserted into the console prior to using Card Manager. Card Manager is accessed by selecting the _Card Manager_ softkey on the _System Tools_ page. The PC Card must be set to "YES" in Console Setup for Card Manager to be accessed.

Figure 5-12: Card Manager
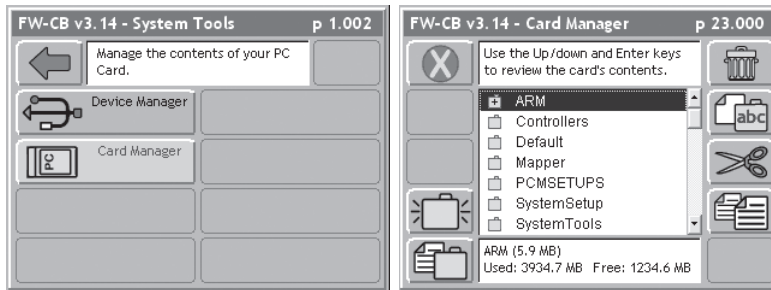
Table 5-6: Card Manager Softkeys

Softkey	Description
	Create New Folder. Creates a new folder on the PC Card.
	Close. Closes the current folder and move up one folder level.
	Properties. Displays information about the highlighted file or folder.
	Delete. Deletes the selected file or folder.
	Rename. Renames the selected file or folder.
	Cut. Cuts the selected file or folder to be moved to another location.
	Copy. Copies the selected file or folder to be moved to another location.
	Paste. Pastes the previously cut or copies file or folder to a new location.
	Exit. Exits the Card Manager application.

CHAPTER 6 - MAPPER

Mapping specific locations in a field is an important tool in precision agriculture. The mapper program allows the operator to map specific locations or more generalized areas of a field. Once a desired location is mapped, the operator can then return to that location at a later date or use the map as a background for future reference. The primary use of the mapper program is for mapping specific items such as boundaries, weed patches, insect infestation, wet areas, tile lines, tile risers, poles, rocks, holes, etc. The items mapped are stored as (.GMF) and (.BND) files on a PC Card that can be used as background files during product application. The mapper application is used without the lightbar. A PC Card must be inserted in the Legacy 6000.

To access the mapper application, select the *Mapper* softkey on the *Launcher* page. If the *Mapper* softkey is not displayed, the PC Card option in Console Setup is configured to "No". Refer to CHAPTER 2 - CONSOLE SETUP for additional information. Once the *Mapper* softkey has been selected, enter a Job name.

Mapper softkey
(F7)

Figure 6-1: Accessing Mapper
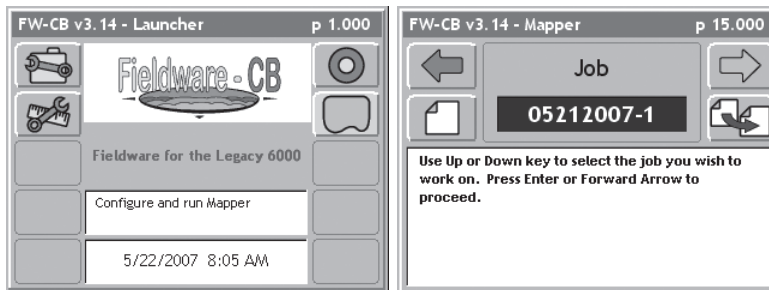
DATA SETUP

Pressing the *Mapper* softkey on the *Launcher* page will launch the *Job* page. When a Job is named, a folder is created on the PC Card labeled with the same name. All files related to that job (map file, background file, and base map file) are stored in the folder.

New Job Creation

New Job softkey (F2)

Copy Job softkey (F7)

Forward Arrow softkey (F6)

Arrow keys

Enter button

To create a new job, press the *New Job* softkey on the *Job* page. The *Job* page will be launched. A new job can be created based on the settings of an existing job. This is helpful when starting a new job but no settings need to be changed. Select the desired job to base the new job from and press the *Copy Job* softkey. Rename the job or auto name the job and press the *Forward Arrow* softkey. All settings from the previous job can now be viewed on the Mapper page.

To manually name a job, use the *Arrow* keys to enter the name of the job. Job names can contain alphanumeric characters. Once the desired name has been entered, press the *Forward Arrow* softkey to save the name and return to the Job page.

Existing Job Selection

To select an existing job, use the *Arrow* keys on the *Job* page until the appropriate job has been identified. An existing Job has an associated file folder located on the PC Card. The name of the job folder is the same as the job name. Press the *Enter* button to select the job.

Naming Jobs Automatically

Auto-Name softkey (F7)

The *Auto-Name* softkey provides another method for naming jobs. Pressing the *Auto-Name* softkey will name the job based on the current date, followed by the number that job is for the day. For instance, the first job on January 31, 2006 will automatically be named 01312006-1. The second job for the same day will be named 01312006-2.

Figure 6-2: Naming Jobs Automatically
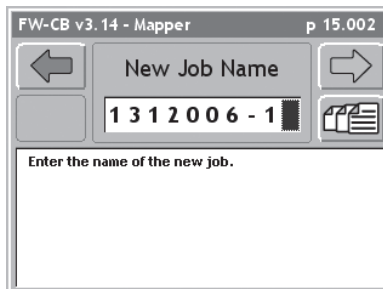
MAPPER SETUP AND MARKERS

Mapper Setup and Markers are two additional features offered in Mapper.

Table 6-1: Mapper Softkeys

Softkey	Description
	Setup. Used to name data files and set the data collection rate. The Map File must be named prior to starting the mapping process.
	Markers. Used to pre-define point and hazard objects. Commonly mapped objects are defined here.

Mapper Setup

Mapper Setup consists of four parameters including file names, importing background files, base map files, and collection interval time.

Figure 6-3: Mapper Setup
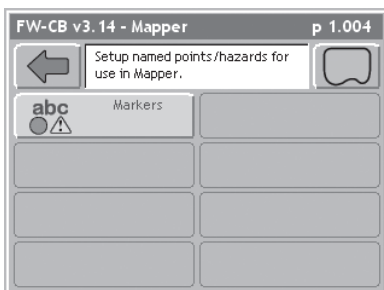
Table 6-2: Setup Options

Settings	Description
Map File	Same file name as the Job Name. The file name can be changed to better describe the application. All mapping functions (lines, points, hazards, and polygon) are stored in this file as .GMF and .BND on the PC Card.
Background File	Created prior to the mapper session. Transferred to the root directory of the PC Card (i.e., points or hazards mapped during product application such as rocks that the operator would like to return to pick up). File formats allowed are (.GMF and .BND).
Base Map File	Similar to Background files but .TIF. Downloaded from the Internet and placed on the root directory of the PC Card. Pictures with geo-referenced coordinates to provide location (e.g., elevation, roadway maps).
Collection Intervals	Frequency data is written to the PC Card. The selection can range from once per second to five times per second.

Markers

Markers allow the prenaming of commonly used points and hazards. These names will appear on the left side of the Map page.

Figure 6-4: Markers
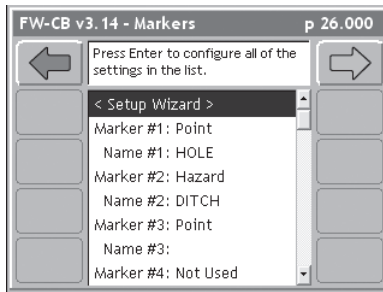
Table 6-3: Road Marker Parameters

Settings	Description
Marker #	The type of marker being defined (Point, Hazard, and Not Used).
Name #	The name of the marker defined above.

Entering Marker Names

Select Marker #1 and press the *Enter* button. Use the *Arrow* keys to select "Point" or "Hazard" and press the *Forward Arrow* softkey. Select Name #1 and enter the desired name. Press the *Enter* button to complete name entry.

Figure 6-5: Entering Road Marker Names
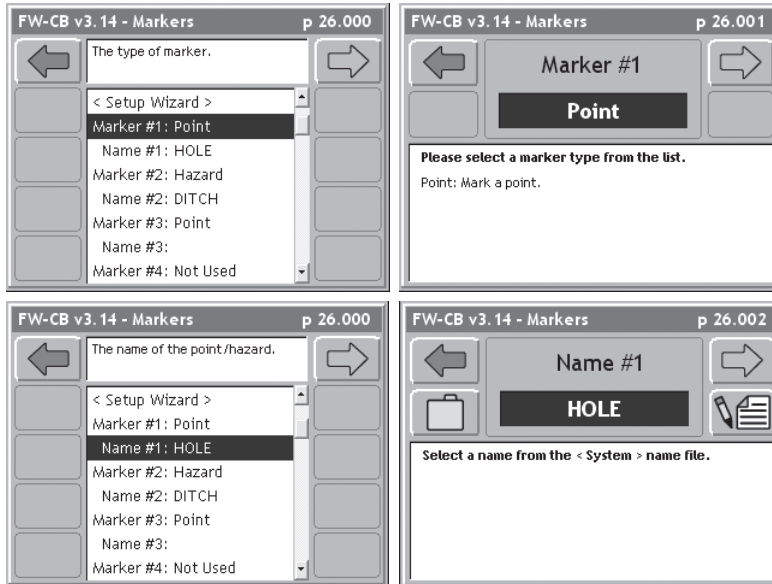
Enter button

Arrow keys

Forward Arrow softkey (F6)

Object Name Creation

Object names are created to identify objects that occur as obstacles or hazards. To enter new object names, press the *New Object* softkey. Enter the object name and press the *Forward Arrow* softkey to continue to the next page.

New Object softkey (F7)

Forward Arrow softkey (F6)

Figure 6-6: Creating New Objects

FW-CB v3.14 - Markers	p 26.002
Name #1
< No Name >
Select a name from the < System > name file.

FW-CB v3.14 - Markers	p 26.003
New Name
HOLE
Enter a new name.
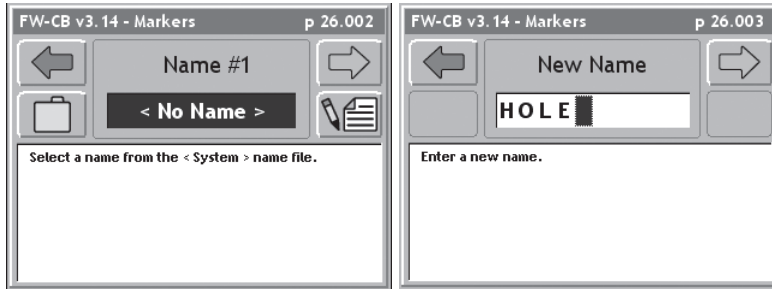
Object Names Folders

New File softkey
(F7)

A file folder option is available on the _Object Name_ page. Selecting the _New File_ softkey allows the operator to create a folder in which to store all related object names. For example, a folder can be created called "Field Tile". Within that folder the Object Names created will only pertain to "Field Tile" such as 4in, 5in, riser, main, etc.

Figure 6-7: Object Names Folder

FW-CB v3.14 - Markers	p 26.004
Name #2
< No Name >
Select a name from the < System > name file.

FW-CB v3.14 - Markers	p 26.006
Name File
< System >
Please select a name file from the list.
The system name file.

FW-CB v3.14 - Markers	p 26.007
Name File
FIELDTILE
Please enter the name file you wish to create.
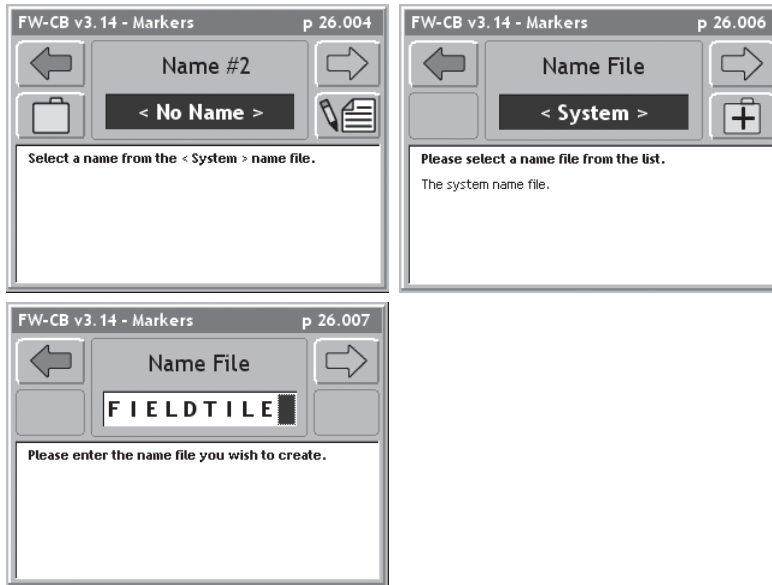
MAPPER APPLICATION

Once setup is complete, the Mapper application can be accessed. To access the map page, select the *Mapper* softkey on the main Setup page.

Mapper softkey

Figure 6-8: Launching Mapper Application

—————— *Mapper* softkey
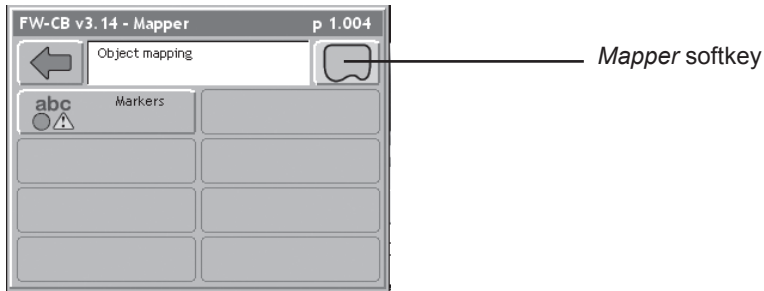
Map Page

The *Map* page is the first page the operator will view when entering the mapper application. The *Map* page displays the vehicle at its current location and trajectory. If a base or background map was previously loaded, it will be displayed in the background. Map softkeys are displayed on the right side of the screen. Established points and hazards are displayed on the left side of the screen. Additional keys are available by scrolling on the right side of the screen.

Figure 6-9: Map Page
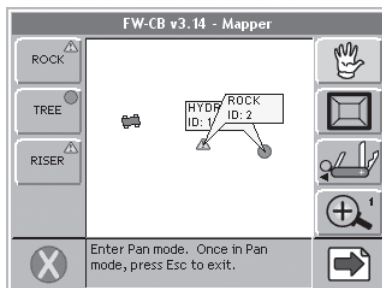
Table 6-4: Map Page Softkeys

Settings	Description
	Exit. Exits out of the mapper process and returns to the main menu.
	Next Page. Switches between the Map page and the Information page.
	Alarm Silence. Silences an alarm.
	System Devices. Allows the operator to monitor the devices in use without exiting out of the Mapper pages.
	View Options. Opens an Options menu.
	Zoom In. Decreases the area displayed on the page (5 zoom levels).
	Zoom Out. Increases the area displayed on the page (5 zoom levels).
	Full Screen. The entire Map page is replaced by the map view. Used to view more vehicle trajectory. Press any key to return to normal page view.
	Partial Screen. Once the Full Screen softkey is pressed, the softkey changes to the Partial Screen. When pressed, the display area will contain the map view and the mapping softkey column once again.
	North Up View. Ensures North consistently remains at the top of the page view. Once pressed, this softkey changes to the COG View softkey.
	Course on Ground (COG) View. Ensures the vehicle's heading (course) is pointing to the top of the page view. When pressed, this softkey changes to the North Up View softkey.
	Center Vehicle. Centers the vehicle on the map page.
	New Object. Launches a menu that allows the mapping of an object.
	Pan. Allows the operator to focus in on a specified area of the map without the necessity of travelling to the area to look for gaps in application.
	Antenna Offset. Allows for the adjustment of the antenna offset.

	Erase Object. Erases the last object or object vertex created.

Information Page

The Information page is accessed by selecting the *Next Page* softkey. The Information page displays the vehicle's latitude and longitude in addition to antenna height, GPS speed, course in degrees (North 0º), and file size.

Next Page
softkey (F10)

Figure 6-10: Information Page

FW-CB v3.14 - Mapper		
Lat:	45 50 11.16 N	
Lon:	111 3 38.47 W	
Height:	4704	ft
Speed:	3.4	MPH
Course:	107	deg
File:	fieldbound.gmf	
Size:	0.3	kb
⊗	Check status of system devices.	➡

Table 6-54: Information Page Softkeys

Settings	Description
	Exit. Exits out of the Information page and returns to the Main Menu.
	Next Page. Switches between the Map page and the Information page.
	System Devices. Launches the CAN Process diagnostic. Used to troubleshoot the CAN modules during operation.
	Alarm Silence. Silences an alarm.
	View Options. Allows a number of viewing options to be turned on or off.

MAPPER TOOLS

Map Object softkey

The primary task performed on the *Map* page is object mapping. In Mapper, objects include points, poly-lines, or polygons. As previously described, point and hazard objects can be predefined during marker setup. Each predefined object has a corresponding softkey on the *Map* page.

Arrow keys

Mapping objects are accessed via the *Map Object* softkey. Pressing this softkey will launch a menu containing all object types. Each mapper tool selected will prompt the operator for an object name. The object name is the label for the item being mapped (refer to CHAPTER 6 - OBJECT NAME CREATION). To select an object, use the *Arrow* keys followed by the *Enter* button.

Enter button

Figure 6-11: Mapper Page

Markers
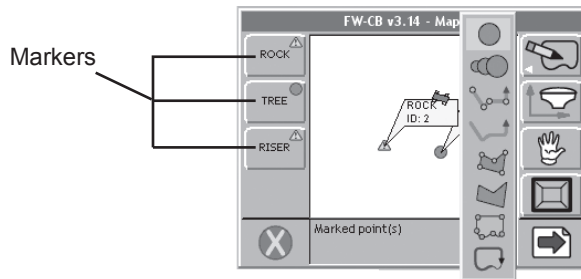
Table 6-4: Map Page Softkeys

Settings	Description
(circle icon)	Point-Mark. Maps a single point. Press to mark a point. A prompt will request a name each time a point is marked.
(overlapping circles icon)	Point-Stream. Maps a stream of points at the data collection interval rate. Press to turn stream ON and OFF. A prompt will request an object name.
(polyline mark icon)	Polyline-Mark. Map or locate features represented by a line of discrete points. Press to mark a point along the polyline. A prompt will request an object name.
(polyline stream icon)	Polyline-Stream. Map or locate features represented by a line of streaming points. Press to turn streaming ON and OFF. A prompt will request an object name.

	Polygon-Mark. Map or locate features represented by a closed shape comprised of discrete points. Press to mark points along the polygon perimeter. A prompt will request an object name.
	Polygon-Stream. Map or locate features represented by a closed shape made up of streaming points. Press to turn streaming ON and OFF. A prompt will request an object name.
	Mark Boundary Polygon - Maps the perimeter and obtains the area of a feature by a closed shape comprised of discrete points. Saved as a boundary file (.BND) and used in an ARM application as the Boundary File.
	Streamed Boundary Polygon - Used to map the perimeter and obtain the area of a feature by a closed shape comprised of streaming points. Saved as a boundary file (.BND) and used in an ARM application as the Boundary File.

MAPPER OPTIONS

View Options softkey

The *View Options* softkey is located on the *Map* page. Pressing the *View Options* softkey launches a menu on the *Map* page. The options menu contains mapping aides and tools that can be used without exiting the mapper process. All items on the *Options* menu are toggle-type. The items are either set to "ON" or "OFF". To activate an option, use the *Arrow* keys to select the appropriate item and press the *Enter* button. Pressing the *Enter* button will switch the state of the option item (if the item was ON, it will be switched OFF).

Arrow keys

Figure 6-12: Options Menu

Enter button
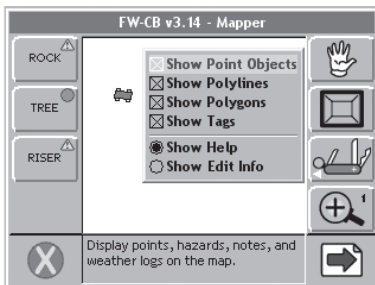
Table 6-7: Options Menu

Settings	Description
Data Zoom	When activated, the map page uses collected data, not the background map, as its Zoom extents.
Show Base Map	When activated, the base map file is displayed in the background. When turned off, the base map file is not displayed.
Show Point Objects	When activated, all point objects contained in the map file .GMF named during Mapper setup are displayed on the Map page.
Show Polylines	When activated, all polylines contained in the Map file .GMF named during Mapper setup are displayed on the Map page.
Show Polygons	When activated, all polygons contained in the Map file .GMF named during Mapper setup are displayed on the Map page.
Show Tags	All mapping objects have an associated tag that contains the mapping object type and attributes. When activated, a tag is displayed with each object.
Show Help	When activated, help information is displayed on the bottom half of the Map page. Help text corresponds to the highlighted softkey.
Show Edit Info	When activated, attribute information for the nearest map object is displayed on the bottom half of the Map page.

EXITING OPERATION

Exit softkey

Press the *Exit* softkey (located on the bottom left corner of the screen) to exit MAPPER. If data is being stored to the PC Card, the exit process may take a few minutes.

CHAPTER 7 - EXT

The Legacy 6000 system allows for the operation of the system as an External (EXT) system. That is, the system can be used as an external computer used to control already installed controllers. During EXT mode, the system can operate in three modes:

- Guidance Only Mode
- Log Data
- Application Rate Control

The system is configured to operate in one of these modes during the system setup process. In most cases, any of these three modes can be run with or without Swath Manager Automatic Boom Section Control in the system.

To set the Legacy console in EXT mode, refer to the Console Setup section in Chapter 2.

GUIDANCE ONLY MODE

Guidance Mode is used when machine guidance is required. There is no rate controller in use during Guidance Only mode. A rate controller may be running on the vehicle, but it is not interfacing with the Legacy 6000 console. When a PC Card is inserted into the console during Guidance Only mode, it is possible to collect where-applied data and use it to create an Application Report in Fieldware Map Manager. To operate in Guidance Only mode, the Rate Controller menu item must be set to "None".

LOG DATA MODE

Log Data mode allows the collection of where-applied or as-applied data without running guidance. The Legacy 6000 can operate in Log Data mode with or without a rate controller attached. If a rate controller is not attached, the data collected is considered "where applied" data. Where applied data contains only the vehicle trajectory. No rate information is saved in the file. If a compatible rate controller is connected to the Legacy console serial port and product is applied, Log Data mode will collect "as applied" data. As applied data contains the vehicle trajectory and product application rate information. To operate in Log Data mode, set lightbar operation to "Off" or "Text Only". If "Text Only" is selected, the lightbar can be used

to view messages such as area applied and ground speed. If "Off" is selected, a lightbar is not required to collect data.

Table 7-1: Guidance Only Mode and Log Data Mode Settings

Setup Name	Setting	Description
Controller		During Controller Setup, a controller driver name must be set to "None" to run in Guidance Only mode.
Guidance Only		
Lightbar	Text/Lights	If the lightbar is set to "Text/Lights", machine guidance can be used. Data is logged to the PC Card (refer to Lightbar Setup for additional information).
Log Data mode with a lightbar		
Lightbar	Text Only	If the lightbar is set to "Text Only", guidance cannot be used. Where applied data is logged to the PC Card.
Log Data mode without a lightbar		
Lightbar	Off	If the lightbar is set to "Off", guidance cannot be used. Where applied data is logged to the PC Card. A lightbar is not required.

RATE CONTROL MODE

Rate Control mode implies that an external rate controller is connected to one of the COM ports on the Legacy 6000 console. During Rate Control mode, several options exist where data can be collected with or without guidance. If rate data is being collected without guidance, the use of a lightbar is optional. All data collected during Rate Control mode is considered "as applied" data.

To configure Rate Control mode, the controller setting must be set to the type of rate controller connected to the Legacy 6000 console. If this setting is set to "None", product application will not be possible.

Table 7-2: Rate Control Mode Settings

Setup Name	Setting	Description
Controller	A Driver Name	During Controller Setup, a controller driver name must be selected to perform product application.
Rate Control with Guidance		
Lightbar	Text/Lights	If the lightbar is set to "Text/Lights", machine guidance can be used. Data is logged to the PC Card (refer to Lightbar Setup for additional information).
Log Data mode with a lightbar and without Guidance		
Lightbar	Text Only	If the lightbar is set to "Text Only", guidance cannot be used. As applied data is logged to the PC Card.

Log Data mode without a lightbar or Guidance		
Lightbar	Off	If the lightbar is set to "Off", guidance cannot be used. As applied data is logged to the PC Card. A lightbar is not required.

Most setup functions for a job are the same when running in EXT as they are when running a full CAN based control system with DCM. Refer to Chapter 2 for information on setting up the Console, Lightbar, GPS Receiver, and FieldPilot (ignore Chapter 2 sections on Channel Setup). Refer to Chapter 3 for information on setting up a job, and Chapter 4 for information on running a job. Please note that many of the DCM based controller functions and features are not available when running in EXT mode.

Refer to the following sections for additional information specific to EXT mode.

RUNNING IMPLEMENT SETUP WITH A RATE CONTROLLER

When operating the Legacy 6000 with an external rate controller interfaced to the console, Implement Setup is reduced to implement width, Y-axis direction, and Y-axis distance. The operator will not be able to establish boom sections. Boom section setup must occur on the rate that is connected to the Legacy console.

Entering Implement Width

Implement Width is used for guidance purposes and could be considered the distance between guidelines. This width is typically determined by the vehicle swath width or spread area. Setting the implement width slightly smaller than the actual width will eliminate skips in application. Setting the implement width slightly larger than the actual swath width will eliminate overlap during application. To enter Implement Setup from the *Launcher Page*, press the *System Setup* (F1) softkey followed by the *Implement Setup* softkey.

The *Implement Width* page also contains a *Review Settings* softkey. Selecting this softkey will launch a page to display the details of the current implement configuration.

Review Settings
softkey (F2)

Figure 7-1: Implement Width Page
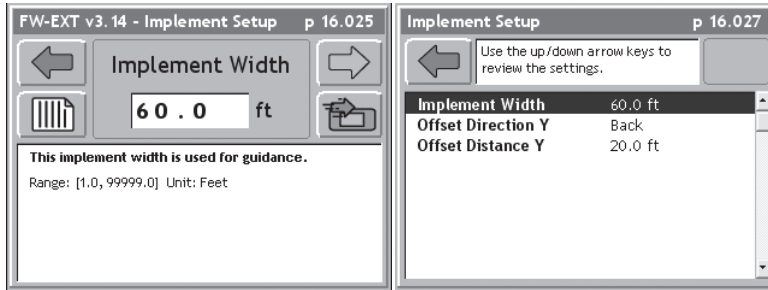
Entering Offset Direction Y

Forward Arrow
softkey (F6)

The Y direction offset is the direction along the center line of the vehicle from the GPS antenna to the center of the swath. Once the correct direction is entered, press the *Forward Arrow* softkey to proceed to the next page.

Figure 7-2: Offset Direction Y Page
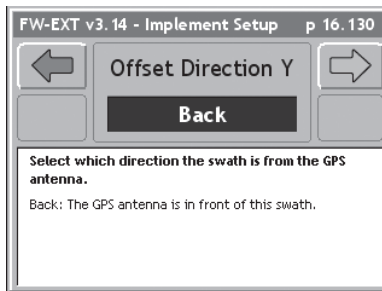
Figure 7-3: GPS Antenna Relationship
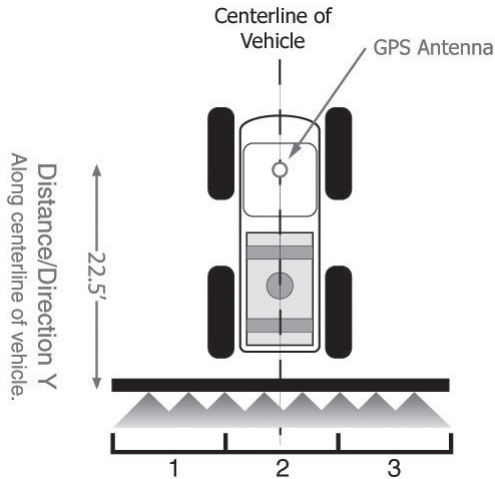
Entering Offset Distance Y

When entering Offset Direction Y, it is necessary to enter the Y Offset Distance. This is the distance from the GPS antenna along the vehicle center line to the swath. To obtain the most accurate application files and maps, it is recommended that the distance be measured and not estimated or guessed. Once the correct direction is entered, press the _Forward Arrow_ softkey to proceed to the next page.

Forward Arrow
softkey (F6)

Figure 7-4: Offset Distance Y Page

Implement Setup Completion

Review Settings
softkey (F2)

Once the necessary entries have been made, the *Finish* page will be displayed. Select the *Review Settings* softkey to review the selected configurations. Select the *Forward Arrow* to save the configuration and return to the main ARM launcher.

Forward Arrow
softkey (F6)

Figure 7-5: Implement Setup Finish Page

FW-EXT v3.14 - Implement Setup   p 16.500

Finish

Save the setup and exit.
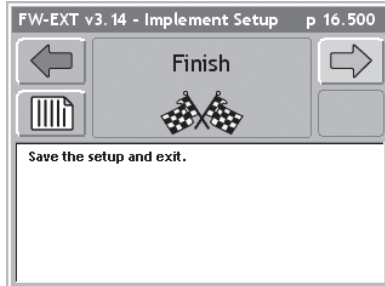
CONTROLLER SETUP

The type of external rate controller to be connected to the Legacy 6000 console is selected during Controller Setup. Select "System Setup (F1)" from the *Main Launcher* page to launch the *System Setup* page. From the *System Setup* page select "Controller Setup".

Figure 7-6: Controller Setup Page

FW-EXT v3.14 - Controller Setup   p 17.000

Press Enter to configure all of the settings in the list.

< Setup Wizard >
Controller: MidTech98
Com Port: Com 2
Base Rate: 0.0 lb/ac
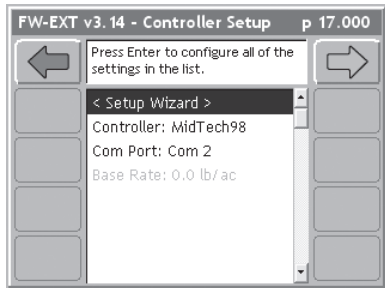
The *Controller Setup* page contains every setup option available in list format. From this list each Controller Setup item can be edited individually, or the Controller Setup Wizard can be used. The top item on the setup list is the Setup Wizard. To run the Setup Wizard, highlight <Setup Wizard> from the main list using the *Arrow* keys and press the *Enter* button. Setup Wizard will navigate through the entire Controller Setup item list.

Arrow keys

Enter button

Table 7-3: Controller Setup Settings

Settings	Description
Settings	Description
Controller	Defines the type of compatible rate controller to be connected to the Legacy 6000.
COM Port	Defines the Legacy 6000 COM Port to which the rate controller is connected.
Base Rate	Defines the base rate required for a Rawson Controller. This is inactive unless the Rawson Controller is previously selected.
Status Detect	Active when the Rawson Controller or "None" is selected. Must be set to "On" if using the TeeJet Input Status Module.

Table 7-4: Compatible External Rate Controllers

Controller	Driver Name	Product Type
All Mid-Tech TASC	TeeJet 98	All
Raven 440, 450, 460, 660, 661	RavenLiq100 (single product)	Liquid
Raven 440, 450, 460, 660, 661	RavenGran100 (single product)	Dry
Raven 750	Raven 750	Liquid
Raven 760	Raven 760 Gran	Dry
Raven 760	Raven 760	Liquid
TeeJet 854	TeeJet 854	Liquid
Case FlexHead	Case Flex400	Dry
Mark III	Mark IV	Dry
DICKEY-john	Land Manager	N/A

Once the controller settings or the status detect settings have been changed, the Legacy 6000 console must be powered off before continuing.

PRODUCT SETUP OPERATION

Product Setup tab

Product information (product name and prescription map file name information) is entered during Product Setup. To run Product Setup, select the *Product Setup* tab on the *ARM Launcher*.

Figure 7-7: Product Setup

```
FW-EXT v3.14 - A.R.M.                    p 1.003
┌─────┐  Setup application products      ┌─────┐
│ ←   │                                  │  ◎  │
└─────┘                                  └─────┘
┌─────────────────────┐  ┌─────────────────────┐
│ ▥   Job Report      │  │                     │
└─────────────────────┘  └─────────────────────┘
┌─────────────────────┐  ┌─────────────────────┐
│ ◎   ARM Setup       │  │                     │
└─────────────────────┘  └─────────────────────┘
┌─────────────────────┐  ┌─────────────────────┐
│ ▨   Product Setup   │  │                     │
└─────────────────────┘  └─────────────────────┘
┌─────────────────────┐  ┌─────────────────────┐
│                     │  │                     │
└─────────────────────┘  └─────────────────────┘
```
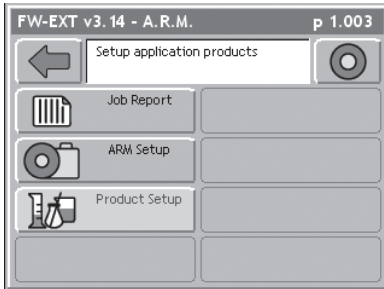
Table 7-5: Product Setup Descriptions

Settings	Description
Prescription	If Variable Rate product application is to occur, select the prescription file (.ARM) that contains the prescription information for the specific product. The (.ARM) file can be on the root of the PC Card or in the Job folder. The PC Card must be inserted into the Legacy 6000 console. If variable rate application is not to be performed, leave this setting at "None".
Layer	Some prescription files (.ARM) can contain several products in a single file. A single product is associated to a single layer. In a multiple product prescription file, it is necessary to set which layer is associated with which product. If there is only one product layer in the (.ARM) file, this setup item is automatically set to Layer 1 and this page is skipped during the Product Setup wizard process.
Product	Product Setup contains a product database with approximately 4000 product names and their associated EPA numbers. A product name can be selected from this setup page. If a prescription map (.ARM) is being used, product setup automatically extracts the product name from the (.ARM) product layer. Select the <From Map> setting on the product page.

Product Setup Wizard

The Product Setup page contains every setup option available in list format. From this list each Product Setup item can be edited individually, or the Product Setup Wizard can be used. The top item on the setup list is the Setup Wizard. To run the Setup Wizard, highlight <Setup Wizard> from the main list using the *Arrow* keys and press the *Enter* button. Setup Wizard will navigate through the entire Product Setup item list.

Arrow keys

Enter button

Figure 7-8: Product Setup Page

Select Prescription Map Layer

If Variable Rate product application is not being performed, it will not be necessary to set anything on this page.

Figure 7-9: Product Setup Layer Page
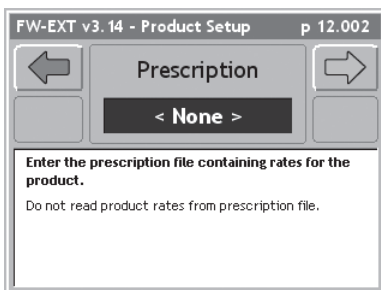
RATES PAGE

The *Rates* page displays information related to the product and associated rate controller (product name, current rate, speed, material applied, acres applied, amount of material remaining). A completed field boundary must exist to calculate the remaining acres. There are also two alternate pages available for view by selecting the *Next Page* softkey.

Figure 7-10: Rates Page and Alternate Rates View Page
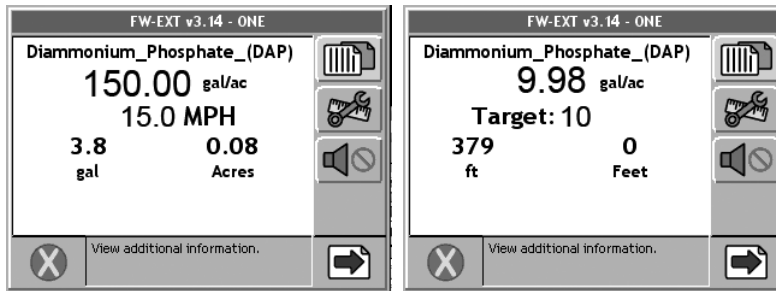
Two pages are displayed during operation: the *Rates* page and the *Map* page. Each pay has the same general layout: a left column of softkeys, a center column that displays rate or map information, and a right column of softkeys.

The left column is reserved for product control softkeys. There is a softkey for each product used during the current product application. If there is only one product being applied, no softkey will be displayed in the left column. (For example, if the Legacy 6000 is connected to an external rate controller and is configured as a two-product system, there will be two product control softkeys displayed.) If there are more than four products during application, the left column will display a scroll bar and additional softkeys will become available by scrolling down to the appropriate icon. The left column reacts and is controlled the same for the *Map* page (refer to Chapter 4). This allows for the control of product application while viewing the application map. A product control softkey will contain the product name and the current application rate.

The right column softkeys will vary depending on which page is currently being viewed. When viewing the *Map* page, the right column contains all of the mapping, guidance, and general viewing softkeys. When viewing the *Rates* page, the right

column contains various utility softkeys such as an "Alternative Rates Page soft-key" and the "Alarm Off softkey".

EXITING OPERATIONS

To exit operations, select the *Exit* softkey. If data needs to be stored to the PC Card, the exit process may take several minutes.

Exit softkey (F5)

APPENDIX A - CHANNEL FAVORITE SETTINGS

LIQFLOW-A			GRANSERVO-A		
Favorite:		LIQFLOW-A	**Favorite:**		GRANSERVO-A
Application		Liquid	**Application**		Granular
	Application name	MAIN_TANK		Application name	MAIN_BIN
	Configuration	Standard		Configuration	Standard
	PCM link	None		PCM link	None
Drive Type		Servo	**Drive Type**		Servo
	Gain	3		Gain	3
	Start Up Drive	20%		Start Up Drive	20%
	Master Switch	Hold		Master Switch	Close
	Implement Status	Close		Implement Status	Close
	Valve Delay	1.00s		Valve Delay	1.00s
	Valve Location	In-Line		Valve Location	In-Line
Units		gal/ac	**Units**		lb/ac
	Control Basis	Area		Control Basis	Area
Primary Sensor		Flowmeter	**Primary Sensor**		Granular
	Input	A		Input	A
	Sensor Name	FLOWMETER		Sensor Name	CONVEYOR_SENSOR
	Calibration #	153.1 pul/gal		Calibration #	400 pul/ft3
	Cal# Basis	NONE		Cal# Basis	NONE
Secondary Sensor		None	**Secondary Sensor**		None
Monitor 1		Pressure Analog	**Monitor 1**		Shaft
	Input	E		Input	D
	Sensor Name	PRESSURE_SENSOR		Sensor Name	SPINNER SPEED
	Alarm Units	psi		Calibration #	2.0 pul/r
	Min. Alarm	15		Alarm units	rpm
	Max. Alarm	60		Min. Alarm	Off
	Alarm Delay	3s		Max. Alarm	Off
	Sensor Output	4-20mA		Alarm Delay	10s

GRANSERVO-B			GRANPWM-A		
Favorite:		GRANSERVO-A	**Favorite:**		GRANPWM-A
Application		Granular	**Application**		Granular
Application name		MAIN_BIN	Application name		MAIN_BIN
Configuration		Standard	Configuration		Split Drive
PCM link		None	PCM link		None
Drive Type		Servo	**Drive Type**		PWM
Gain		3	Gain		1
Start Up Drive		20%	Frequency		120Hz%
Master Switch		Close	Min.Duty Cycle		23%
Implement Status		Close	Max. Duty Cycle		77%
Valve Delay		1.00s	Ramp Time		4 s
Valve Location		In-Line	Dither		5%
			Master Switch		Close
			Implement Status		Close
			Valve Delay		1.00 s
Units		lb/ac	**Units**		lb/ac
Control Basis		Area	Control Basis		Area
Primary Sensor		Granular	**Primary Sensor**		Granular
Input		A	Input		A
Sensor Name		CONVEYOR_SENSOR	Sensor Name		CONVEYOR_SENSOR
Calibration #		368.2 pul/ft3	Calibration #		717.5 pul/ft3
Cal# Basis		NONE	Cal# Basis		NONE
Secondary Sensor		None	**Secondary Sensor**		Granular
			Input		B
Monitor 1		None	Sensor Name		CONVEYOR_SENSOR
Monitor 2		None	Calibration #		717.5 pul/ft3
Monitor 3		None	Dual Warning %		10%
Montior 4		None	Dual Warning Delay		10 s
			Monitor 1		Low Bin
			Input		C
			Sensor Name		LOW_BIN_LEFT
			Alarm Status		High
			Alarm Delay		5 s
			Monitor 2		Low Bin
			Input		D
			Sensor Name		LOW_BIN_RIGHT
			Alarm Status		High

SPINMOTOR-A		INJ-A	
Favorite:	SPINMOTOR-A	**Favorite:**	INJ-A
Application	Motor	**Application**	Liquid
Application name	SPINNERS	Application name	INJECTION_PUMP
Configuration	Standard	Configuration	Standard
PCM link	None	PCM link	None
Drive Type	Servo	**Drive Type**	Injection
Gain	3		
Start Up Drive	20%	**Units**	fl oz/ac
Master Switch	Hold	Control Basis	Area
Implement Status	Close		
Valve Delay	1.00s	**Primary Sensor**	Injection
Valve Location	In-Line	Input	A
		Sensor Name	INJECTION_PUMP
Units	rpm	Calibration #	6.67 pul/fl oz
Control Basis	Time	Cal# Basis	NONE
Primary Sensor	Shaft	**Secondary Sensor**	None
Input	A		
Sensor Name	SPINNER_SENSOR	**Monitor 1**	Product Detect
Calibration #	3 pul/ft3	Input	C
Cal# Basis	NONE	Sensor Name	PUMP_N_FLOW_SENSOR
Alarm units	rpm	Alarm Status	Low
Min. Alarm	500	Alarm Delay	5 s
Max. Alarm	1000		
Alarm Delay	5 s	**Monitor 2**	None
		Monitor 3	None
Secondary Sensor	None	**Monitor 4**	None
Monitor 1	None		
Monitor 2	None		
Monitor 3	None		
Montior 4	None		

APPENDIX B - CREATING CALIBRATION TABLE

A Calibration Table can be created two ways. It is recommended that the table be created on a PC and loaded on the Legacy 6000. The second option is to create the table using the Legacy 6000. A Calibration Table allows the operator to select from a pre-defined set of calibration numbers that are commonly used. An example would be a granular application in which the gate height changes frequently, resulting in the change of the calibration number.

Creating a Calibration Table on a PC

Create a calibration table with a text editor (such as NOTEPAD) and save the file as "**CALS.TXT**" in a folder labeled "**SYS**" on the PC Card for the Legacy 6000.

CALS.TXT → SYS → PC Card

CALS.txt - Notepad

File   Edit   Format   View   Help

```
Fieldware Calibration Table - Midwest Technologies
[GATE HEIGHT][1 INCH][1406]
[GATE HEIGHT][2 INCH][703]
[GATE HEIGHT][3 INCH][468]
[GATE HEIGHT][4 INCH][351]
[GATE HEIGHT][5 INCH][281]
[GATE HEIGHT][6 INCH][234]
[GATE HEIGHT][7 INCH][200]
[GATE HEIGHT][8 INCH][175]
[GATE HEIGHT][9 INCH][156]
[GATE HEIGHT][10 INCH][140]
[GATE HEIGHT][11 INCH][127]
[GATE HEIGHT][12 INCH][117]
```


Calibration #

[GATE HEIGHT][1 INCH][1406]

Cal Table Identifier   Cal # Definition

The calibration table is shown providing nominal calibration numbers for a granular system that employs Gate Height ranging from 1 to 12 inches. A valid entry **must** have three fields separated by square brackets. Within the bracket there **must** be some text [GATE HEIGHT][1 INCH][1406]. The Calibration Identifier is the table name or label when loading the table in the Legacy 6000. The Cal # Definition defines the calibration number to it. The calibration number **must** be greater than zero and the units must relate to those selected during Channel Setup. For example; if sensor units are lbs/ac and the Application is type 'Granular', the Calibration # must be in pulses/cubic foot.

Loading Calibration Table in Legacy 6000

With the console off, place the PC Card in the Legacy 6000 and power the console ON.

System Devices softkey

1. From the *Launcher* page select the *System Devices* softkey.
2. Select Device Manager from the *System Tools* page.
3. From the *Device Manager* page, select "Console" using the *Arrow* keys.
4. Press the *Update Console* softkey.
5. From the *Update Files* page, use the *Arrow* keys to select "Cal Table".

Device Manager tab

Press the *Update Console* softkey. An information bar will be displayed along with a message that the console is being updated. Once the bar is no longer displayed, the console update is complete and the Calibration Table has been loaded onto the L6K.

Arrow keys

Update Console softkey
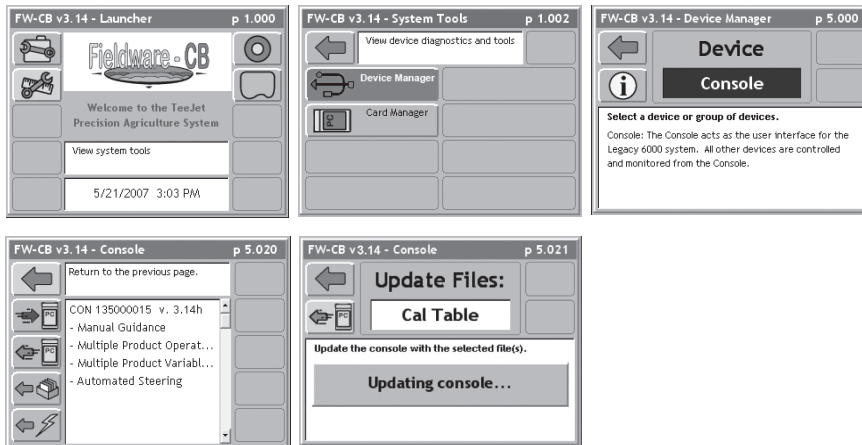
Using the Calibration Table

To implement the calibration table, the table must be activated during Primary Sensor setup. Once activated, the calibration numbers can be chosen during Product Setup before product application. It is recommended that each Calibration Table setting be calibrated using the procedure from the *ARM Launcher* page.

1. Enter Channel Setup and navigate to Primary Sensor. Select the *Settings* softkey.
2. Use the *Arrow* keys to highlight Cal# Basis and press the *Enter* button.
3. Select the Cal Table to be used. The Name of the Cal Table is the Cal Table Identifier (the first column in the brackets when creating the Cal Table). After the Cal# Basis has been selected, continue through Channel Setup and save to **Apply the Settings**. The Cal Table is now ready for use.
4. To use the Cal Table enter Product setup from the *ARM Launcher* page.
5. Use the *Arrow* keys to highlight the Cal Table Identifier (e.g., GATE HEIGHT) and press the *Enter* button. Select the desired calibration description. This selection will automatically change the Cal# in the system.
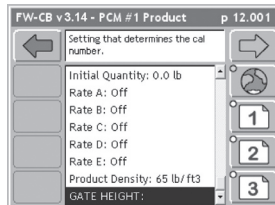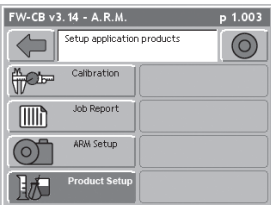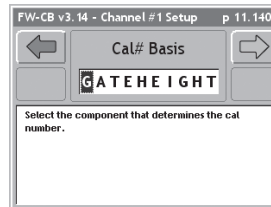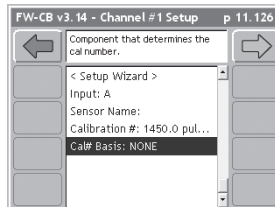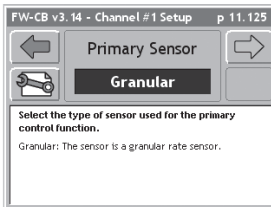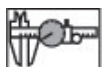
Settings softkey

Arrow keys

Enter button

Settings softkey

Arrow keys

Enter button

Calibration softkey

Creating a Calibration Table Using the Legacy 6000

*   From Channel Setup, navigate to the *Primary Sensor* page and press the *Settings* softkey.
*   Use the *Arrow* keys highlight Cal# Basis and press the *Enter* button.
*   Name the Cal# Basis (the name of the Cal Table). Once a name has been established, continue through Channel Setup and apply settings.
*   Advance to the *ARM Launcher* page and select the *Calibration* softkey. Choose the calibration procedure for the application and press the *Forward Arrow* softkey.

Forward Arrow softkey

- Since Cal# Basis is not completed during Channel Setup, a new screen will be displayed during calibration. The screen will display the same name entered for Cal# Basis during Channel Setup.
- Proceed through the calibration process. Name the parameter and repeat the process for each calibration table parameter.

NOTE: *If GATE HEIGHT is to be used for the Cal# Basis name during Channel Setup, it has already been established as a pre-named parameter in Calibration 1 INCH - 12 INCH.*

APPENDIX C - NH3 APPLICATION

When using NH3 mode, review the following settings to ensure the Cal # and Density have been correctly entered. The Cal # is located in Channel Setup under "Primary Sensor, Tools". The Density value is accessed from the *ARM Launcher* page in Product Setup.

NH3 Application Cal#

For all NH3 applications, the Cal # units should be entered in **Pulses / Gallon**. The Cal # units **DO NOT** change even if the displayed units are in (LBS of NH3 / acre) or (LBS Actual N / acre).

Density for NH3 and Actual N

Density determines the units of applied and displayed rate (lbs of NH3 / acre or lbs of actual N / acre) during application. If application and display rate in lbs of NH3 / acre is desired, enter a density of lbs of NH3 / gal. If application and display rate in lbs of Actual N / acre is desired, enter a density of lbs of Actual N / gal.

NOTE: *Temperature affects the Density. The following chart provides a corrected value. Use the temperature or tank pressure column to determine the correct density.*

Example: *The display of pounds of actual N / acre is desired. If the temperature is 65°F, the density would be entered during Product Setup as 4.19 lbs of actual N / per gal.*

Properties Of Liquid Ammonia At Various Temperatures

Temperature		Pressure		Liquid Density (lbs / gal of NH3)			
°F	°C	PSI	bar	NH3 lbs/gal	NH3 Kg/L	N lbs/gal	N Kg/L
0	-18	15.7	1.1	5.53	0.66	4.54	0.54
10	-12	23.8	1.6	5.47	0.66	4.49	0.54
20	-7	33.5	2.3	5.41	0.65	4.44	0.53
30	-1	45	3.1	5.34	0.64	4.37	0.53
40	4	58.6	4	5.28	0.63	4.33	0.52
50	10	74.5	5.1	5.21	0.63	4.27	0.52
60	16	92.9	6.1	5.15	0.62	4.22	0.51
65	18	103.1	7.1	5.11	0.61	4.19	0.5
70	21	114.1	7.9	5.08	0.61	4.17	0.5
75	24	125.8	8.7	5.04	0.6	4.13	0.49
80	27	138.3	9.5	5.01	0.6	4.11	0.49
85	29	151.7	10.5	4.97	0.6	4.08	0.49
90	32	165.9	11.4	4.94	0.59	4.05	0.48
95	35	181.1	12.5	4.9	0.59	4.02	0.48
100	38	197.2	13.6	4.87	0.58	3.99	0.47

NH3 is 82% Actual N by weight

1gal NH3 @ 60oF = 5.15lbs x .82 = 4.22lbs of Actual N / 1 gal of NH3