GREENSTAR™ Guidance Parallel Tracking and AutoTrac Assisted Steering Systems

OPERATOR'S MANUAL

GREENSTAR Guidance Systems — Parallel Tracking and AutoTrac Assisted Steering Systems

OMPC20463 Issue J5 (ENGLISH)

CALIFORNIA
Proposition 65 Warning

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

If this product contains a gasoline engine:

⚠ WARNING

The engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

The State of California requires the above two warnings.

John Deere Ag Management Solutions
(This manual replaces OMPC20441 E5)
LITHO IN U.S.A.

Foreword

WELCOME TO GREENSTAR™ PRECISION FARMING SYSTEMS offered by John Deere. Parallel Tracking and AutoTrac guidance systems are precision farming packages. These guidance systems are intended to aid operator to more efficiently operate machine.

READ THIS MANUAL carefully to learn how to operate and service your system correctly. Failure to do so could result in personal injury or equipment damage. This manual and safety signs on your machine may also be available in other languages. (See your John Deere dealer to order.)

THIS MANUAL SHOULD BE CONSIDERED a permanent part of your system and should remain with system when you sell it.

MEASUREMENTS in this manual are given in both metric and customary U.S. unit equivalents. Use only correct replacement parts and fasteners. Metric and inch fasteners may require a specific metric or inch wrench.

RIGHT-HAND AND LEFT-HAND sides are determined by facing in direction of forward travel.

WRITE PRODUCT IDENTIFICATION NUMBERS (P.I.N.) in Specification or Identification Numbers section. Accurately record all numbers to help in tracing components should it be stolen. Your dealer also needs these numbers when you order parts. File identification numbers in a secure place off machine.

WARRANTY is provided as part of John Deere's support program for customers who operate and maintain their equipment as described in this manual. Warranty is explained on warranty certificate which you should have received from your dealer.

GREENSTAR is a trademark of Deere & Company

This warranty provides you assurance that John Deere will back its products where defects appear within warranty period. In some circumstances, John Deere also provides field improvements, often without charge to customer, even if product is out of warranty. Should equipment be abused, or modified to change its performance beyond original factory specifications, warranty will become void and field improvements may be denied.

OUO6050,0000931 –19–06SEP05–2/2

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Continued on next page

All information, illustrations and specifications in this manual are based on the latest information available at the time of publication. The right is reserved to make changes at any time without notice.

Continued on next page

102105
PN=4

Recognize Safety Information

This is a safety-alert symbol. When you see this symbol on your machine or in this manual, be alert to the potential for personal injury.

Follow recommended precautions and safe operating practices.

T81389 –UN–07DEC88

DX,ALERT –19–29SEP98–1/1

Understand Signal Words

A signal word—DANGER, WARNING, or CAUTION—is used with the safety-alert symbol. DANGER identifies the most serious hazards.

DANGER or WARNING safety signs are located near specific hazards. General precautions are listed on CAUTION safety signs. CAUTION also calls attention to safety messages in this manual.

TS187 –19–30SEP88

DX,SIGNAL –19–03MAR93–1/1

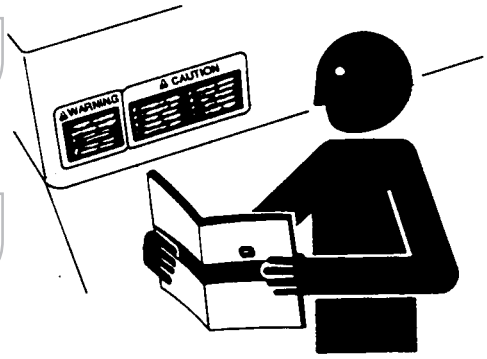
Follow Safety Instructions

Carefully read all safety messages in this manual and on your machine safety signs. Keep safety signs in good condition. Replace missing or damaged safety signs. Be sure new equipment components and repair parts include the current safety signs. Replacement safety signs are available from your John Deere dealer.

Learn how to operate the machine and how to use controls properly. Do not let anyone operate without instruction.

Keep your machine in proper working condition. Unauthorized modifications to the machine may impair the function and/or safety and affect machine life.

If you do not understand any part of this manual and need assistance, contact your John Deere dealer.



TS201 –UN–23AUG88

DX,READ –19–03MAR93–1/1

Keep Riders and Children Off Machine

Only allow operator on machine. Keep riders off machine except for periods of training or short periods of observation.

Riders are subject to injury such as being thrown off machine. Riders also obstruct operator's view resulting in machine being operated in an unsafe manner.

Children should never be allowed on machine or in machine cab when engine is running.

The instructional seat should only be used for instruction or short periods of machine observation, and not for accommodation of children.

TS253 –UN–23AUG88

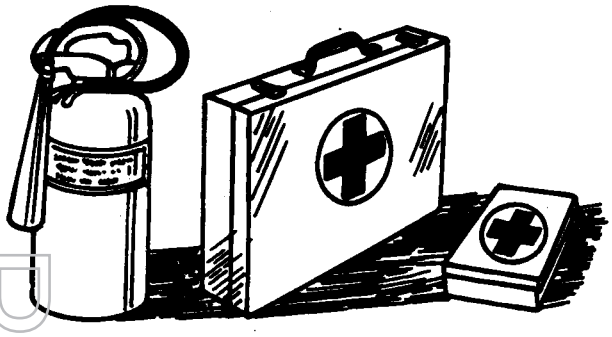
OUO6092,000025F –19–18OCT04–1/1

Prepare for Emergencies

Be prepared if a fire starts.

Keep a first aid kit and fire extinguisher handy.

Keep emergency numbers for doctors, ambulance service, hospital, and fire department near your telephone.



TS291 –UN–23AUG88

DX,FIRE2 –19–03MAR93–1/1

Practice Safe Maintenance

Understand service procedure before doing work. Keep area clean and dry.

Never lubricate, service, or adjust machine while it is moving. Keep hands, feet , and clothing from power-driven parts. Disengage all power and operate controls to relieve pressure. Lower equipment to ground. Stop engine, remove key, and set parking brake. Allow machine to cool.

Securely support any machine elements that must be raised for service work.

Keep all parts in good condition and properly installed. Fix damage immediately. Replace worn or broken parts. Remove any buildup of grease, oil, or debris.

Disconnect battery ground cable (-) before making adjustments on electrical systems or welding on machine.

TS218 –UN–23AUG88

HX,STSSA,K –19–11OCT05–1/1

Operate AutoTrac Steering System Safely

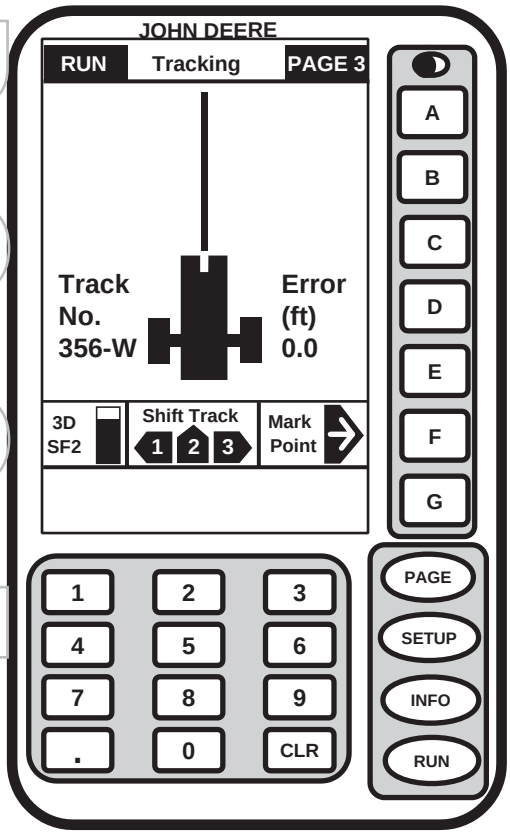
Read and understand this manual before operating AutoTrac steering system. Do not let others operate system without instruction. If you do not understand any part of this manual and need assistance contact your John Deere dealer.

Always operate machine from operator's seat. If provided, always use seat belt.

When system is activated, remain alert and pay attention to surrounding environment. Take control of steering when necessary to avoid field hazards, bystanders, equipment or other obstacles. Stop operation if poor visibility conditions impair your ability to safely operate and steer machine.

Be prepared to take control of steering at end of row or field. System will not turn at end of track.

Always deactivate system before entering a roadway. Never attempt to activate system during roadway transport.



PC7944 –19–22OCT03

OUO6043,0001746 –19–18OCT04–1/1

General Information

Item	Abbreviation	Description
Guidance System		Refers to both Parallel Tracking and AutoTrac assisted steering.
Global Positioning System	GPS	24 Orbiting Satellites that broadcast global positioning signals to ground based receivers.
Differential Correction		A second signal that corrects for inaccuracies such as timing errors, ionospheric interference or system errors.
StarFire 1	SF1	John Deere's proprietary differential correction signal - requires a subscription to receive this signal.
StarFire 2	SF2	John Deere's proprietary differential correction signal - requires a subscription to receive this signal.
Wide-Area Augmentation System	WAAS	U.S. Government differential correction signal
Static Accuracy		Position accuracy of a stationary receiver over a 24-hour time period
A—B Lines		Points A and B are set by operator from display. A straight line is calculated through those two points - this line is path guidance system will use to guide operator/vehicle through field.
Shift Track		Allows position of machine track to be corrected due to satellite drift
Mark Point		Storage for up to five positioning points that you can return to later.
Mobile Processor		Information processor that attaches to display and can be moved from machine to machine.
KeyCard		Information card that loads data to mobile processor for a particular function.
PC Card		Computer card that you can save field information on.
Track 0		First machine path through a field
CAN Bus	CAN	Controller Area Network is a vehicle system that allows on-board computers to communicate with each other.
Tracking Lead Compensation		For Parallel Tracking use only - projects position of receiver forward to aid in lining up correctly on path on turns and to help minimize steering efforts when traveling through field.
Terrain Compensation Module	TCM	Device used to compensate for cab roll, required for AutoTrac.

OUO6050,00011A1 –19–11AUG05–1/1

Read This Manual

Before attempting to operate Parallel Tracking or AutoTrac, read this manual fully to understand components and procedures required for safe and proper operation.

This manual is for both Parallel Tracking and AutoTrac guidance systems applications. Parallel Tracking and AutoTrac share many features and SETUP/INFO functions. Sections unique to one of systems will be identified in heading. Steps unique to one of systems will be noted at beginning of step.

OUO6050,00011A2 –19–11AUG05–1/1

Guidance Systems

Parallel Tracking shows your position in field relative to track that you determine with your first pass through field. Parallel Tracking has modes to follow a straight or Curve track and has a row finder mode. Using machine icon and line on your display, you know which way to steer in order to keep your path parallel with your last. Audible alerts accompany display so you can keep your eyes on field.

IMPORTANT: AutoTrac system is intended to aid operator for more efficient machine operation. Operator is still responsible for machine and must continue to pay attention to surrounding environment during its operation.

AutoTrac is an assisted steering system. After operator enters a reference path (Track 0) in AutoTrac, machine will then steer itself parallel to that track.

OUO6050,00011A3 –19–07SEP05–1/1

System Components

Display

NOTE: There is no power on/off switch for display. Power is applied when machine is turned on.

Display is located in cab and allows operator to view instantaneous system information from seat while operating machine. (See Display and Key Pad section for operating details).

OUO6050,00011A4 –19–11AUG05–1/4

Mobile Processor

Mobile processor is assembled to back of display and has two main purposes; It is device that writes data to PC Card for use with JDOffice® desktop software and accesses key from KeyCard to unlock application software.

PC Card

PC Card is located in mobile processor while operating and will store up to 250 A—B lines when running with AutoTrac or Parallel Tracking. Please see Setup-Current Field in SETUP section. It provides a storage medium for all data acquired from system. PC Card will store data that can be easily transported to home office to download new data.

JDOffice is a trademark of Deere & Company

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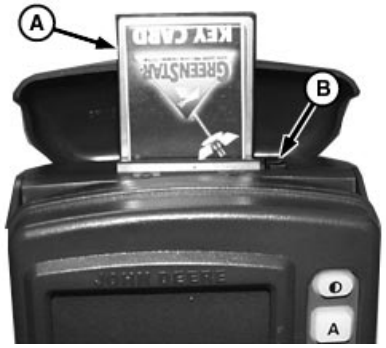
OUO6050,00011A4 –19–11AUG05–2/4

KeyCard

KeyCard (A) is used to load operating information for a particular system on to mobile processor and unlocks that software.

Insert KeyCard in either front or rear slot of mobile processor with label facing you and arrows on card aligned with arrows on processor case.

Press black button (B) and pull up on KeyCard to remove it from processor.



PC6424 –UN–25JUL00

A—KeyCard
B—Black Button

OUO6050,00011A4 –19–11AUG05–3/4

Receiver

Position receiver is located on top of machine. Position receiver receives global positioning and differential correction signal through a single receiver and integrates signal for use with system.

Both Parallel Tracking and AutoTrac require a StarFire position receiver for GPS information.

PC8327B –UN–20OCT04

OUO6050,00011A4 –19–11AUG05–4/4

Features

- **Straight Track** mode assists operator in driving straight parallel paths by using display and audible tones to alert operator when machine is off track. (See Setup Straight Track for details).
- **Curve Track** mode assists operator in driving equally spaced Curve paths. System has capability to guide operator along a variety of patterns. (See Setup Curve Track for details).
- **Circle Track** mode assists operator in driving concentric circles by using display and audible tones to alert operator when machine is off track. (See Setup Circle Track for details.)
- **Row Finder (Parallel Tracking Only)** mode is intended for use in row crop applications where rows are not always equally spaced. Row Finder can be operated in two modes, continuous and turns only. (See Setup Row Finder for details).

Within these modes are the following additional features;

- **Turning View** provides an aerial view to assist operator when turning into a new path. (See Turning View in Setup Guidance System section for details).
- **Mark Point** feature allows storage of up to five geographical locations that operator can return to later. EXAMPLE: When using system in a sprayer application you can store location when you run out of spray solution, refill, and system will help return you back to exact location where you ran out. (See Mark Point in RUN Functions section for details).
- **Shift Track** allows operator to move A—B lines to left, right, or re-center based on machines current location. (See Shift Point in RUN Functions section for details).
- **Adjustable Tracking Tones** allow operator to adjust when audible signal for off track error will sound. (See SETUP section for details).
- **Offsets**
  - **Implement Offset** allows operator to “move” position of receiver to center of an implement that does not pull centered behind tractor.
  - **Receiver Offset** allows operator to “move” position of receiver not mounted in the center of the cab. This offset is for left/right adjustment..

Continued on next page

- **Aerial View** (Curve Track mode only) is an overhead view that aids operator in performing field operation.

OUO6050,00011A5 –19–06SEP05–2/2

General Information

IMPORTANT: Display screens illustrated on following pages are provided for reference only. Your actual screens may appear differently due to connection of optional devices and/or software version in use.

The display is a multipurpose display with easy-to-use, menu-driven commands. It has a display area with several information display cells; seven letter buttons A—G located to right of display cells; a numeric keypad; a PAGE button and three mode select buttons (SETUP, INFO, and RUN).

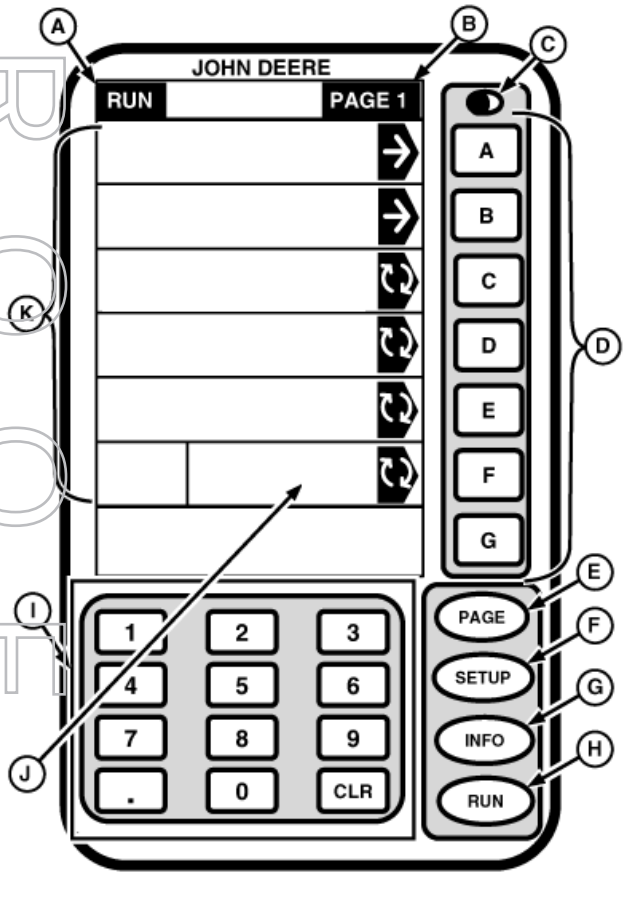
Selected mode (SETUP, INFO, or RUN) will display in cell (A) and when PAGE appears in cell (B) additional selections or pages of information are available by pressing PAGE button. (See SETUP, INFO and RUN in this section for details on these modes).

An example of each display screen is shown on following pages. Each screen contains many cells and each cell displays a specific piece of information.

Each information display cell is either active or inactive. Active cells display information that can be changed and are highlighted by a black arrow. Inactive cells just display information and cannot be changed.

Pressing active cell button results in one of following:

- Data in cell may be changed using numeric key pad.
- New menu will appear.
- Process will be started.
- New page will appear.
- Selected item will be changed.



A—Mode Identification: SETUP, INFO or RUN Mode
B—Mode Page Sequence
C—Contrast Button
D—Alpha Key Pad
E—Advance Screen Page
F—SETUP Button
G—INFO Button
H—RUN Button
I—Numeric Key Pad
J—Active Cell
K—Display Area

Continued on next page

When operating display, several icons are displayed in cells. Each icon indicates type of function that can be performed in that cell.

SYMBOL IDENTIFICATION

GO TO icon. Press key to activate choice.

TOGGLE OR MORE icon. Press key to toggle between selections in a cell.

RETURN icon. Press letter button to return to previous screen.

Setup

Black arrow indicates alpha key is active.

1

Operation number.

PC7968 –19–04NOV03

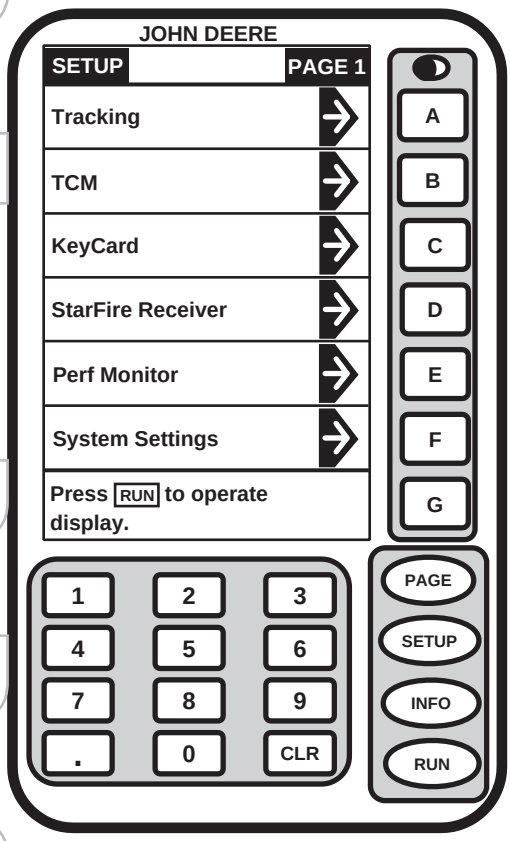
OUO6050,00011A6 –19–11AUG05–2/2

SETUP

SETUP screens allows operator to change operating information. When SETUP button is pushed, a menu will appear. Press letter button next to menu item that requires change or SETUP button (See Setup-Guidance System section for details).

If there are more selections than screen area available, a second page of selections is created. Press PAGE button to view additional selections.

IMPORTANT: When setting up your components for Parallel Tracking or AutoTrac, see TCM and Receiver sections for additional setup information.



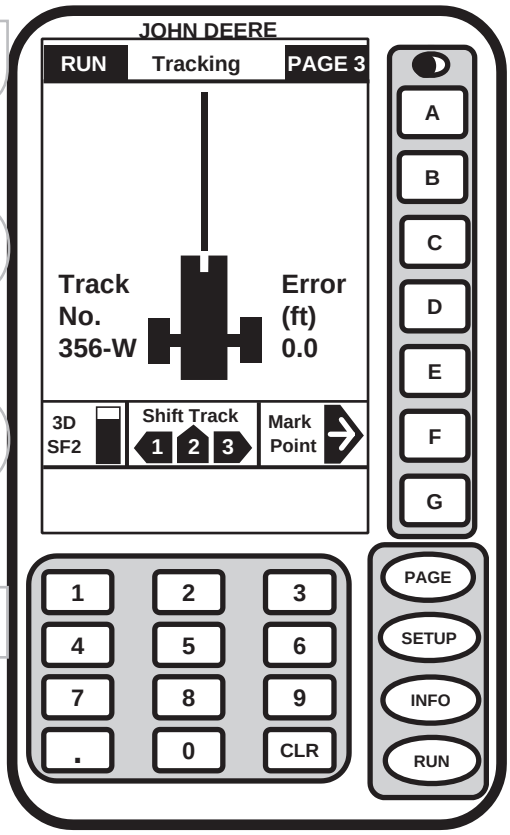
PC7547 –19–27MAR03

OUO6050,00011A7 –19–11AUG05–1/1

RUN

RUN screens are basic operating screens. RUN screens are accessed by pressing RUN button. Pressing PAGE button toggles display between two available RUN screens.

RUN screen can be customized by operator to display various tasks and operation. (See RUN Functions section for details.)



PC7944 –19–22OCT03

Full Page Tracking System RUN Screen Shown

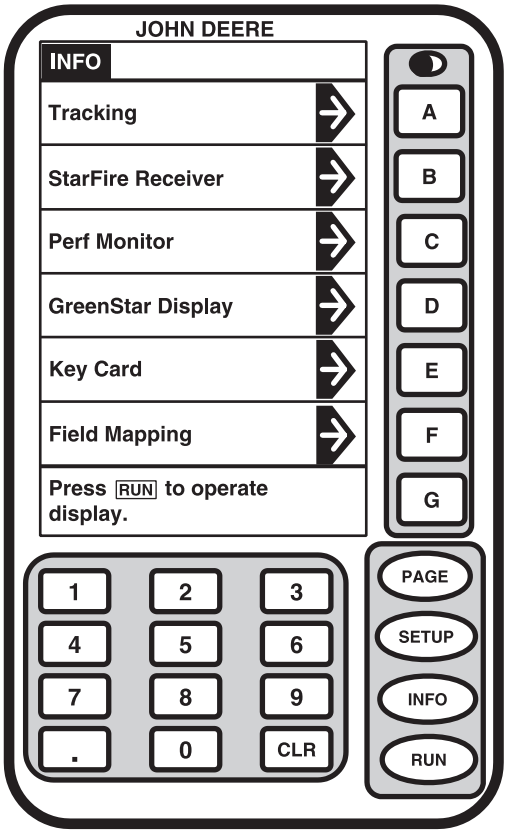
OUO6050,00011A8 –19–11AUG05–1/1

INFO

NOTE: Depending on number of programs loaded on KeyCard some selections may not appear on current page. Press PAGE button to access additional selections.

INFO screen allows operator to view general information screens. Press INFO button for menu to appear. Press letter button next to menu item that you would like to view information on.

IMPORTANT: When setting up your components for Parallel Tracking or AutoTrac, see TCM and Receiver sections for additional INFO information.



PC7008 –19–10JAN02

OUO6050,00011A9 –19–11AUG05–1/1

Display Backlighting and Contrast

Screen: SETUP - DISPLAY

Press: SETUP >> GREENSTAR DISPLAY

Backlight Choice

This screen allows you to choose backlighting intensity level of display for both day and night backlight modes.

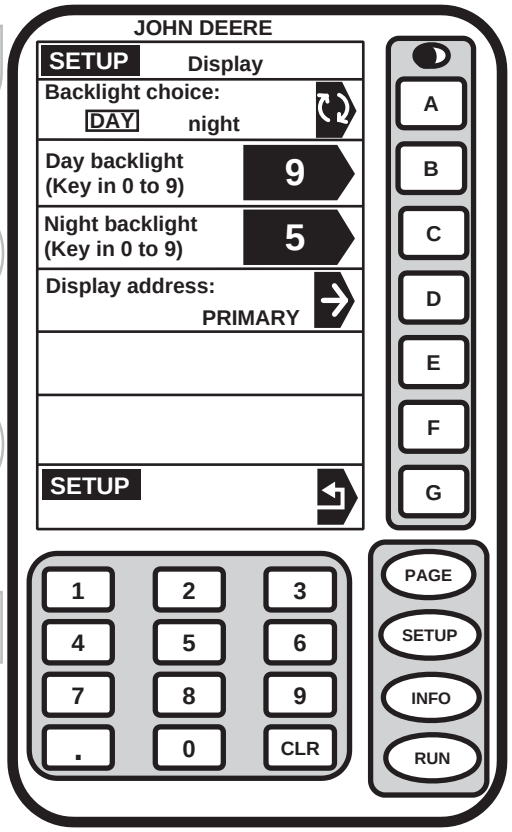
Press letter button next to BACKLIGHT CHOICE to toggle between DAY and NIGHT. Chosen backlight will appear boxed in and in capital letters.

Adjust Day Backlight

Press letter button next to DAY BACKLIGHT. Using numeric keypad, enter any number from 0 to 9 for to adjust daytime intensity level. The higher the number the brighter the screen.

Night Backlight

Press letter button next to NIGHT BACKLIGHT to adjust level intensity. Using numeric keypad, enter any number from 0 to 9 for intensity level. The higher the number the brighter the screen.



PC6792 –19–27AUG01

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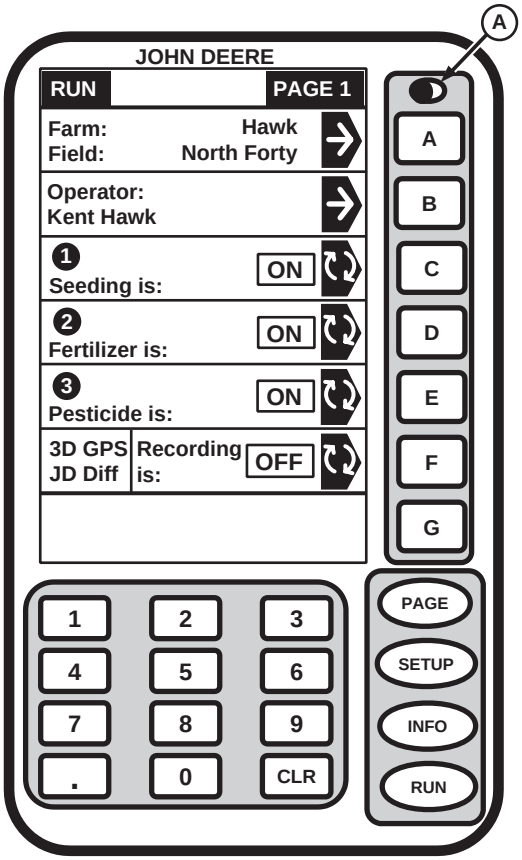
OUO6050,00011AA –19–11AUG05–1/2

Contrast

Contrast button (A) is used to adjust light level of display for visibility and clarity. Adjust contrast by pressing contrast button and holding until desired contrast level is reached. Pressing button will cause screen to lighten or darken each time button is pressed.

A—Contrast Button



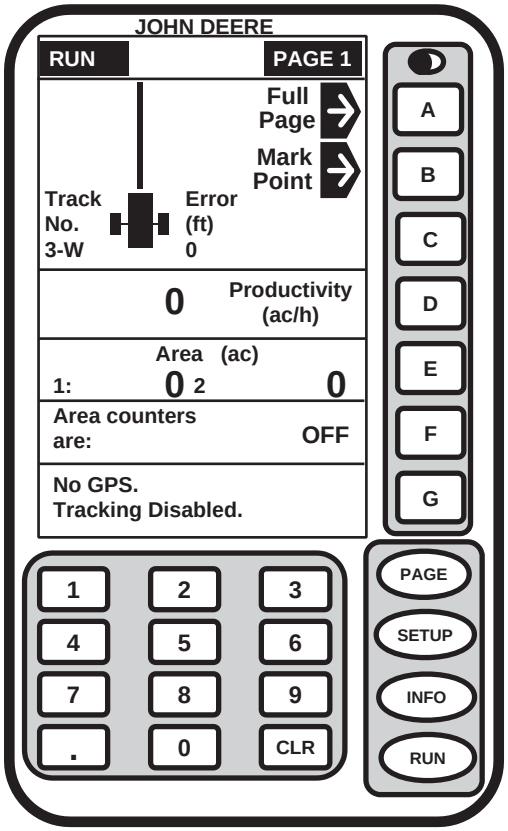
PC6653 –19–09NOV00

OUO6050,00011AA –19–11AUG05–2/2

Before You Start

NOTE: On start-up, INITIALIZING SYSTEM will be displayed on RUN - PAGE 1 screen. This message will self-cancel once power up sequence is completed. After power up sequence is completed, display will show RUN - PAGE 1 screen, or if full page mode was active when machine was shut down it will return to full page mode. To change screen, press PAGE , SETUP or INFO buttons.

AutoTrac can only be operated when KeyCard is installed into mobile processor.



PC6795 –19–27AUG01

OUO6050,00011AB –19–11AUG05–1/1

Programming Guidance System

General Information

IMPORTANT: SF1 and SF2 are StarFire licensed satellite differential correction subscriptions. RTK (Real Time Kinematic) is a land-based form of differential correction. Optimal system performance will be achieved with SF2 correction signal or RTK. When using SF2, accuracy may continue to increase after powering up system.

15 minute Pass-to-Pass accuracy when using SF1 correction is +/-13 inches 95% of the time.

15 minute Pass-to-Pass accuracy when using SF2 correction is +/-4 inches 95% of the time.

PROGRAMMING PROCEDURES

- **Install and Reprogram Components From Yield Mapping to a Guidance System:**
  Use this procedure when moving components from another vehicle. Use this programming procedure to manually re-program components to a guidance system.
- **Programming Components For Guidance System Operation—Automatic Software Load:**
  General programming procedure from most GreenStar systems to a guidance system. This procedure will program components for guidance systems operation in most cases.
- **Programming Second Display:**
  Use this procedure in conjunction with programming procedures to operate a guidance system using two displays.

OUO6050,00011AC –19–11AUG05–1/1

Reprogram From Yield Mapping

NOTE: Before operating either guidance system, verify your KeyCard has latest software available. Acquire latest version of software on Internet at www.stellarsupport.com, call 1888GRNSTAR or contact your John Deere dealer.

If a newer software is installed on KeyCard than on system automatic software load should start and load newest version of software (see Automatic Software Load later in this section).

When system is programmed for yield mapping and is moved onto another machine to be used for a Parallel Tracking or AutoTrac, system must be re-programmed.

The following procedures show basic programming steps needed to prepare system to operate in a guidance system mode. Mobile processor, display and position receiver **must be** re-programmed to operate in a guidance system mode.

Continued on next page

OUO6050,00011AD –19–11AUG05–1/4

IMPORTANT: If AutoTrac/Parallel Tracking display is used with a second display on same wiring harness, AutoTrac/Parallel Tracking display address must be set to auxiliary 1 after it has been re-programmed (See Re-programming Second Display). Other display (SPRAYSTAR™ or SEEDSTAR™ display) address must be set to primary (See procedures in SETUP section).

When re-programming a system with two displays, only one display can be connected to wiring harness at a time. Disconnect wiring harness connector from display not being re-programmed then reconnect after programming is completed. Repeat procedure on second display.

PC6433 –UN–04AUG00

A—KeyCard

NOTE: The re-programming steps shown below are for yield mapping systems with software version 6.32 or greater. (See your Yield Mapping operator's manual for re-programming information on all other versions.)

NOTE: Before starting re-programming make sure PC Data Card is removed from mobile processor.

1. Install KeyCard (A) into top slot of mobile processor.
2. Turn ignition key to RUN position.
3. Press letter button next to CONTINUE to cancel following warning messages.
   - KeyCard Warning
   - SETUP Data Missing
   - Data Network Error
4. Wait for RUN - PAGE 1 screen to appear.

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SEEDSTAR is a trademark of Deere & Company

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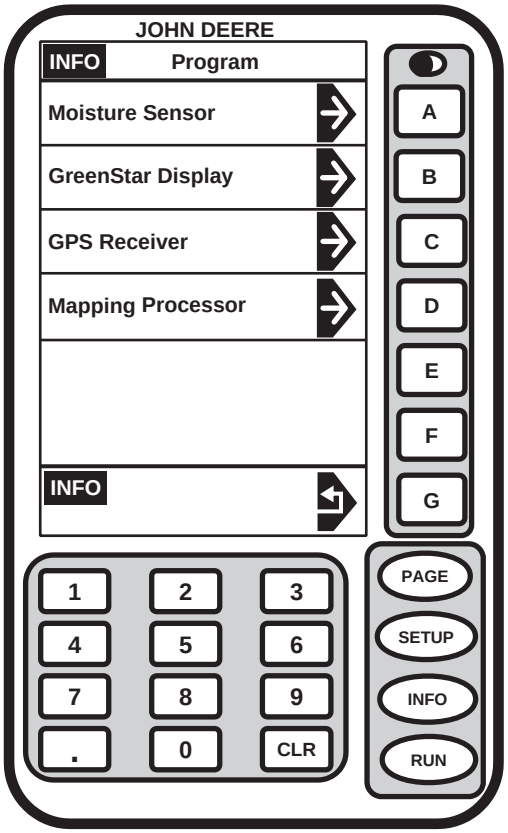
5. **Screen:** INFO - PROGRAM

   Press: INFO >> REPROGRAM >> PROGRAM TARGET >> MAPPING PROCESSOR

   If needed, cycle power to cancel programming.

NOTE: Some displays will produce the following message: DISPLAY COMMUNICATIONS OVERLOAD-RESET DISPLAY OR CYCLE POWER. If this message appears repeat REPROGRAM >> PROGRAM TARGET and immediately after pressing letter button next to PROGRAM TARGET, press D button. Repeat steps until software version appears.



PC6831 –19–07SEP01

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NOTE: To select correct KeyCard software, choose file starting with word KEY. (In this example KEY0R1_0.Y12 would be correct choice.)

If additional language needed to be loaded (see SETUP and Load a Language later in this section).

6. Press letter button next to KEYCARD SOFTWARE VERSION or if needed, cycle power to cancel programming.

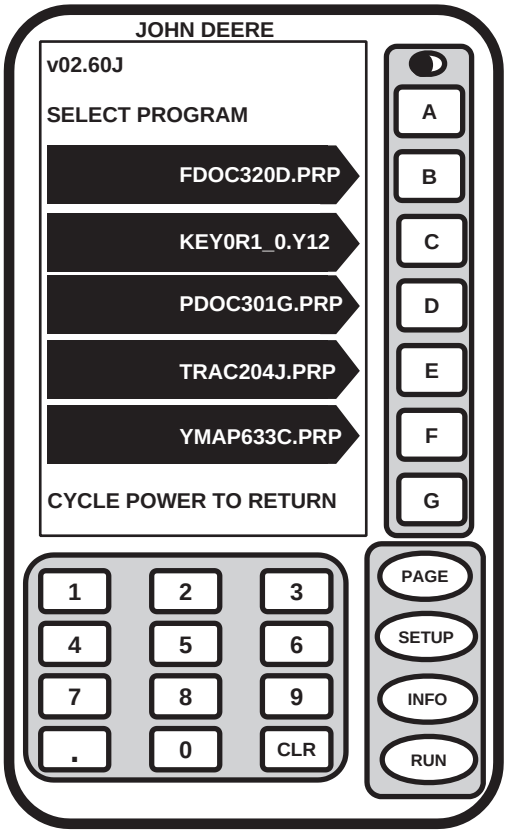
7. Wait until WARNING PROGRAMMING screen appears and follow directions on screen.

   DO NOT REMOVE PC CARD

   DO NOT REMOVE POWER

8. When programming is complete, PROGRAMMING COMPLETE screen may appear. If PROGRAMMING COMPLETE screen does appear, OK will be displayed in lower left corner.

9. Press letter button next to OK. Automatic software load will now begin.



PC7836 –19–06AUG03

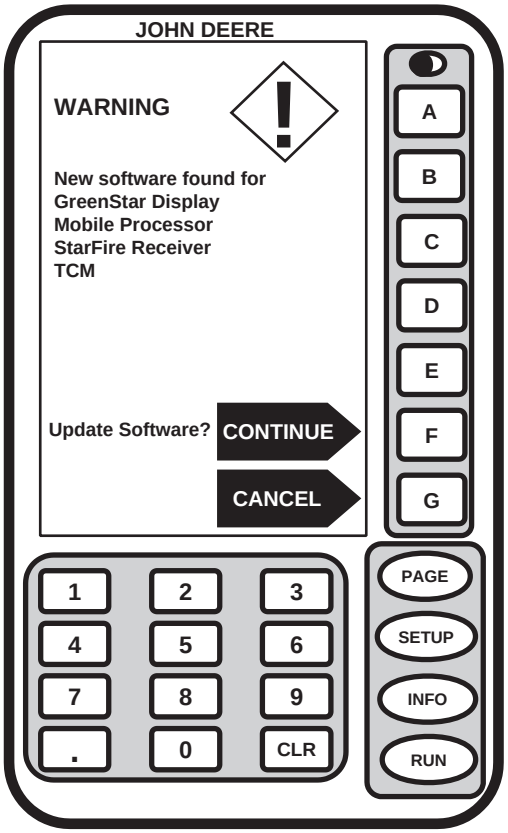
OUO6050,00011AD –19–11AUG05–4/4

Automatic Software Load

NOTE: Before operating either guidance system, verify your KeyCard has latest software available. Acquire latest version of software on Internet at www.stellarsupport.com, call 1888GRNSTAR or contact your John Deere dealer.

If you have Parallel Tracking or AutoTrac loaded on components and you insert a KeyCard with updated software into mobile processor, automatic software load should start after key switch is turned on. If Parallel Tracking or AutoTrac has not been previously loaded on components, proceed to step 2.

IMPORTANT: During these procedures you will be instructed to select an available option since display screens illustrated on following pages are provided for reference only. Your actual screens may appear differently due to connection of optional devices and/or software version in use.



PC7869 –19–29SEP03

1. Insert KeyCard with updated software into mobile processor. NEW SOFTWARE FOUND screen should appear. Press letter button next to CONTINUE to update software or letter button next to CANCEL to exit.

   Once programming is complete, PROGRAMMING COMPLETE screen should appear. Cycle power to complete process.

Continued on next page

2. **Screen:** SETUP - KeyCard

   Press: SETUP >> KEYCARD

   This screen will show all systems available on your KeyCard.

   If several systems are available on your KeyCard and you do not see system selection you wish to download on this screen page, press PAGE button to view additional selections.

3. Press letter button next to guidance system you wish to load to mobile processor (TRACKING for Parallel Tracking or AUTOTRAC).

4. Mobile processor is now being loaded with chosen guidance system program.

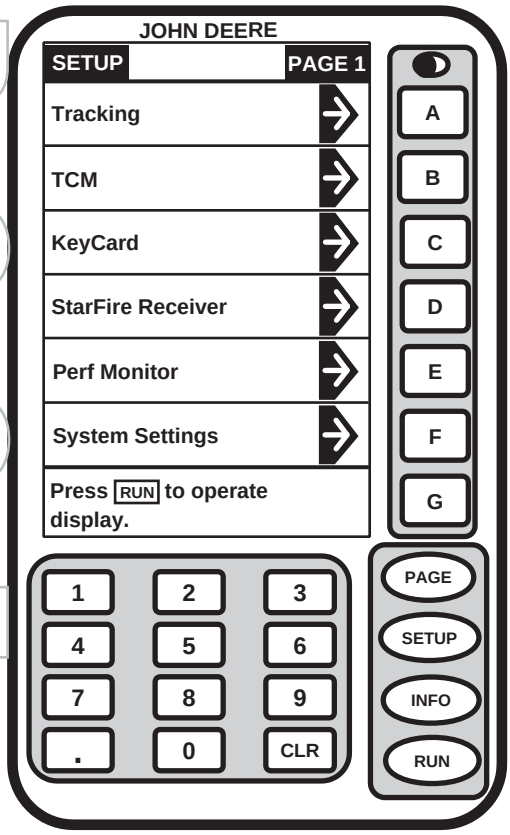
   DO NOT REMOVE PC CARD

   DO NOT REMOVE POWER

5. When prompted, press letter button next to CONTINUE to update component or letter button next to CANCEL to exit.

6. While KeyCard software is being installed in mobile processor, system will check software version on mobile processor, display, and position receiver. If KeyCard contains a more recent version of software, system will ask operator if they want to update with most recent version of software.

   Press letter button next to CONTINUE if new mobile processor loader update software is found.



PC7547 –19–27MAR03

Select KeyCard

Continued on next page

OUO6050,00011AE –19–10OCT05–2/3

NOTE: In order for automatic software load to operate correctly when two displays are being used, both displays (primary and auxiliary) must have most recent version of loader software. System will automatically update loader version for primary display. Auxiliary display must be manually updated. (See Re-programming Second Display in this section).

7. PROGRAMMING COMPLETE screen will appear once all components of system have been re-programmed. Cycle power to complete process.

OUO6050,00011AE –19–10OCT05–3/3

Re-Programming Second Display—If Equipped

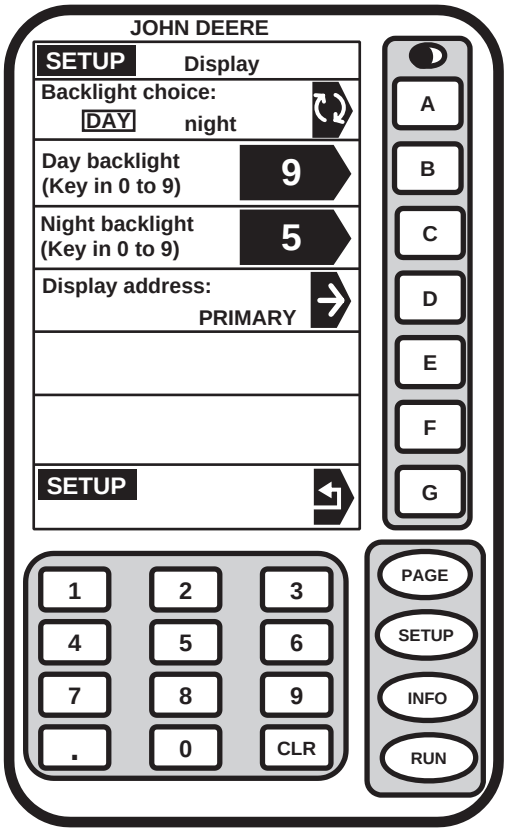
IMPORTANT: If AutoTrac/Parallel Tracking display is used with a second display on same wiring harness, AutoTrac/Parallel Tracking display address must be set to auxiliary 1 after it has been re-programmed. Other display (SPRAYSTAR or SEEDSTAR) address must be set to primary.

When re-programming a system with two displays, only one display can be connected to wiring harness at a time. Disconnect wiring harness connector from display not being re-programmed then reconnect after programming is completed. Repeat procedure on second display.

The main display (SPRAYSTAR or SEEDSTAR) must be set to primary display. Secondary display (Parallel Tracking/AutoTrac) must be set to AUXILIARY 1.

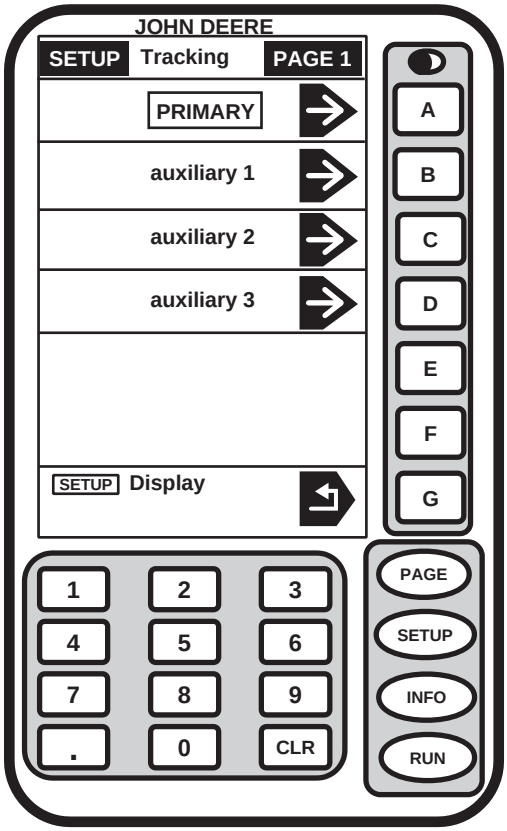
Continued on next page

OUO6050,00011AF –19–07SEP05–1/4



PC6792 –19–27AUG01

DISPLAY ADDRESS Set To PRIMARY Shown



PC6817 –19–07SEP01

Address Selection Page

NOTE: The AutoTrac/Parallel Tracking display must be changed back to primary when operating as a stand alone display.

The primary display (when operating dual displays) must be connected to CCD Bus in order for system to operate correctly.

Make sure auxiliary display is attached to auxiliary harness.

If tracking is on one display, then turned on other display original display will be turned off.

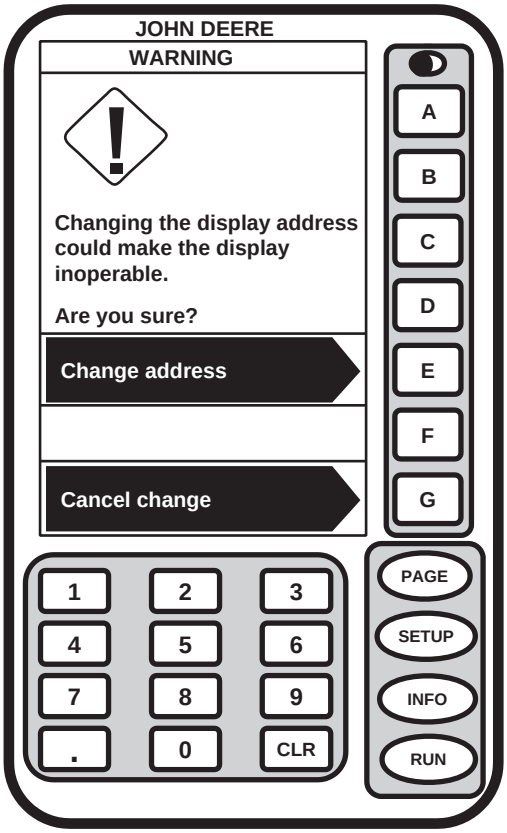
Information (i,e, Curve Track or Track 0) will not be transferred between displays.

1. **Screen:** SETUP - TRACKING - PAGE 1

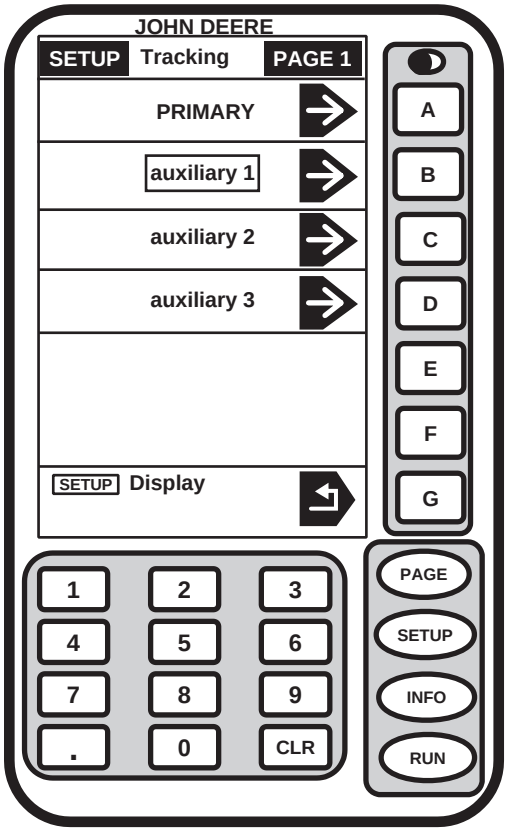
   Press: SETUP >> GREENSTAR DISPLAY >> DISPLAY ADDRESS

   This screen allows operator to change address of Parallel Tracking/AutoTrac display. Press letter button next to AUXILIARY 1.

Continued on next page



PC6390 –19–19MAY00



PC6389 –19–14JUN00

Change Address WARNING Screen

2. Warning screen will appear asking you to verify address change selected. Press letter button next to CHANGE ADDRESS to allow display address to be changed, or letter button next to CANCEL CHANGE to disregard selection.

3. Press letter button next to SETUP DISPLAY to exit and return to SETUP screen or press RUN button to go to RUN - PAGE 1 screen.

4. Turn ignition switch off.

5. Disconnect wiring harness connector from Parallel Tracking/AutoTrac display.

6. Connect second display.

7. Turn power on and automatic software load should begin. Press letter button next to CONTINUE to update software.

NOTE: When KeyCard software is installed in mobile processor and power is ON, system will check version of software on mobile processor, display, and position receiver. If KeyCard contains a more recent version of software, system will ask operator if they want to update with most recent version of software.

*In order for automatic software load to operate correctly when two displays are being used, both displays (primary and auxiliary) must have most recent (***1.7 or higher***) version of loader software. System will automatically update loader version for primary display. Auxiliary display must be manually updated.*

8. Press letter button next to CONTINUE if new mobile processor loader update software is found.

Continued on next page

NOTE: Re-programming will take a few minutes for each component.

Press letter button next to CONTINUE if new software is found for any remaining component.

9. When programming is complete, PROGRAMMING COMPLETE screen will appear. OK may be displayed in lower left corner.

   Press G button.

10. Turn key switch to OFF.

11. Connect wiring harness connector to other display.

12. Turn ignition switch on.

IMPORTANT: The display set to primary must be connected to main GreenStar wiring harness in order for AutoTrac to operate properly. Auxiliary display must be plugged into auxiliary harness. AutoTrac may be on either display.

NOTE: When operating AutoTrac or Parallel Tracking with two displays, only one display can have AutoTrac or Parallel Tracking active at a time. An error message will be displayed if AutoTrac or Parallel Tracking are active on more then one display at a time on same CAN Bus.

13. Setup Tracking. (See SETUP section).

OUO6050,00011AF –19–07SEP05–4/4

Tracking

NOTE: It is important that your system be setup properly. Read and follow each procedure in this section to assure proper operation of your guidance system.

Screen: SETUP - TRACKING - PAGE 1

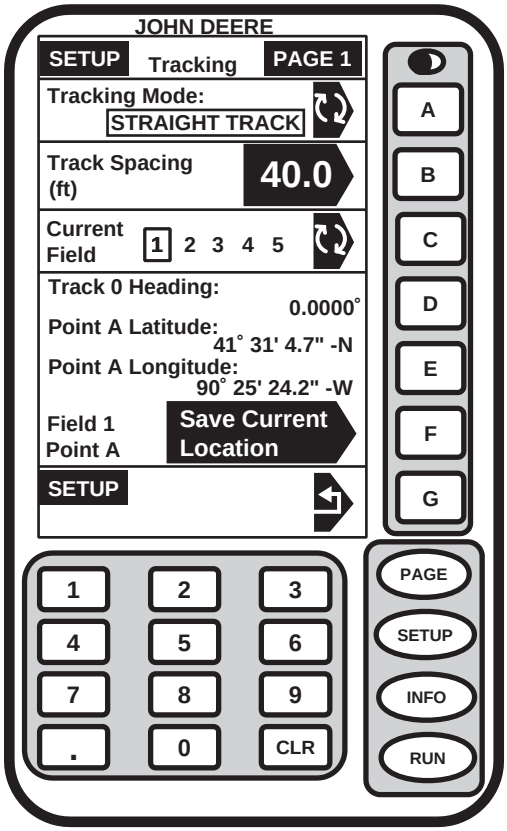
Press: SETUP >> TRACKING

NOTE: Depending on number of programs loaded on KeyCard, TRACKING may not appear on SETUP - PAGE 1 screen. Press PAGE button to access TRACKING.

This screen allows operator to prepare AutoTrac and Parallel Tracking for operation in field. Operator can select:

- **Tracking Mode:**
  - STRAIGHT TRACK
  - CURVE TRACK
  - CIRCLE TRACK
  - ROW FINDER (Parallel Tracking only)
- **Track Spacing**
- **Current Field**
- **Set A—B Line or Track 0**

Press letter button next to TRACKING MODE to toggle between STRAIGHT TRACK, CURVE TRACK, CIRCLE TRACK and ROW FINDER.



PC7414 –19–11NOV02

OUO6050,00011B0 –19–07SEP05–1/1

Straight Track

NOTE: Track 0 and A/B lines are two terms used interchangeably, We will use term Track 0.

Track Spacing and Track 0 must be set for operation of this mode.

Track 0 is the pass from which all parallel passes in field are based. Use following procedures to setup Track Spacing and Track 0.

Toggle to STRAIGHT TRACK by pressing letter button next to TRACKING MODE.

TRACK SPACING

1. Press letter button next to TRACK SPACING (FT).

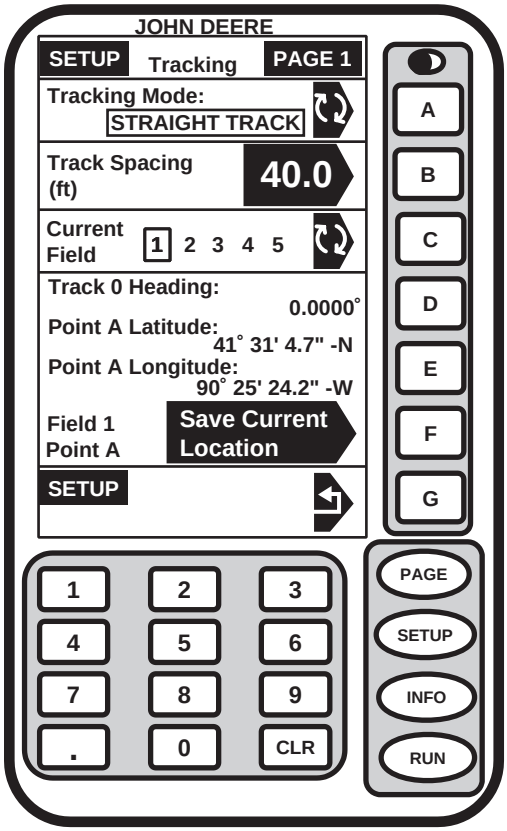
NOTE: Track spacing may require adjustment due to operator and/or GPS error. This is an operator preference option.

EXAMPLE: An operator may want to enter a slightly smaller width in Track Spacing than actual implement width to account for operator error while steering or GPS error. This is not recommended when using a row-crop planter.

The minimum setting for track spacing is 61 cm (2 feet). Default setting for tracking spacing is 9.0 m (30 ft). Maximum track spacing is 92.0 m (300 ft).

2. Enter implement width using displays numeric keypad.

3. Press letter button next to TRACK SPACING (FT) to save entered value.



PC7414 –19–11NOV02

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OUO6050,00011B1 –19–11AUG05–1/6

CURRENT FIELD

Current field is an important piece of AutoTrac/Parallel Tracking setup. The field number is where Track 0 information (Point A latitude and longitude and Track Heading) is stored for future use. If operator desires to perform multiple passes in same field throughout year (or years) and follow exact same passes, then they would recall corresponding field number. For example, during planting, operator sets up a Track 0 for a specific field and has Current Field set to 3. When operator came back to spray field a couple of months later, they would select Field 3 on Current Field and Track 0 that was setup during planting would be recalled. Then when they returned to Harvest field, they could select Field 3 and that same Track 0 would be recalled for harvest operation.

Continued on next page

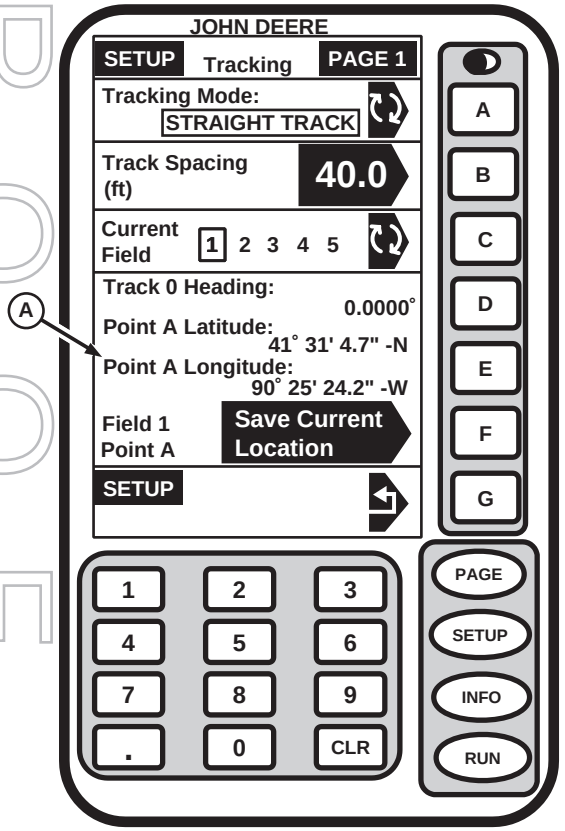
NOTE: When returning to field to perform subsequent applications, it may be necessary to use SHIFT TRACK to compensate for GPS Drift. Please see Shift Track description in Operating section for more information.

The Current Field is not related to Farm/Field information in Field Doc, Combine Yield Mapping or Harvest Doc.

There are two options for the Current Field - without a PC Card and with a PC Card. If a PC Card is **NOT** inserted in mobile processor, only 5 fields (or Track 0's) can be saved to display. If a PC Card is inserted in mobile processor, then 250 fields (or Track 0's) can be saved to PC Card. Fields 1-5 remain on display, but Fields 6-250 will be saved to PC Card. Track 0 information assigned to that field number will remain saved until a new Track 0 is setup assigned to that number.

IMPORTANT: If an operator wants to save Track 0 to a specific field in Current Field cell, it is important to remember to change Current Field to a different number when setting up a new Track 0.

NOTE: When system is powered up, display defaults to last CURRENT FIELD number selected when it was shut down. If no CURRENT FIELD information has been stored display, it will default to selection 1.



PC7404 –19–05NOV02

A—Display Cell

The following procedures describe how to select current field.

1. **To select a current field:** Go to SETUP - TRACKING - PAGE 1 screen.

2. CURRENT FIELD cell in this graphic shows selection number 1 of 5 available when not using a PC Card or 1 of 250 when using a PC Card. To select number (1—250) that you wish to save field information to: press letter button next to CURRENT FIELD, select number using displays numeric keypad, press letter button next to CURRENT FIELD.

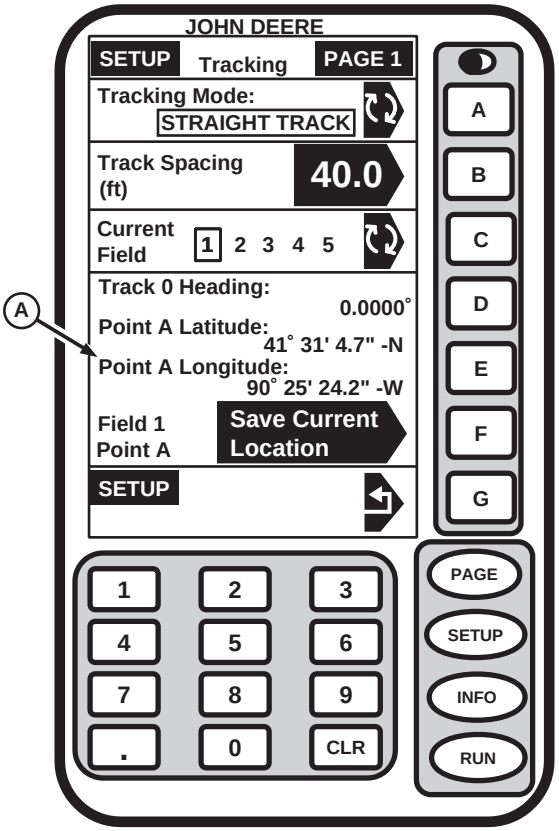
3. Setup Track 0 as explained in TRACK 0 in this section.

Continued on next page

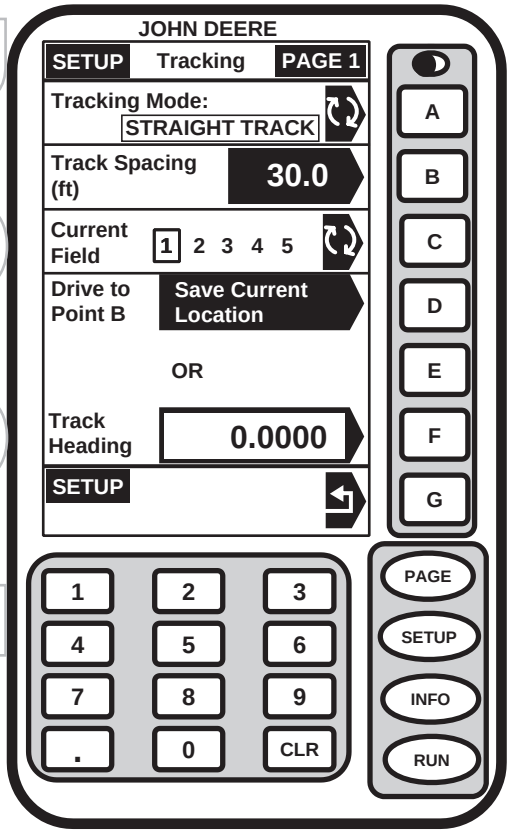
IMPORTANT: Remember to select a new number (1—250) before setting new Track 0 heading, and pressing letter button next to CURRENT FIELD or current coordinates for that number will be overwritten.

4. **To Display a Previously Saved Field:** Go to SETUP - TRACKING - PAGE 1 screen.
5. Press letter button next to CURRENT FIELD.
6. Select number field was saved on using displays numeric keypad.
7. Selections coordinates will now be shown in display cell (A).

Continued on next page



Defining Point A



Defining Point B

A—Point A Latitude and Longitude

TRACK 0

NOTE: If NOT DEFINED appears for Track 0 heading and Point A latitude and longitude, this means that a track has not been defined for that field yet. Follow steps below to setup Track 0.

1. Drive machine to desired starting location in field.
2. Press letter button next to SAVE CURRENT LOCATION. This is A point for your A—B line.
3. Select desired method and define point B.

NOTE: It is required to drive a longer distance than 3m (10 ft) to set point B.

a. Drive machine to desired point B.

Press letter button next to DRIVE TO POINT B SAVE CURRENT LOCATION. This is point B for your A—B line. A straight line is then defined through points A and B. This is your Track 0.

NOTE: 0.000 indicates north, 90.000 east, 180.000 south, and 270.000 west. Save value by pressing F button again.

b. Press letter button next to TRACK HEADING. Using numeric keypad, manually enter direction/heading of Track 0. You have now determined a path in which to parallel travel on the next pass(es).

Continued on next page

NOTE: If two or more vehicles are operating in same field at same time, one method of assuring that all vehicles will be using same heading is to use method b for establishing Track 0. However, if that is not possible, then have first vehicle establish a Track 0 using method A. Once Track 0 has been established, Track 0 Heading will be displayed on SETUP - TRACKING - PAGE 1 screen. The rest of the vehicles can then use Method b. to establish a Track 0 and enter heading that the first vehicle established when they set their Track 0.

If operator owns a data card, A-B line can be saved in any field 6-250. This A-B line can be transported to other tractors or copied to other data cards and used in multiple tractors in same field.

OUO6050,00011B1 –19–11AUG05–6/6

Row Finder

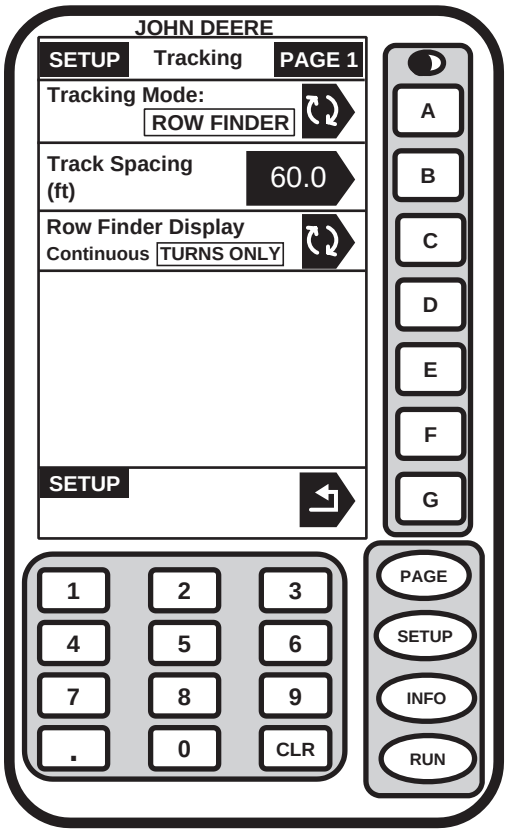
NOTE: Only Parallel Tracking will operate in Row Finder mode.

RowFinder is only available on RUN Full Page (Not RUN - PAGE 1 screen or RUN - PAGE 2 screen).

1. Press letter button next to TRACKING MODE to toggle to ROW FINDER. ROW FINDER will be shown boxed and in capital letters.

NOTE: Continuous, navigation line will remain visible on display. TURNS ONLY, navigation line will remain on display for a distance of four times the track spacing from where letter button next to SET ROW was pressed on RUN screen.

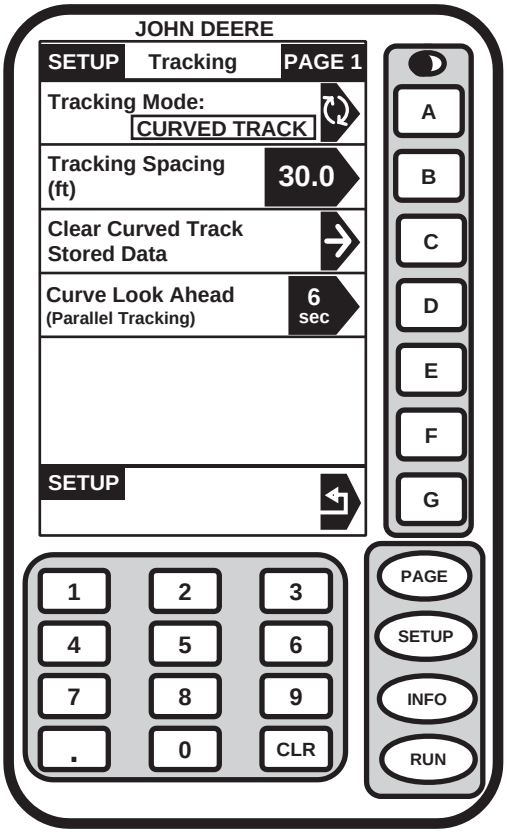
2. Press letter button next to ROW FINDER DISPLAY to toggle between CONTINUOUS and TURNS ONLY. Selection will appear boxed and in capital letters.



PC6983 –19–07JAN02

OUO6050,00011B2 –19–11AUG05–1/1

Curve Track



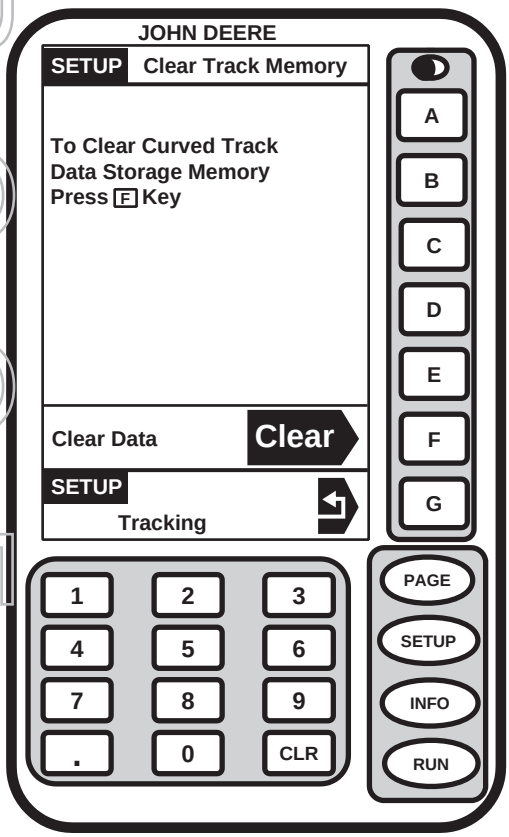
PC7280 –19–09OCT02

NOTE: To set track spacing (see Track Spacing earlier in this section).

To select CURVE TRACK press letter button next to TRACKING MODE until CURVE TRACK is shown boxed in capital letters. To operate Curve Track, track spacing must be setup.

IMPORTANT: The operator must stop machine before clearing Curve Track stored data.

When operating Curve Track with ACCUDEPTH™, after operator presses letter button next to CLEAR CURVE TRACK STORED DATA, system prompts user to cycle power to clear memory.



PC7411 –19–06NOV02

NOTE: The amount of free memory will be displayed in RUN - TRACKING screen.

When beginning a new field contents of stored data must be cleared. To clear stored data press letter button next to CURVE LOOK AHEAD on SETUP - TRACKING - PAGE 1 screen. SETUP - CLEAR TRACK MEMORY screen will appear. Press F button to clear memory or G button to cancel.

Curve Track Look Ahead

This option allows operator to change how far ahead system looks (in seconds) when operating in Curve track mode. Default setting is 6 seconds.

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Continued on next page

This option is used when operating at higher speeds and operator desires system to search further ahead for line segments.

When operating in Curve track mode, Curve look ahead can be changed from 0—9 seconds. Press C button, then enter desired selection using numeric key pad.

OUO6050,00011B3 –19–07SEP05–2/2

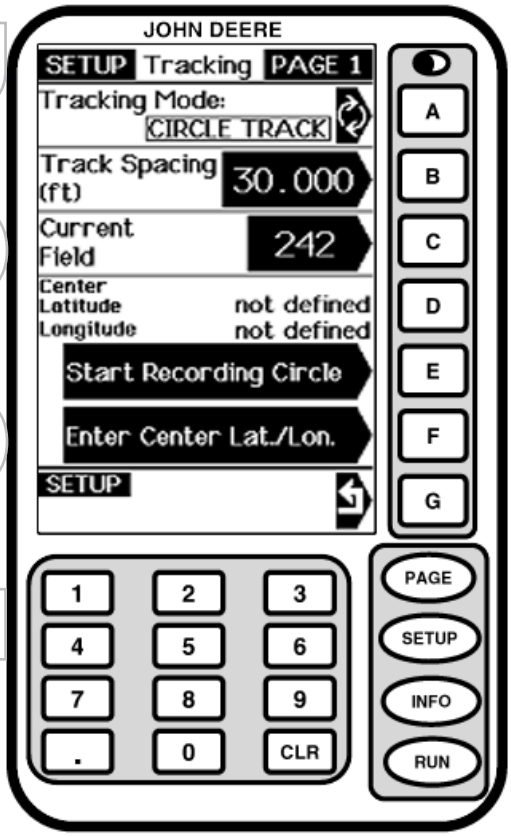
Circle Track

The Current Field is not related to Farm/Field information in Field Doc, Combine Yield Mapping or Harvest Doc.

IMPORTANT: A PC Data Card is REQUIRED for Circle Track Operation.

Current Field-Circle Center coordinates for Fields 1-250 are saved to the PC Card in Circle Track Mode. Circle Center coordinates assigned to that field number will remain saved until a new Circle Center is assigned to that number. To avoid overwriting Circle Center information, change the Current Field number before creating a new Center Circle.

NOTE: When system is powered up, display defaults to last CURRENT FIELD number selected when it was shut down. If no CURRENT FIELD information has been stored display, it will default to selection 1.



PC8694 –19–11AUG05

Select Current Field

1. Go to SETUP – TRACKING - PAGE 1 screen.
2. CURRENT FIELD cell shows 1 of 250 with a PC Card. To select number (1—250) that you wish to save field information to: press CURRENT FIELD button , select number using displays numeric keypad, press CURRENT FIELD button.
3. Setup Circle Center as explained in the setting Circle Center in this section.

IMPORTANT: Remember to select a new number (1-250) before setting new Circle Center, and pressing CURRENT FIELD button or current coordinates for that number will be overwritten.

4. To Display a Previously Saved Field: Go to SETUP - TRACKING - PAGE 1 screen.
5. Press CURRENT FIELD button.
6. Select number field was saved on using displays numeric keypad.
7. Selections coordinates will now be shown in display cell (A).

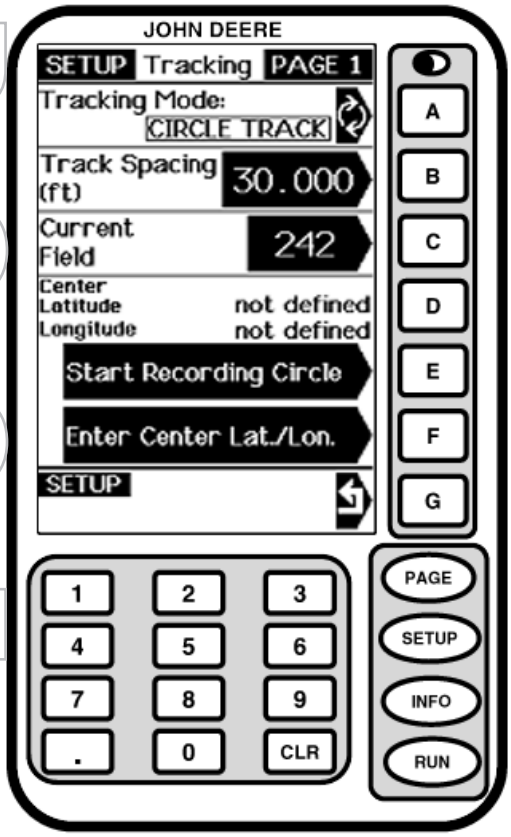
Continued on next page

Setting Circle Center

Circle Center – Driving the Circle

NOTE: If NOT DEFINED appears for Circle Center latitude and longitude, this means that a center has not been defined for that field yet. Follow steps below to setup Circle Center.

1. Drive machine to desired starting location in field.
2. Press “START RECORDING CIRCLE” button. This is the start point for your circle.



PC8694 –19–11AUG05

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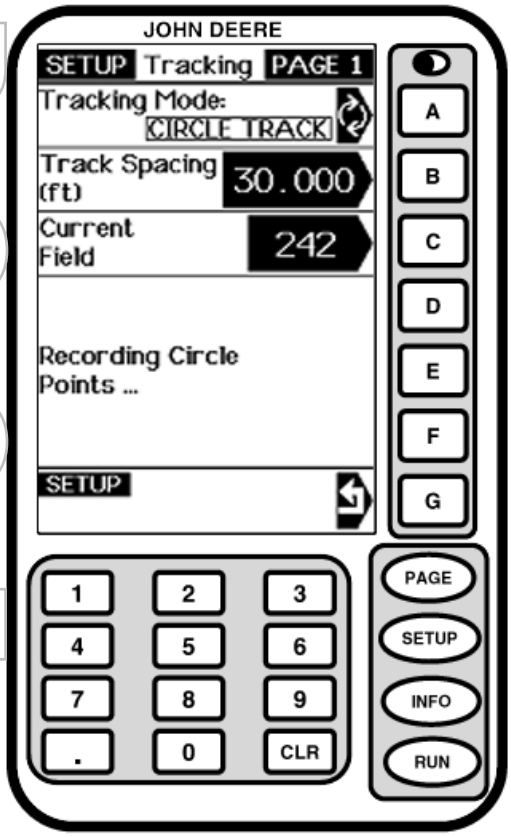
OUO6050,00011B4 –19–10OCT05–2/5

3. Drive desired circle.

NOTE: It is required to drive over 1/2 of the circle before you can calculate the center. The more of the circle you drive the more accurate the circle center will be.



PC8696 –19–11AUG05

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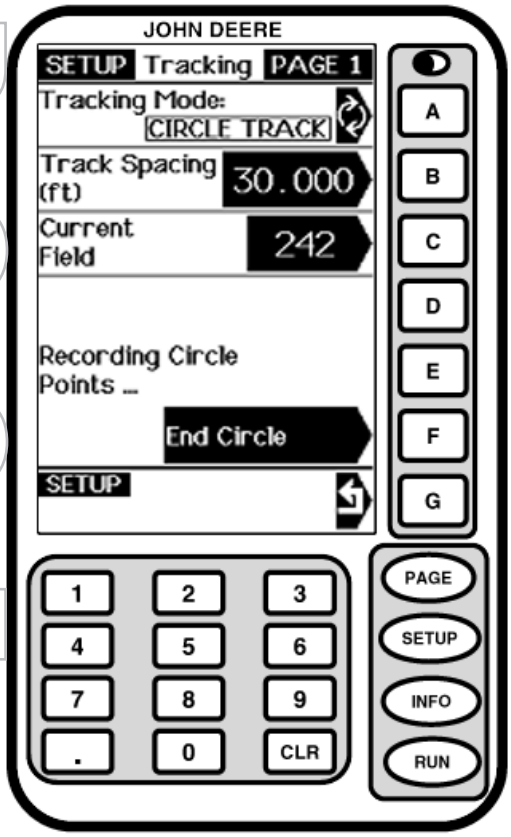
OUO6050,00011B4 –19–10OCT05–3/5

4. Press the “End Circle” button to complete the circle Track. This calculates the circle center.



PC8697 –19–11AUG05

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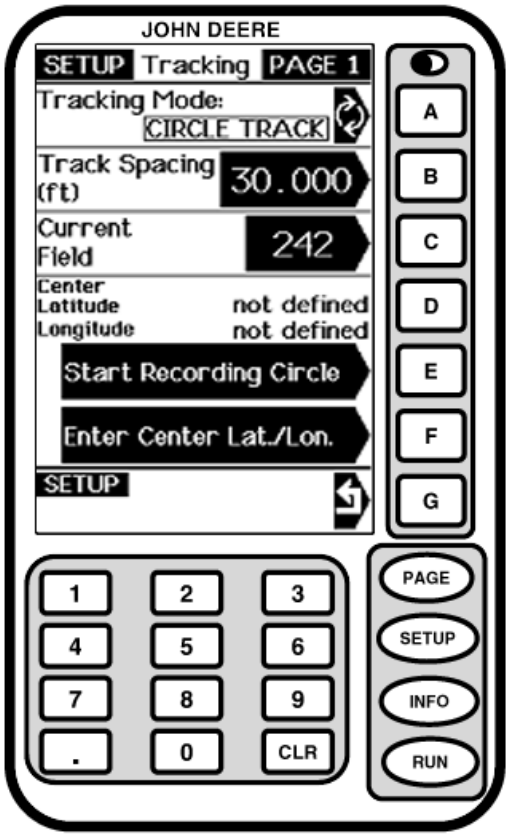
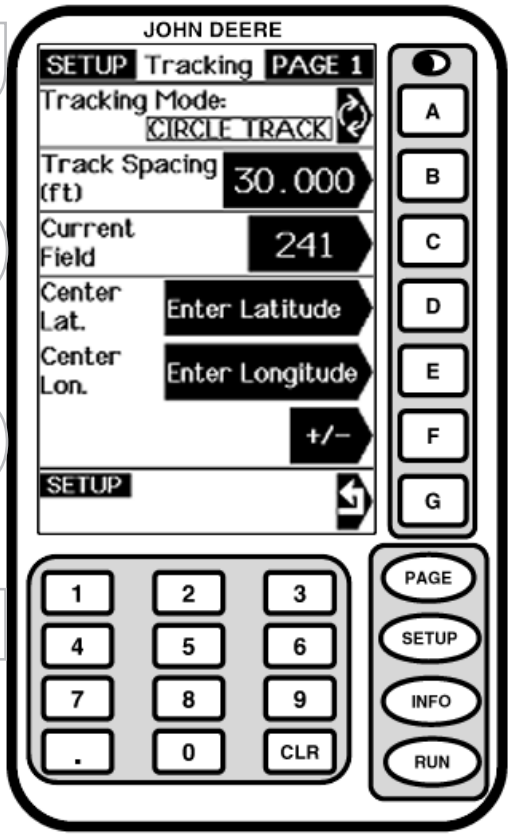
OUO6050,00011B4 –19–10OCT05–4/5



PC8694 –19–11AUG05



PC8699 –19–11AUG05

Circle Center – Entering the Circle Center

1. Press letter button next to ENTER CENTER LAT/LON. This enters the coordinates for the center of the circle.
2. Press letter button next to ENTER LATITUDE and enter coordinate.
3. Press letter button next to ENTER LONGITUDE and enter coordinate.

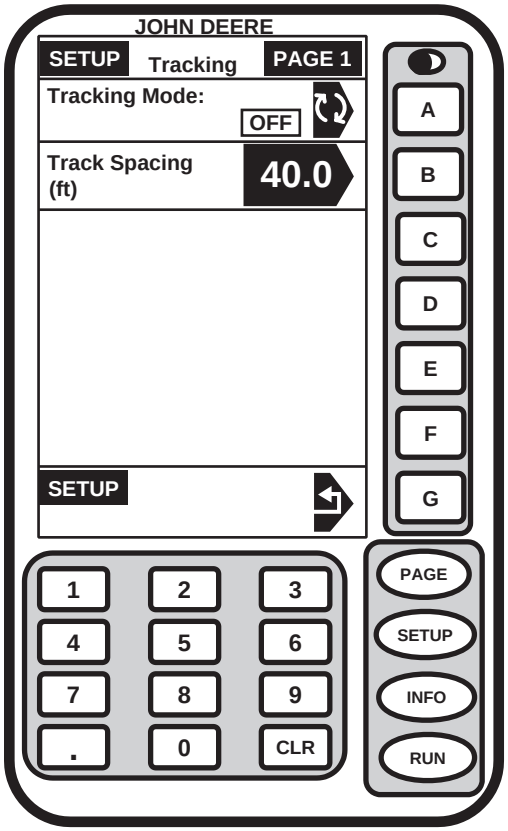
This enters the circle center, and shows concentric tracks based upon the track spacing.

OUO6050,00011B4 –19–10OCT05–5/5

Turn Tracking Off

Press letter button next to TRACKING MODE to turn Parallel Tracking and AutoTrac on or off.

When tracking is off, it will be removed from RUN screens and display can be fully utilized by other applications.



PC6996 –19–10JAN02

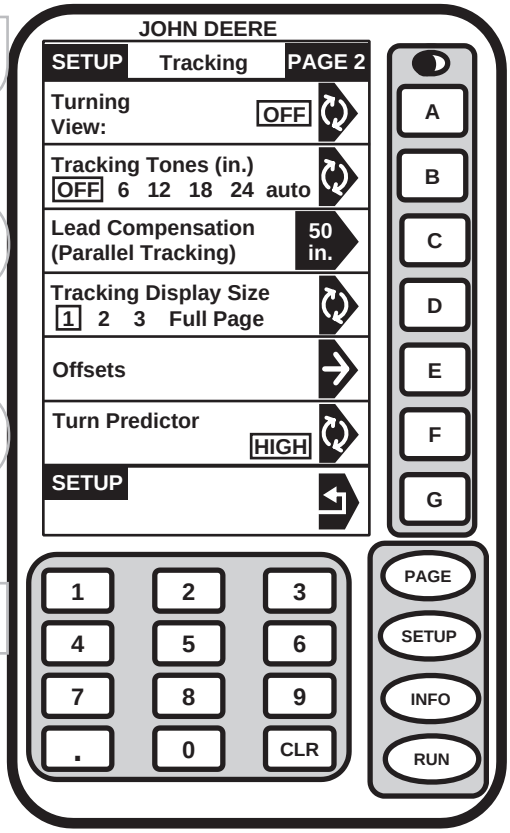
OUO6050,00011B5 –19–11AUG05–1/1

SETUP - TRACKING - PAGE 2

Screen: SETUP - TRACKING - PAGE 2

Press: SETUP >> TRACKING >> PAGE

This screen allows operator to turn turning view ON/OFF, set tracking tone, insert lead compensation, change tracking display size, set offsets, and set turn predictor OFF, HIGH or LOW.



PC8403 –19–26OCT04

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Turning View

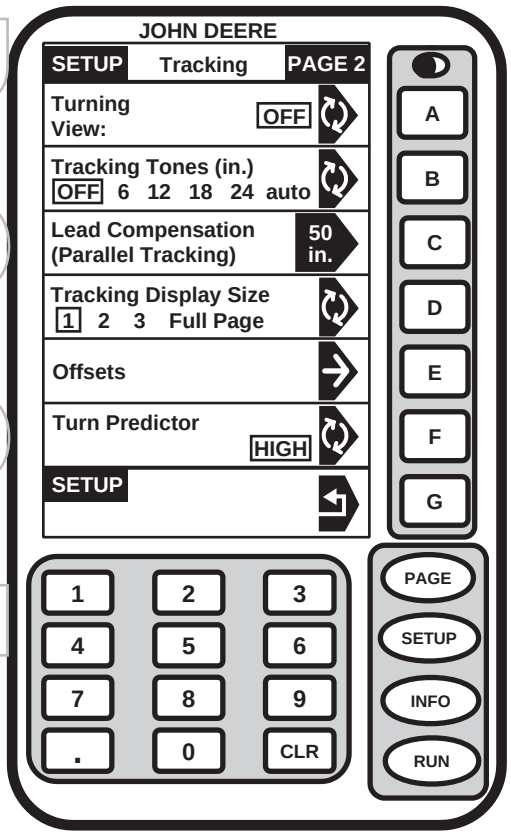
NOTE: Track 0 must be established for current field for turning view to be active.

Press letter button next to TURNING VIEW to set turning view on or off.

Turning view provides a visual indicator of machine in relationship to closest track as machine turns. This view can be used as a guide when turning into next track. Operator can see relationship between machine and track.

Turning View will appear in Straight Track and Row Finder modes once vehicle has turned more than 45° from track heading. RUN screen will revert back to normal once vehicle is within approximately 5° of track.

Turning view does not work in Curve Track mode.



PC8403 –19–26OCT04

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Tracking Tones

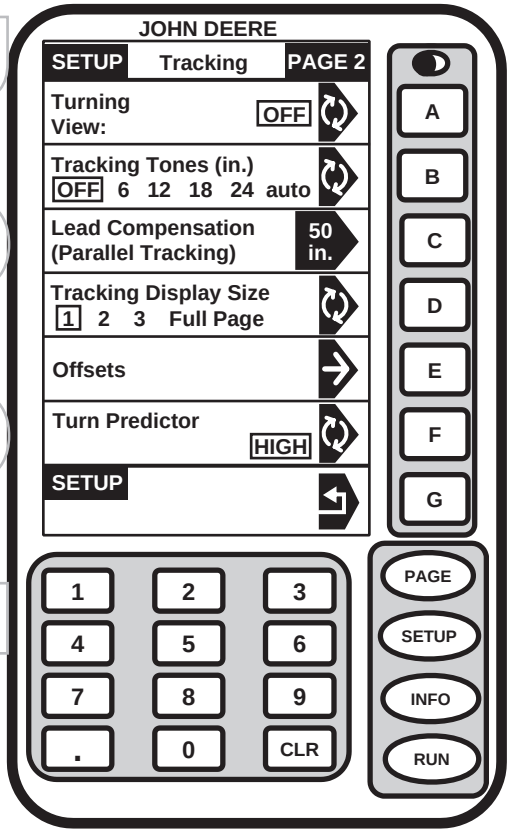
Press letter button next to TRACKING TONES (IN.) to toggle between tracking tone selections. Tones can be set to sound when a desired off track error is reached. This selection also allows tracking tones to be turned off.

Tracking tones can be used as an audible indication of steering direction. If track is to the right of machine, two low beeps will sound, if to the left of machine a single high beep will sound. Alarm will repeat twice a second until off-track error between machine and desired track is outside threshold as described below.

The following shows off track error thresholds, at which tones can be set to turn on and off.

- 15 cm (6 in) on = 30 cm (12 in) off
- 30 cm (12 in) on = 102 cm (40 in) off
- 45 cm (18 in) on = 152 cm (60 in) off
- 60 cm (24 in) on = 203 cm (80 in) off
- Auto 15 cm (6 in) on = 203 cm (80 in) off

When auto mode is selected frequency of tone increases as off track error increases.



PC8403 –19–26OCT04

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OUO6050,00011B6 –19–17OCT05–3/11

Shift Track

NOTE: Shift Track is only available in Full Page Mode. Since all tracks are based on original track 0, all tracks will be shifted by using this feature.

In Circle Track mode Shift Track is not used to compensate for GPS drift. Shift Track increases of decreases the circumference of the Track the vehicle is on. If the center Shift Track button is pressed the Track will be centered on the vehicles current location.

Shift Track allows an operator to increase or decrease the circumference of the Track the vehicle is on to the right or left three hundredths of a meter or one tenth of a foot depending on selection of unit standard. Operator may also recenter display line on icon.

To move line to left press 1 on numeric keypad. To move line to right press 3 on numeric keypad. Each time button is pressed, line will move three hundredths of a meter or on tenth of a foot to the right or left. To re-center line on the vehicle's current location press 2 on numeric keypad

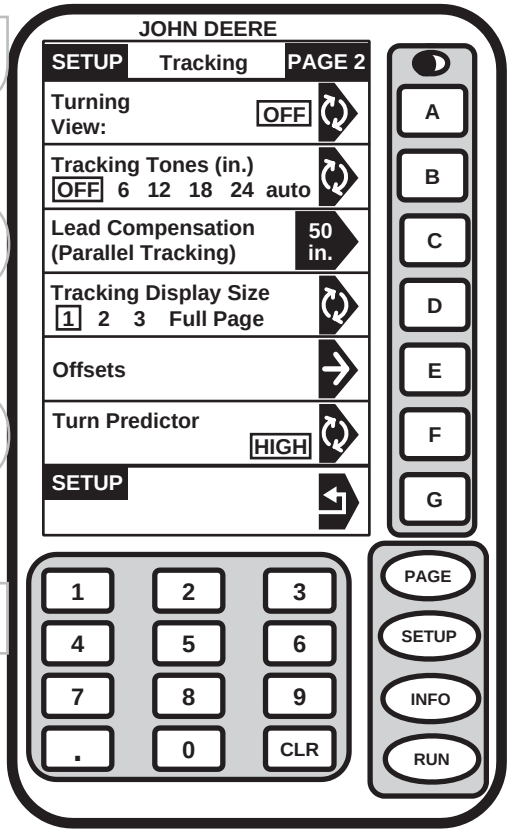
Continued on next page

Tracking Lead Compensation

NOTE: This feature is disabled when working in Curve Track.

Tracking lead compensation is used to calculate a position in front of receiver more closely associated with front of machine. Tracking lead compensation helps minimize over steering when lining up with a track and position delays observed when making a turn. Value entered will depend on speed of travel, type of machine, and user preference. Default setting for lead compensation is 127 cm (50 in.). Settings range from 0—250 cm (0—100 in).

Recommended Tracking Lead Compensation	
Machine Type	**Lead Compensation**
Sprayer	183 cm (72 in)
Combines	183 cm (72 in)
Row Crop Tractor	71 cm (28 in.)
Articulated Tractor	203 cm (80 in.)
Track Tractors	127 cm (50 in.)



PC8403 –19–26OCT04

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OUO6050,00011B6 –19–17OCT05–5/11

Tracking Display Size

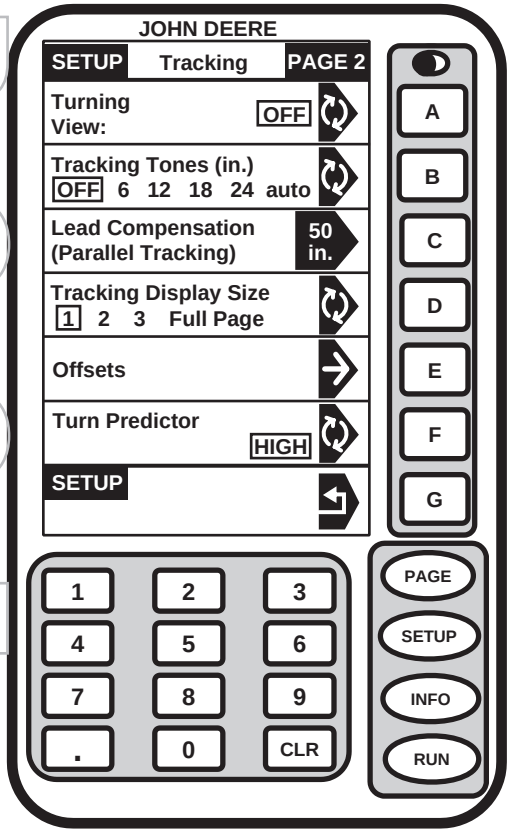
NOTE: When tracking display size is changed, performance monitor information will not be displayed on RUN - PAGE 1 screen until power is cycled.

When full page mode is selected, tracking information will be displayed on RUN - PAGE 3 screen.

Aerial view (Curve track mode only) can only be accessed from full page mode. Full page mode can either be selected on SETUP - TRACKING - PAGE 2 screen or by pressing letter button next to FULL PAGE on RUN - PAGE 1 screen.

Press letter button next to TRACKING DISPLAY SIZE to change tracking display size. Tracking display size will specify number of sections that will be used on RUN - PAGE 1 screen. Tracking display size allows operator to choose appropriate size of RUN - PAGE 1 screen is based on what other applications are using display.

Tracking Display Size	
Setting	**Size of Display**
1	1 Cell Displayed
2	2 Cells Displayed
3	3 Cells Displayed
Full Page	0 Cells Page 1 and 2; All Cells Page 3



PC8403 –19–26OCT04

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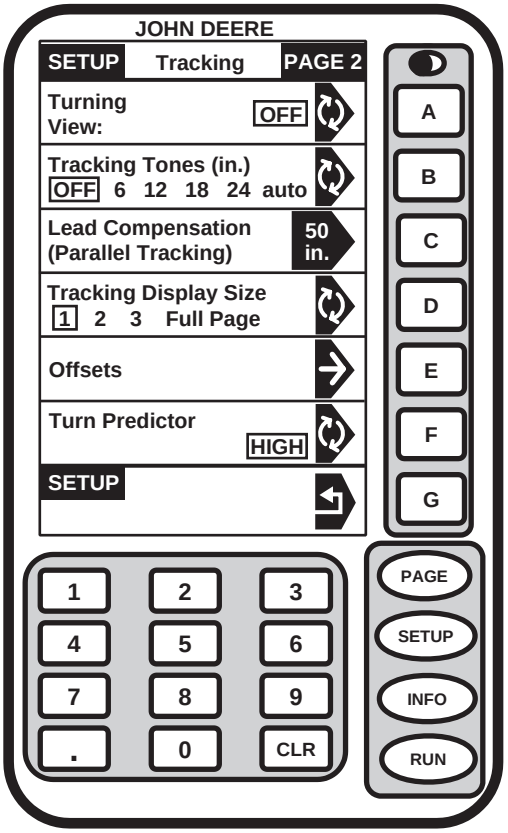
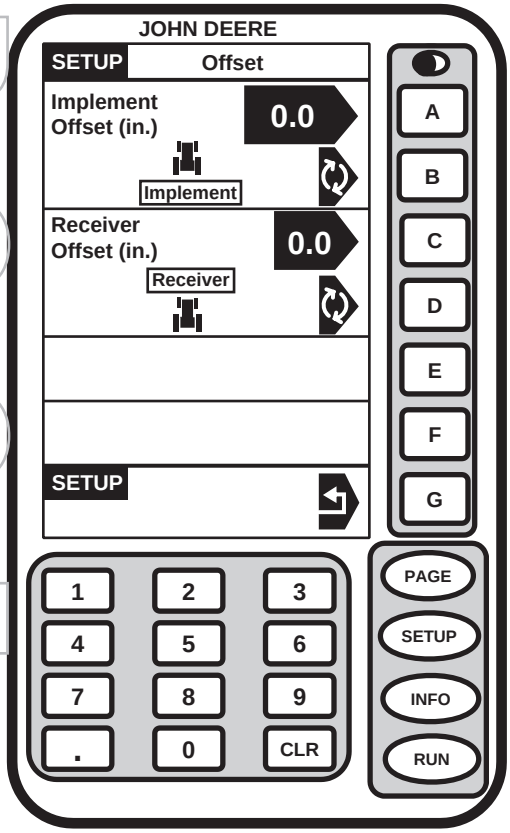
OUO6050,00011B6 –19–17OCT05–6/11



PC8403 –19–26OCT04

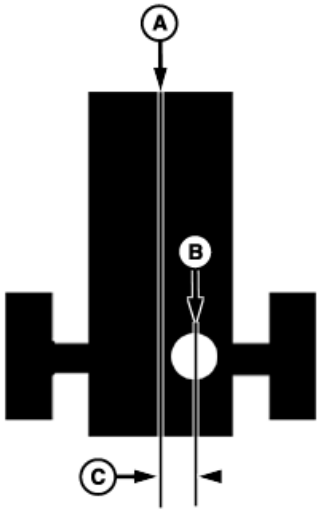


PC8405 –19–26OCT04

Offsets

This feature is used to eliminate skips or overlaps due to an offset receiver or implement, or an implement that does not track directly behind machine. If an offset is required, press letter button next to OFFSETS to bring up IMPLEMENT OFFSET and RECEIVER OFFSET screens.

Press letter button next to RECEIVER OFFSET to highlight cell. The distance between center of machine (A) and center of receiver (B) to determines receiver offset (C). Enter amount of offset in centimeters/inches using numeric keypad. Press letter button next to RECEIVER OFFSET again to save offset amount. Press letter button next to RECEIVER to select direction of offset. If no receiver offset is required, then RECEIVER OFFSET cell should read 0.



PC8404 –UN–19OCT04

A—Center of Machine
B—Center of Receiver
C—Receiver Offset

Continued on next page

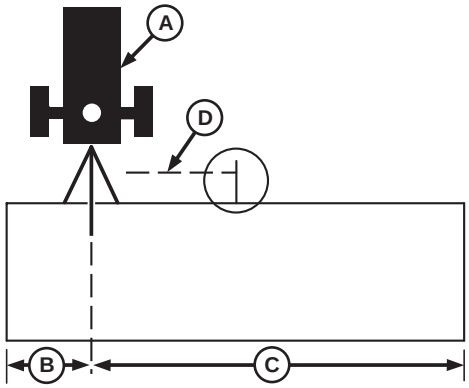
OUO6050,00011B6 –19–17OCT05–7/11

Press letter button next to IMPLEMENT OFFSET to highlight cell. Enter amount of offset in centimeters/inches using numeric keypad. Press letter button next to IMPLEMENT OFFSET again to save offset amount. Press letter button next to IMPLEMENT to select direction of offset. If no implement offset is required, then IMPLEMENT OFFSET cell should read 0.

There are two scenarios where implement offset is used.

Continued on next page

Scenario 1 Offset Implement: When an offset implement is used (such as an offset disk), enter distance required to move position of receiver (A) to center of implement. For example, if you are using a 6.1 m (20 ft) offset disc with 3.7 m (12 ft) to right of hitch and 2.4 m (8 ft) to left of hitch, enter 61 cm (24 in.) in Implement Offset cell and press letter button next to IMPLEMENT until implement is displayed to right side of machine icon. This will position receiver 61 cm (24 in.) to right, so it is in center of implement.



PC7369 –UN–06NOV03

A—Position Receiver
B—Distance to Left-End of Implement
C—Distance to Right-End of Implement
D—Amount of Offset

The following steps are used to set implement offset.

1. Measure total width of implement and enter this as track spacing on SETUP - TRACKING - PAGE 1 screen.
2. Measure distance from center of hitch to left-end of implement (B).
3. Measure distance from center of hitch to right-end of implement (C).
4. Subtract smaller number from larger number and divide by 2. This is amount of offset (D) that needs to be entered in cell next to IMPLEMENT OFFSET.
5. Press letter button next to IMPLEMENT OFFSET and enter amount from step 4 in centimeters (inches).
6. Press letter button next to IMPLEMENT OFFSET again to save setting.
7. Press letter button next to IMPLEMENT to toggle implement icon in cell to larger side of implement offset. Example: If larger part of implement is to left-hand side of tow vehicle, implement icon must be toggled to left-hand side of cell.
8. Set Track 0 (See Set Track 0).

Continued on next page

Scenario 2 Implement always pulls to one side (right or left) during field operation: This scenario typically results from improper implement setup or operation. Check implement operator's manual to ensure implement is setup and operating correctly. Before setting implement offset make sure appropriate track spacing is entered in SETUP - TRACKING - PAGE 1 screen. If there still is skip or overlap then use following procedures. This may help eliminate or lessen effect of skips or overlaps.

NOTE: Implement offset will not compensate for side draft resulting from operating on sloped or uneven terrain.

To determine how much and which direction to set implement offset, use following procedures.

1. Set offset in cell next to Implement Offset to 0 (unless operating an offset implement as described in Scenario 1).

2. Set track spacing and Track 0 (See SETUP section).

3. Make a complete pass up one track and back down a consecutive track. Stop before completing second pass. There are three possible results:

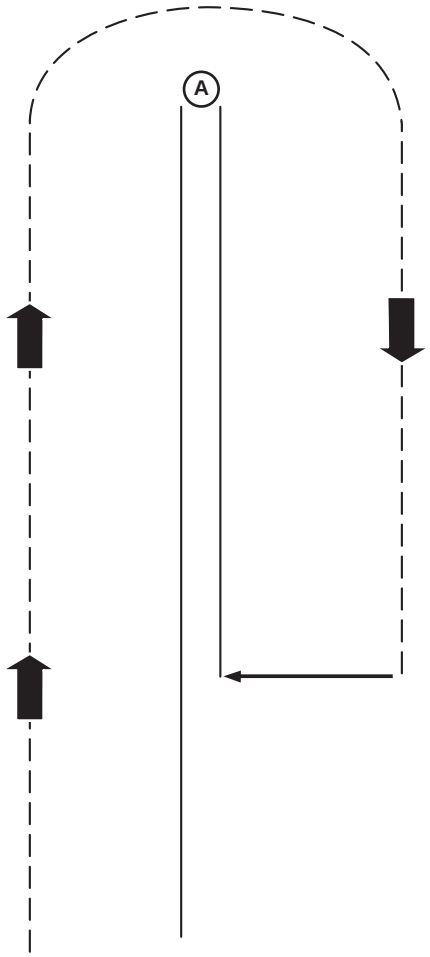
   1. One pass overlapping other.
   2. The two passes do not meet resulting in a skip.
   3. No overlap or skip (no further action required).

4. Measure amount of overlap or skip (A) and divide by 2. This is the amount of offset that needs to entered in cell next to IMPLEMENT OFFSET.

5. Press letter button next to IMPLEMENT OFFSET and enter amount of offset in centimeters (inches).

6. Press letter button next to IMPLEMENT OFFSET again to save this value.

7. Press letter button next to IMPLEMENT to move direction of offset. (See next page for examples.)



PC7370 –UN–28OCT02

A—Amount of Skip

Continued on next page

a. If passes result in an overlap, press letter button next to IMPLEMENT to move implement icon towards overlap. If overlap is on right side of implement, press letter button next to IMPLEMENT until icon is to right, if overlap in on left, press letter button next to IMPLEMENT until icon is to left.

b. If two passes result in a skip, press letter button next to IMPLEMENT to move implement icon away from skip. If skip is on right side of implement, press letter button next to IMPLEMENT until icon is on left. If skip is on left side of implement press letter button next to IMPLEMENT until icon is on right.

OUO6050,00011B6 –19–17OCT05–11/11

Turn Predictor

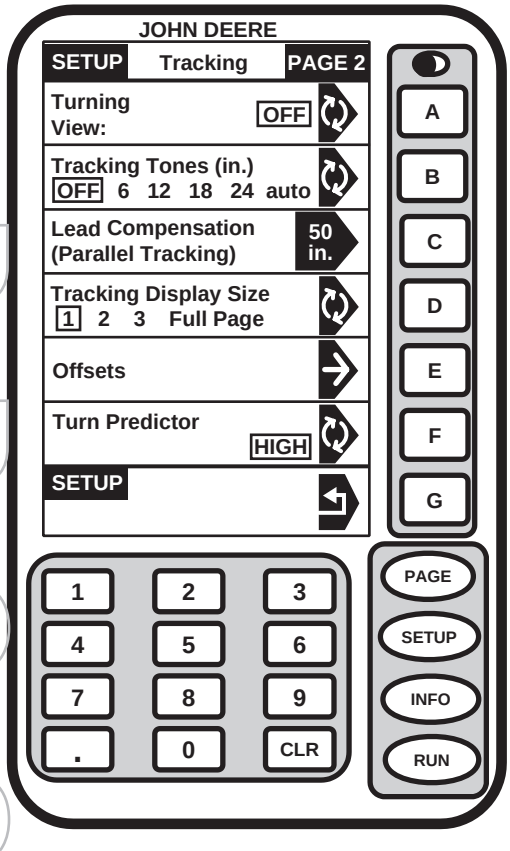
Turn Predictor is intended to only predict turn point of a vehicle using Parallel Tracking or AutoTrac. **It is NOT a headland warning.** Because actual field boundary is unknown, turn predictions are based solely on previous turn behavior of vehicle. Turn predictions will not coincide with field boundary if field boundary is not linear and continuous, or if operator makes turns before or after field boundary.

Parallel Tracking

Turn Predictor will default to ON. To turn off go to SETUP - TRACKING - PAGE 2. Toggle indicator to OFF. TURN: OFF will be displayed on RUN full page. Once turned OFF, it will remain off through power cycles until manually turned back on by operator.

AutoTrac

Turn Predictor will default to ON after every power cycle or after every seat switch timeout. To turn off go to SETUP - TRACKING - PAGE 2. Toggle indicator to OFF. Turn Predictor can not be turned off on vehicles with out an operator presence switch tied to CAN line. Once turned OFF, it will remain off only until next power cycle, seat switch timeout, or if manually turned back on by operator.



PC8403 –19–26OCT04

OUO6050,00011B7 –19–11AUG05–1/1

Integrated AutoTrac Kit

Setup

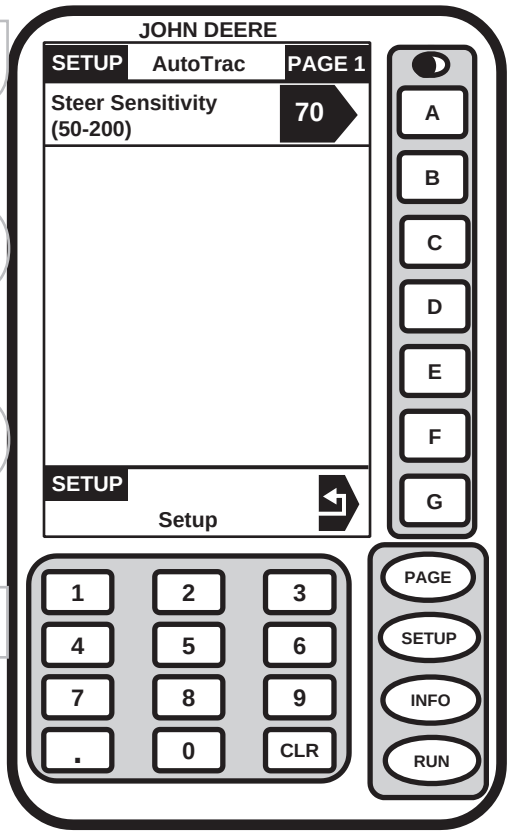
Screen: SETUP - AUTOTRAC

Press: SETUP >> AUTOTRAC

NOTE: It may be necessary to press PAGE button after SETUP button to access AUTOTRAC button.

This screen allows steering sensitivity to be changed. Number should be highlighted. Enter desired sensitivity level using numeric keypad.

NOTE: Once changes are saved on display, it is not necessary to press RUN button for steering sensitivity changes to take effect. Therefore, if it is necessary to make additional changes to steering sensitivity, simply press letter button next to STEER SENSITIVITY and enter desired sensitivity level using numeric keypad..



PC8031 –19–21NOV03

Adjust Sensitivity

IMPORTANT: In addition to OM tractor ballast guidelines, it is recommended that a full set of front weights and duals be installed for optimum AutoTrac performance. In general, more weight on front axle allows for better steering and more accurate tracking.

AutoTrac is not recommended for operating on steep hillsides, in furrows, and with switch plows or any implement that produces a side load. These conditions may cause unsatisfactory performance.

User Adjustable Steering Sensitivity steering sensitivity is aggressiveness of AutoTrac steering system. A high steering sensitivity setting is more aggressive to allow system to handle tough manual steering conditions such as integral implements with a heavy draft load. A low steering sensitivity setting is less aggressive to allow system to handle lighter draft loads and higher speeds.

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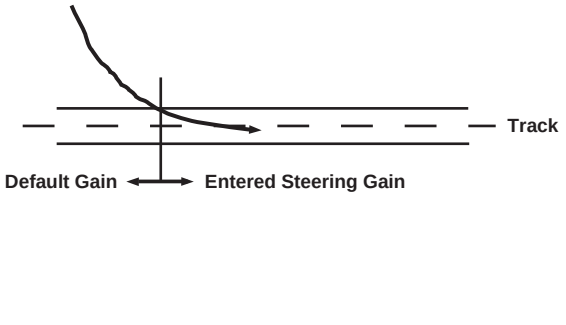


Figure A

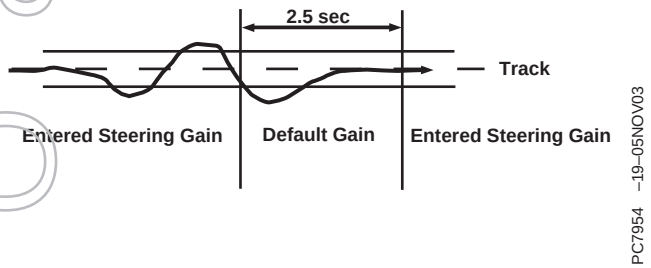


Figure B

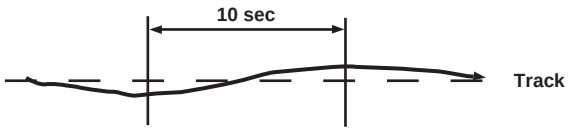
The acquire sensitivity is applied only after machine is within 0.5 M (1.6 ft) of track FIGURE A. Therefore, adjusting steering sensitivity does not change line acquisition performance.

The steering sensitivity is momentarily reduced if tractor front wheel and heading oscillations become too large. This event may be observed when implement is raised at start or end of row transitions. If this event is observed while implement is engaged, sensitivity level is too high (see Steering Sensitivity).

Adjusting Steering Sensitivity Level

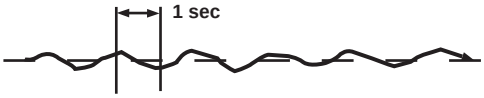
The steering sensitivity must be adjusted to accommodate field conditions and tractor/implement configuration. Steering sensitivity should always be evaluated when implement is engaged. In general, soft soil requires a higher steering sensitivity level than firm ground and an integral implement requires a higher steering sensitivity than a similar drawn implement. Finally, steering sensitivity will not address condition where front wheels are not able to turn tractor. Always make sure front axle load with implement engaged is sufficient for steering before adjusting steering sensitivity level.

Continued on next page



PC7955 –19–28OCT03

Figure A



PC7956 –19–05NOV03

Figure B

Too Low—If steering sensitivity is too low, a slow wandering track error pattern can be observed on display. This track error pattern takes approximately 10 seconds to go from side to side as is shown in FIGURE A. If excessive track error is occurring, increase steering sensitivity by small increments until desired accuracy is achieved.

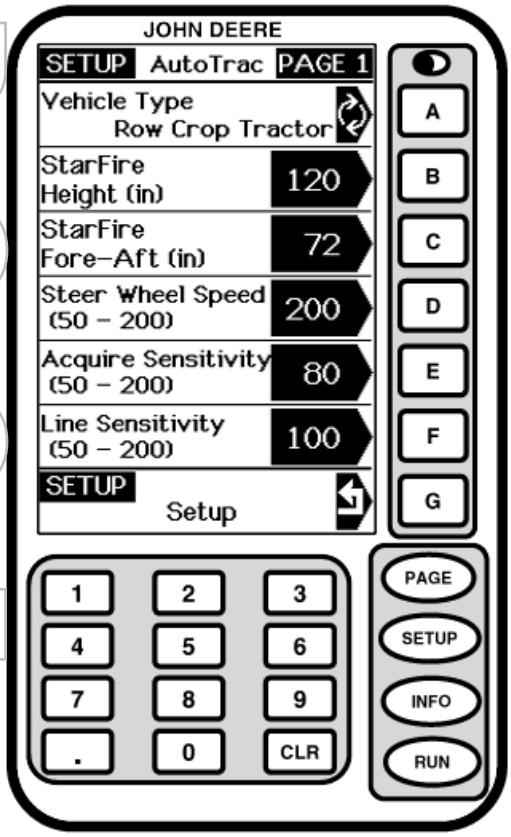
NOTE: It is normal to see a momentary track error when encountering a large rut, furrow, or implement load change. With steering sensitivity properly adjusted, slower speed applications typically achieve a track accuracy of 0.2 ft or less.

Too High—Setting steering sensitivity to highest level will not result in maximum tracking accuracy. If steering sensitivity is too high, excessive front wheel motion will be observed which reduces accuracy and causes unnecessary front axle component wear. At extreme high levels, machine motion will become large enough to cause steering sensitivity to be momentarily changed to default level. Wheel motion to watch for when determining if aggressiveness is too high occurs at an interval of approximately 1 second from side to side as shown in FIGURE B. If excessive wheel motion is observed, lower steering sensitivity by small increments until desired performance is achieved.

OUO6050,00011B8 –19–11AUG05–3/3

AutoTrac Universal Setup

SETUP - AUTOTRAC - PAGE 1



PC8783 –19–16OCT05

Vehicle Type

- Row Crop Tractor—If customer is using AutoTrac at high vehicle speeds, then they may choose sprayer as the vehicle type
- Articulated Tractor—AutoTrac Universal will not properly steer the tractor if engaged during reverse operation. Operator should not engage AutoTrac in reverse for these vehicles.
- Combine
- Sprayer
- Track Tractor
- Windrower

StarFire Height (in.) Enter the height of the StarFire receiver. Height is measured from the ground to the top of the dome.

StarFire Fore-Aft (in.) Enter the Fore-Aft measurement. This is the distance from the fixed axle of the vehicle to the receiver. The fixed axle is the rear axle on a row crop tractor and sprayer or the front axle on an articulated tractor, windrower, and combine. (For track machines the reference point to measure to is approximately 1/3 of the track distance from the front of the track.) The receiver must be at or in front of the fixed axle for all machines except articulated tractors where the receiver needs to be behind the front axle.

Steer Wheel Speed Determines the maximum speed the steering wheel turns to make corrections. Higher gains will turn the steering wheel faster. Lower gains are required for vehicles with slower hydraulic systems. Improper setting may cause AutoTrac Universal to disengage, especially during line acquisition.

Acquire Sensitivity Determines how aggressively the vehicle acquires the track. Higher gains will result in more aggressive steering while acquiring the track. Lower gains will give smoother entry into the next track. Setting sensitivity too high may cause vehicle instability; setting too low will delay acquisition.

Continued on next page

Line Sensitivity Determines how aggressively the vehicle stays on the line once the track has been acquired. Higher gains will result in more aggressive wheel motion. Lower gains may result in reduced accuracy.

OUO6050,00011B9 –19–11AUG05–2/3

SETUP - AUTOTRAC - PAGE 2

Operator Presence

Select a seat switch or operator activity monitor to detect operator presence.

Disengagement Force

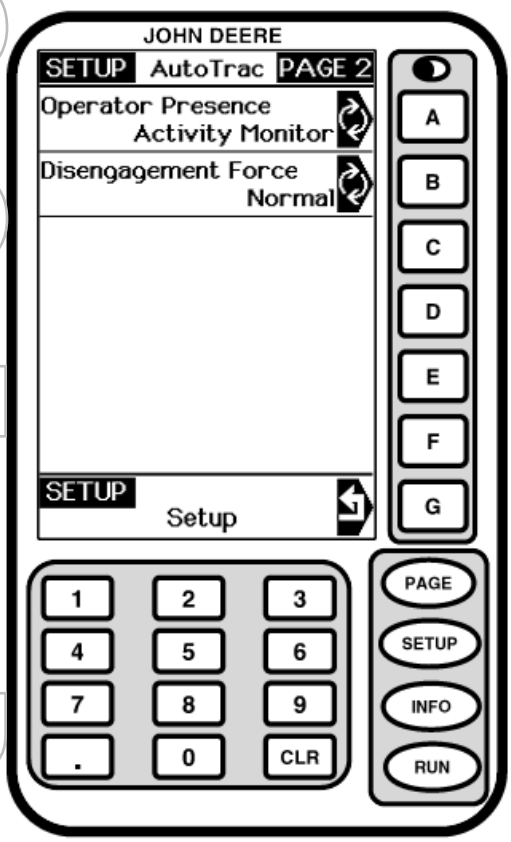
Determines distance operator is required to move steering wheel to disengage. High setting will require more steering wheel motion before disengagement. Use high setting when rough conditions cause frequent disengagement of AutoTrac Universal.

IMPORTANT: Use AutoTrac Universal only on Approved Vehicles – see www.StellarSupport.com for list of approved vehicles

It is important that the operator stay seated while vehicle is moving.

When seat switch is chosen the external seat switch must be plugged into the AutoTrac Universal wiring harness. If operator leaves the seat for more than 7 seconds AutoTrac will be disengaged.

When activity monitor is chosen AutoTrac Universal will look for operator activity every seven minutes. Operator will get a time out warning 15 seconds before AutoTrac will disengage. Pressing resume will reset activity monitor timer.



PC8784 –19–16OCT05

OUO6050,00011B9 –19–11AUG05–3/3

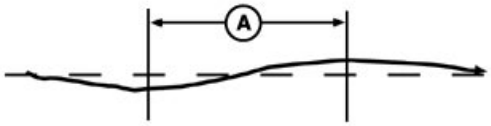
Optimizing AutoTrac Universal Performance

Acquire Sensitivity Too Low

PC8797 –UN–20OCT05

Acquire Sensitivity Too High

PC8796 –UN–20OCT05



Line Sensitivity Too Low

A—10 Seconds

PC8794 –UN–20OCT05

Line Sensitivity Too High

B—1 Second

PC8795 –UN–20OCT05

NOTE: For Row Crop Tractors: performance is optimized when using a MFWD tractor. Operator might notice some degradation in performance with 2WD tractor.

Optimizing AutoTrac Universal Performance

There are three sensitivities that can be set to optimize the performance of AutoTrac Universal.

- **Steering Wheel Speed** will affect the vehicle's ability to stay on the line.
- **Acquire Sensitivity** will affect the vehicles ability to pick up next track.
- **Line Sensitivity** will affect line retention performance.

Find the combination of values that works best for the vehicle. Factory default settings are:

- Steering Wheel Speed - 200
- Acquire Sensitivity - 80
- Line Sensitivity - 100

Test steering wheel speeds and acquire sensitivity individually, by operating vehicle parallel to, and 4 ft off of, the A-B line. Engage AutoTrac Universal and observe performance. Start by tuning steer wheel speed down until the system no longer disengages while acquiring the line. Next tune acquire sensitivity until the system acquires the line smoothly. Finally tune line sensitivity so that the system stays on the line with minimal error. Line sensitivity should be adjusted while operating on the line.

Continued on next page

Recommended Starting Adjustments			
Vehicle Type	Steering Speed (Adjust in Increments of 20)	Acquire Sensitivity (Adjust in Increments of 5)	Line Sensitivity (Adjust in Increments of 20)
Row Crop Tractor	200	80	100
Track Tractor	200	80	100
Articulated Tractor	200	80	100
Sprayer	200	80	100
Combine	200	80	100
Windrower	200	80	100

These recommended settings are a good starting point for most vehicles. Each setting can be adjusted to try and optimize performance. Operator may need to readjust acquire sensitivity and line sensitivity for best results. Increase or decrease settings to change aggressiveness as desired. If AutoTrac is constantly disengaging try lower sensitivity settings. If system is not responsive enough, increase sensitivity settings. If desired performance is not achieved, see TROUBLESHOOTING section for more detail.

OUO6050,00012D0 –19–19OCT05–2/2

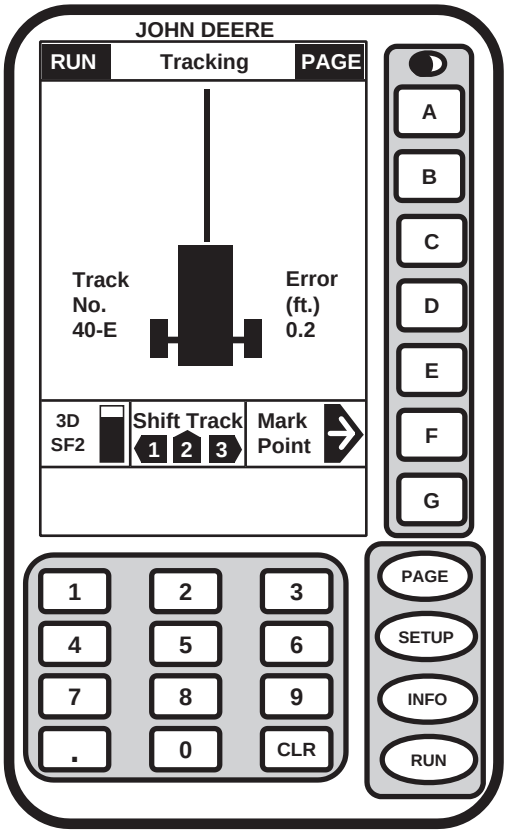
RUN - PAGE 1

NOTE: If full page is selected on SETUP - TRACKING - PAGE 2 screen all Parallel Tracking information will be displayed on RUN - PAGE 3 screen.

At power up display will show RUN - PAGE 1 screen if that mode was active when machine was powered down.

If full page mode was in use when machine was powered down, when machine is powered up it will return to full page mode. User can select number of sections (one, two, three, or full page) allotted to a guidance system. (See SETUP section to change display size).

IMPORTANT: KeyCard and Receiver accuracy levels (AutoTrac SF1, AutoTrac SF2) must match to run AutoTrac. An example of mismatched accuracy levels would be an SF2 receiver and an SF1 KeyCard. (See DIFFERENTIAL CORRECTION SETUP in the StarFire iTC section or SETUP - GPS - PAGE 1 in the Original StarFire Receiver section to set receiver accuracy to correspond with KeyCard accuracy.)



PC7972 –19–04NOV03

OUO6050,00011BA –19–11AUG05–1/1

Straight Track

NOTE: When operating in straight track it is not necessary to drive tracks in a specific order, display will always show closest track.

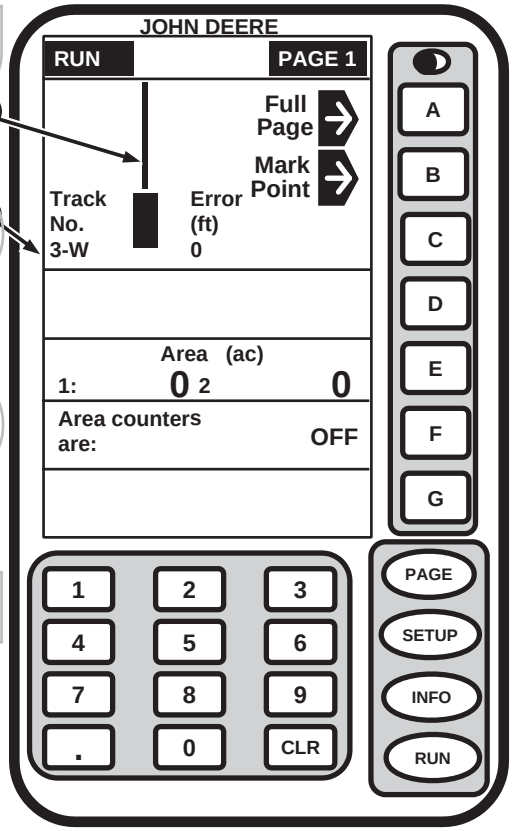
Track number (A) is displayed in lower left-hand corner of Tracking display. Track number displayed is track number closest to machine and is automatically updated by system as a new track is approached. Track number changes when machine is half way between two tracks. Each track number has a N, S, E, or W displayed. This indicates to operator that current track is north, south, east or west of Track 0.

Error distance is shown in lower right-hand corner of Parallel Tracking display. This number shows how far from closest track machine is. Error number will count up until machine reaches point halfway between two tracks. After reaching mid-point error number will count down. If turning view is OFF, operator, by watching error value approach 0, will know where to turn to line up with next row.

If track 0 has not been set RUN - PAGE 1 screen will display NO A—B LINE DEFINED.

If differential correction is not available, both track number and error number will be 0 and navigation bar (B) will be missing.

Navigation bar indicates relative position of machine to closest track. Bar will move either left or right as machine moves through field.



PC7296 –19–14OCT02

RUN - PAGE 1 Screen, Straight Track Shown

A—Track Number
B—Navigation Bar

Continued on next page

When vehicle is moving forward, if bar moves to right of vehicle icon, steer right and bar will move to center. If bar moves to left, steer left and bar will move to center. When bar is centered on vehicle icon, machine is running on closest track. If vehicle is moving in reverse, when line is to right of icon, steer right and line will move back to center. When bar is centered on screen, machine is running on closest track. When making a turn screen will change to turning view (if turning view is active) (See Turning View later in this section) when machine is 45° from current track. Screen will change back to RUN - PAGE 1 screen when machine is 5° from parallel to closest track.

If turning view is not active screen will not change and navigation bar will move all the way to one side as you drive away from current track. When machine is halfway between tracks bar will appear on opposite side of display then move towards center of display as machine approaches closest track.

OUO6050,00011BB –19–17OCT05–2/2

Row Finder (Parallel Tracking Only)

NOTE: Full page mode must be selected to use Row Finder.

If letter button next to ROW FINDER SET ROW is pressed when machine is stopped, system will reset track 0 based on a 0° heading.

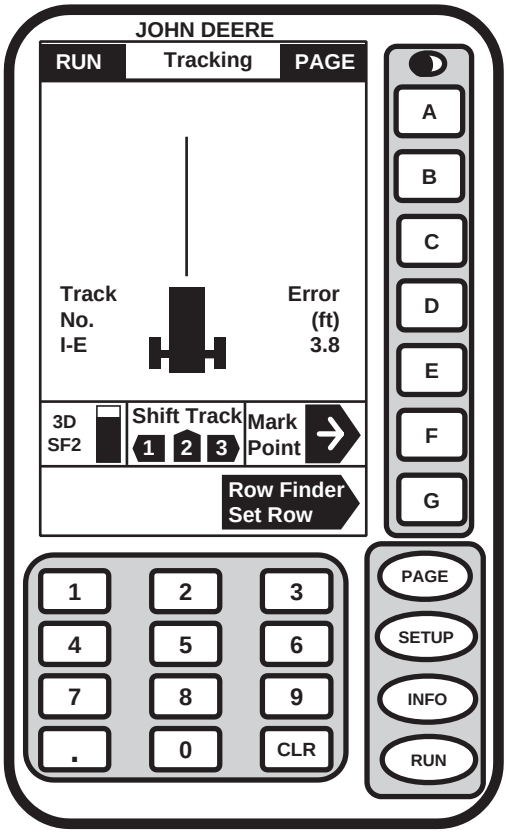
It is important that letter button next to ROW FINDER SET ROW is pressed before machine begins making turn at end of pass.

To use Row Finder press letter button next to ROW FINDER SET ROW at end of pass before starting turn.

Track 0 will be reset based on current track spacing, position and heading. After starting turn, turning view will guide operator into next pass.

If turns only mode is selected (see ROW FINDER in Setup Functions section), navigation bar will disappear after machine has traveled four times track spacing from where letter button next to SET ROW was pressed.

If continuous mode is selected, navigation bar will remain visible entire pass.



PC7970 –19–04NOV03

OUO6050,00011BC –19–11AUG05–1/1

Curve Track

IMPORTANT: The machine must be stopped in order to clear Curve Track memory.

When operating Curve Track with ACCUDEPTH, after operator presses letter button next to CLEAR CURVE TRACK STORED DATA, system prompts user to cycle power to clear memory.

NOTE: Clear Curve track memory before beginning a new field (see Setup Curve Track).

All passes are recorded and amount of memory left is displayed in lower left hand corner of RUN screen. If memory becomes full, memory must be cleared (see Setup Curve Track).

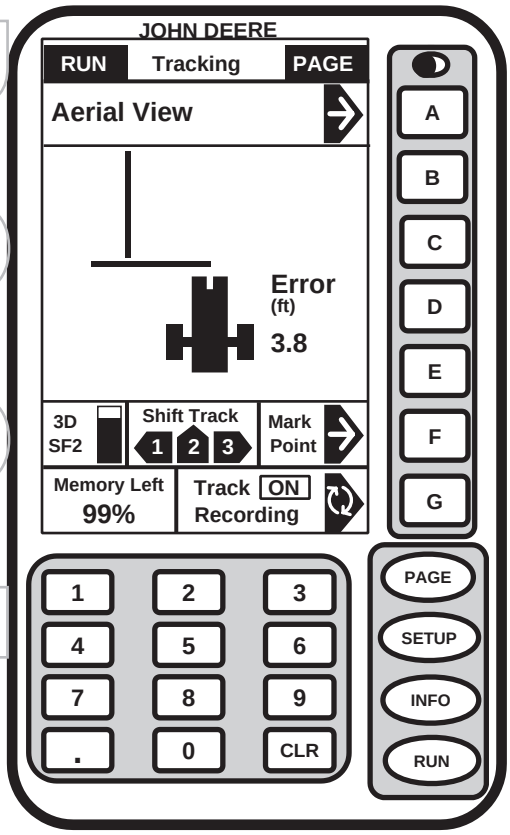
To start using Curve tracking, press letter button next to TRACK RECORDING to start recording. Recording only needs to be turned off if machine is driven outside of normal field pattern (i.e. to refill sprayer, etc.). Recording can be left on when turning at end of each pass.

NOTE: When using AutoTrac Curve Track, vehicle will try and follow previous turn when recording is left on during end turns. Operator needs to be prepared to turn vehicle into next pass.

NOTE: A slight delay in appearance of navigation and driving indicator maybe noticed when a large number of line segments have been recorded.

Drive initial pass, no navigation line will appear until end of pass is reached. Make turn at end of pass and system will begin searching it's memory. During this operation system is searching through all recorded line segments to determine path to guide on. It then locates a line segment that is parallel and within 1/2 to 1-1/2 implement widths (as determined by track spacing entered in SETUP - TRACKING - PAGE 1 screen.

When running with AutoTrac, operator will then press resume to begin automatically steering along the ideal adjacent path.



PC7971 –19–04NOV03

Continued on next page

When operator takes control of steering, curve track will record path operator drives. That section on the next pass will be projected off of manual driven section.

These methods of recording all line segments allows an operator to drive and be guided along a variety of fields patterns: back and forth Curve track, race track, or box pattern.

OUO6050,00011BD –19–07SEP05–2/3

Aerial View

Pressing A button on RUN - TRACKING full page screen will allow operator to access aerial view navigation screen.

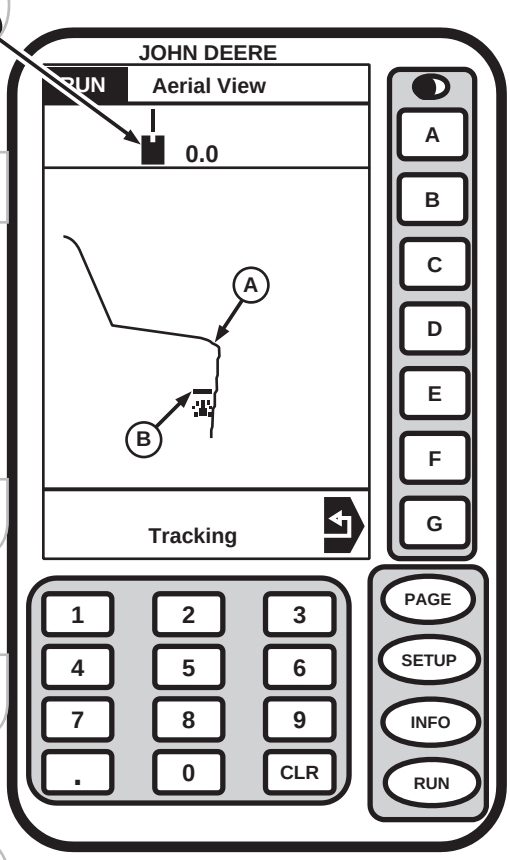
This screen allows operator an additional view of machine moving through field. Screen will show navigation bar and track error in cell A. Display line (A) shows path system is using to guide machine as recorded by system. Thicker portion of line represents how far ahead system is looking as determined on SETUP - TRACKING - PAGE 1 screen.

Line (B) represents implement width as selected on SETUP - TRACKING - PAGE 1 screen.

By pressing 0—9 on numeric keypad operator can zoom in or out.

The aerial view is designed as an aid to help operator see what path system is following. For precise guidance, continue to use vehicle icon and navigation bar in cell A (C).

Press G button to return to RUN - TRACKING full page screen. Pressing RUN button will take you to RUN - PAGE 1 screen.



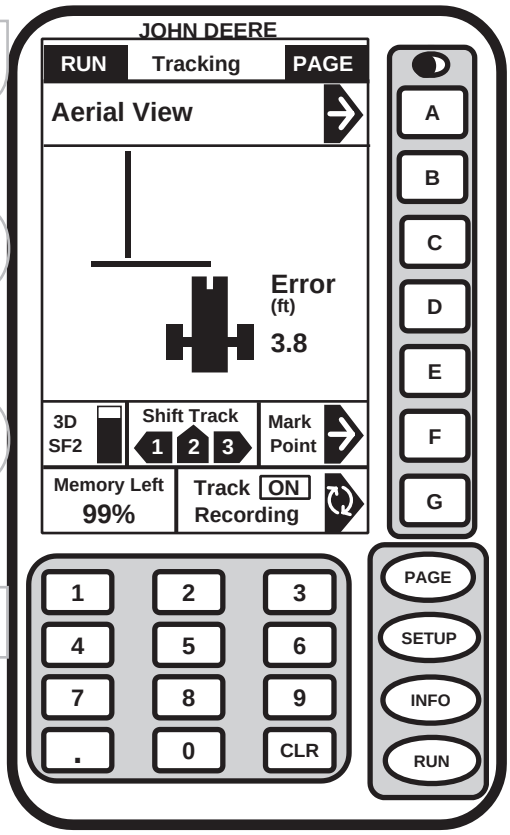
PC7287 –19–05NOV02

A—Curve Track Line
B—Implement Width Line
C—Navigation Bar

OUO6050,00011BD –19–07SEP05–3/3

Full Page Mode

Full page mode is accessed by pressing letter button next to FULL PAGE on RUN - PAGE 1 screen or by selecting it on SETUP - TRACKING - PAGE 2 screen.



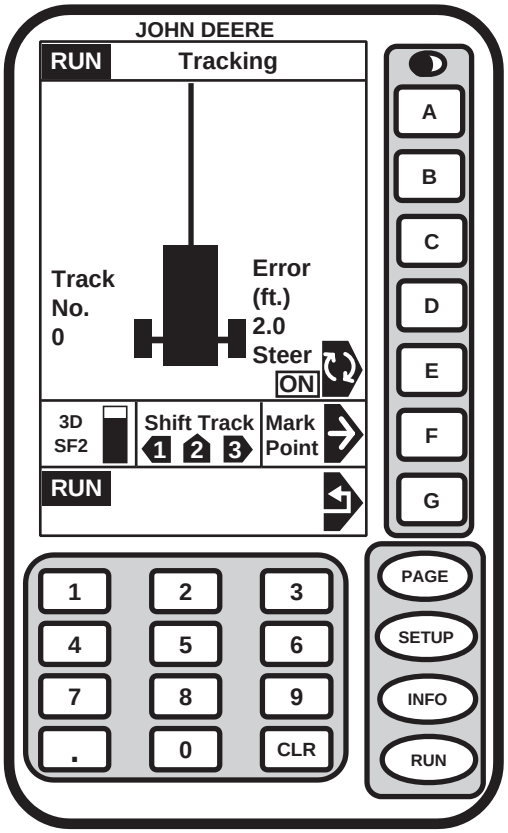
PC7971 –19–04NOV03

OUO6050,00011BE –19–06SEP05–1/1

Circle Track

NOTE: When operating in Circle track it is not necessary to drive tracks in a specific order, display will always show closest track. Track number is displayed in lower left hand corner Tracking display. Track number displayed is track number closest to machine and is automatically updated by system as a new track is approached. Track number changes when machine is half way between two tracks.

Error distance is shown in lower right-hand corner of Tracking display. This number shows how far from closest track machine is. Error number will count until machine reaches point halfway between two tracks. After reaching mid-point error number will count down. If turning view is OFF, operator, by watching error value approach 0, will know where to turn to line up with next Circle.



PC7974 –19–04NOV03

If circle center has not been set RUN - PAGE 1 screen will display NO A—B LINE DEFINED.

If differential correction is not available, both track number and error number will be 0 and navigation bar will missing.

Navigation bar indicates relative position of machine closest track. Bar will move either left or right as machine moves through field.

OUO6050,00011BF –19–11AUG05–1/1

Shift Track

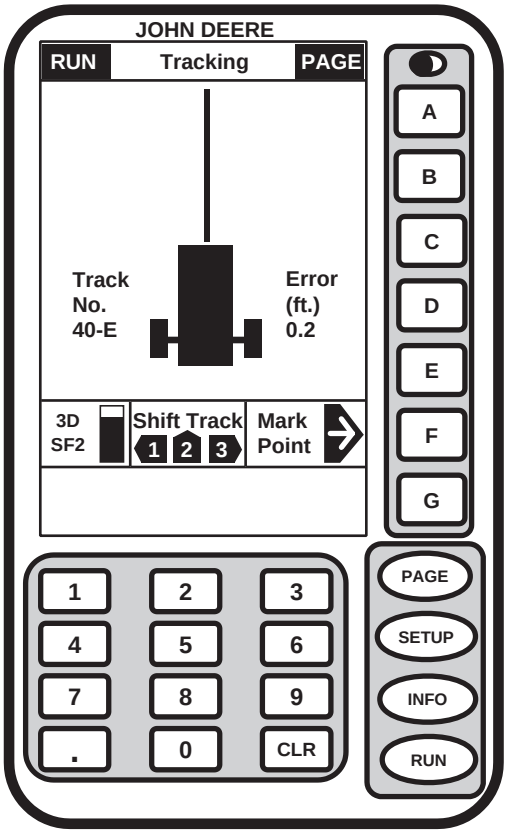
NOTE: Shift Track is only available in Full Page Mode. Since all tracks are based on original track 0, all tracks will be shifted by using this feature.

In Circle Track mode Shift Track is not used to compensate for GPS drift. Shift Track increases or decreases the circumference of the track the vehicle is on. If the Center Shift Track button is pressed the track will be centered on the vehicles current location

Shift Track allows an operator to increase or decrease the circumference of the track in hundredths of a meter (0.03) or tenths of a foot (0.1) depending on selection of unit standard. An operator may also re-center displayed line on icon.

To move line to left, press 1 on numeric keypad. To move line to right, press 3 on numeric keyboard. Each time button is pressed, line will move three hundredths (0.03) of a meter or one tenth (0.1) of a foot to left or right. To re-center line on vehicle's current location press 2 on numeric keypad.

Shift Track can be used to compensate for GPS drift that occurs over time.



Full Page Mode

OUO6050,00011C0 –19–11AUG05–1/1

Marker Page

Press letter button next to MARKER on RUN - PAGE 1 screen or F button on FULL PAGE screen to select marker mode.

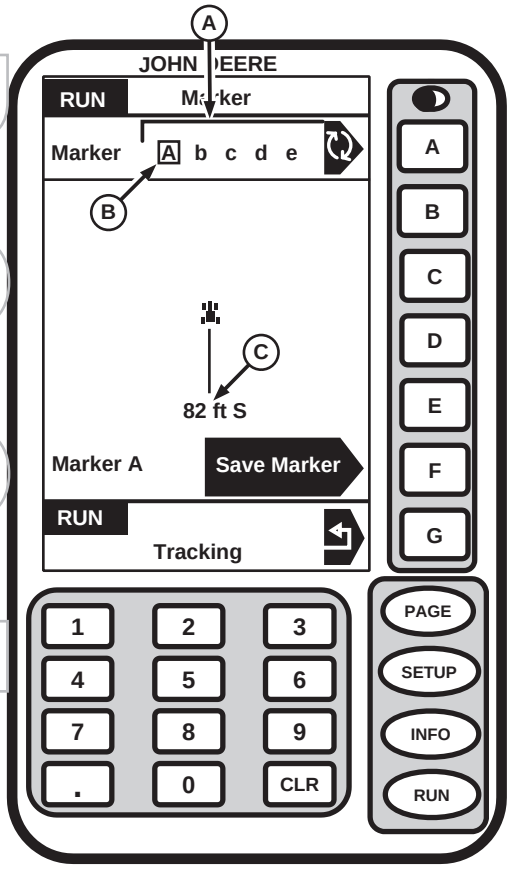
This page allows operator to save location of up to five points called markers. Letters A through E in cell (A) are used to identify each marker. Markers are independent of field number. Markers may be located in one field or split between multiple fields. User may scroll through choices by pressing letter button next to MARKER. Marker selected (B) are shown inside clear box. Distance (C) to selected marker is displayed below navigation section. Markers will be stored until written over.

NOTE: Due to nature of GPS satellite system, position drift can occur. As time passes marker shown on display may be different from location originally marked.

The center of page is used to provide navigation information. Box in center of screen represents machine. Line points in direction of travel to reach marker. For example if marker is behind direction of travel, line will point down. When driving towards mark point line will point up. As machine gets closer to marker line will shorten until it disappears. The distance and direction given (C) is distance and direction machine must travel to return to selected marker. Distance will be displayed in meters/feet until machine reaches a point beyond 1000 meters or 5280 feet then it will switch to kilometers/miles.

Travel direction is accurate only when machine is in motion. System always assumes that machine is moving forward.

Pressing G button will return display to previous RUN - PAGE screen. If RUN button is pressed display will return to RUN - PAGE 1 screen.

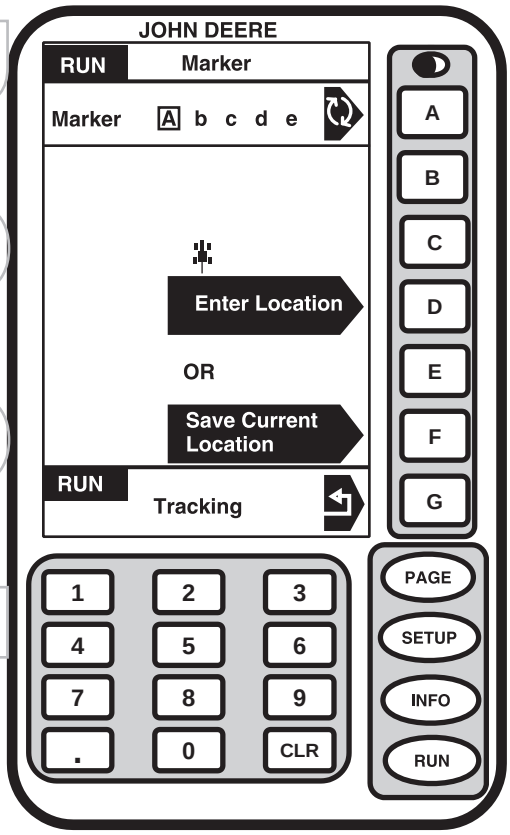


PC7292 –19–14NOV02

A—Mark Point Letters
B—Selected Mark Point
C—Distance

Continued on next page

The selected marker can be set to current location by pressing letter button next to SAVE CURRENT LOCATION or by manually entering latitude and longitude by pressing letter button next to ENTER LOCATION.



PC7301 –19–17OCT02

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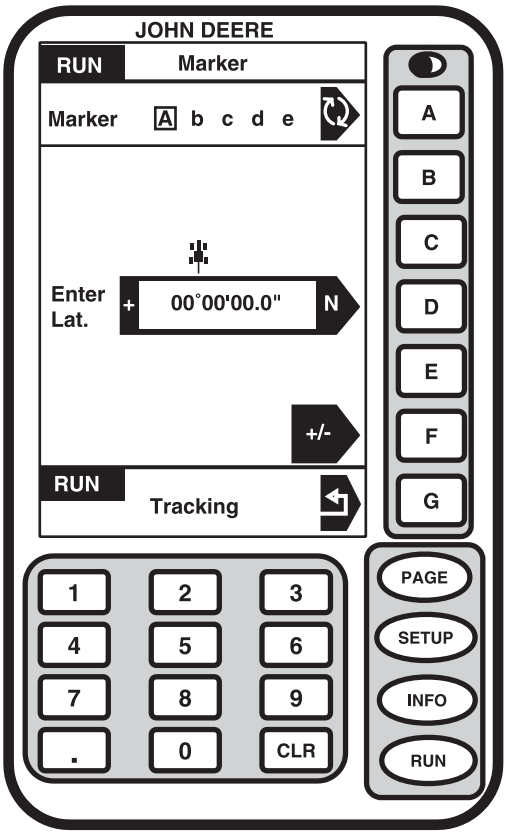
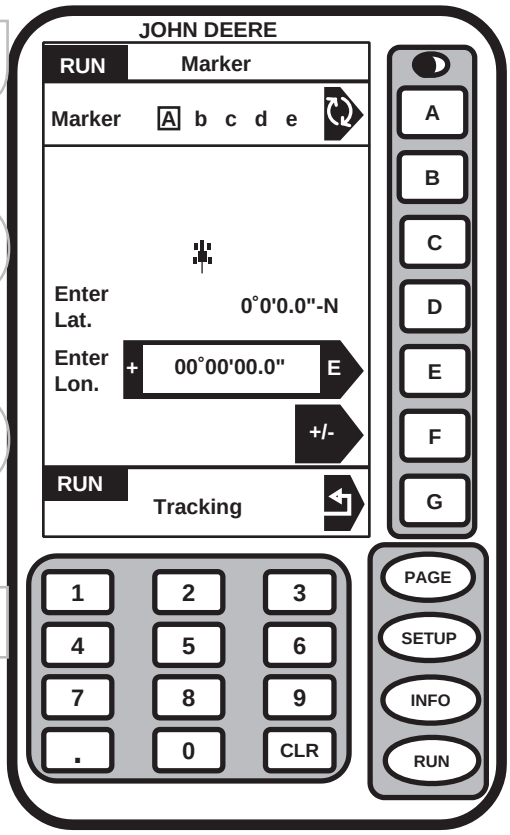
OUO6050,00011C1 –19–11AUG05–2/3



PC7343 –19–17OCT02



PC7344 –19–17OCT02

NOTE: Tenths of seconds will have a resolution of 3 m (10 ft).

Latitude point must be entered having 2 digits for degrees, 2 digits for minutes, and optional decimal seconds. Longitude point must be entered using 3 digits for degrees, 2 digits for minutes and optional decimal seconds. Press F button to toggle between positive or negative.

Markers are stored in system memory until overwritten by a new marker for that field.

OUO6050,00011C1 –19–11AUG05–3/3

Turning View

The turning view provides a visual indicator of machine in relationship to closest track as machine turns. This view can be used as a guide when turning onto a pass. Operator can see relationship between machine and track. Once machine is almost parallel with track, display will automatically return to RUN screen from which it started.

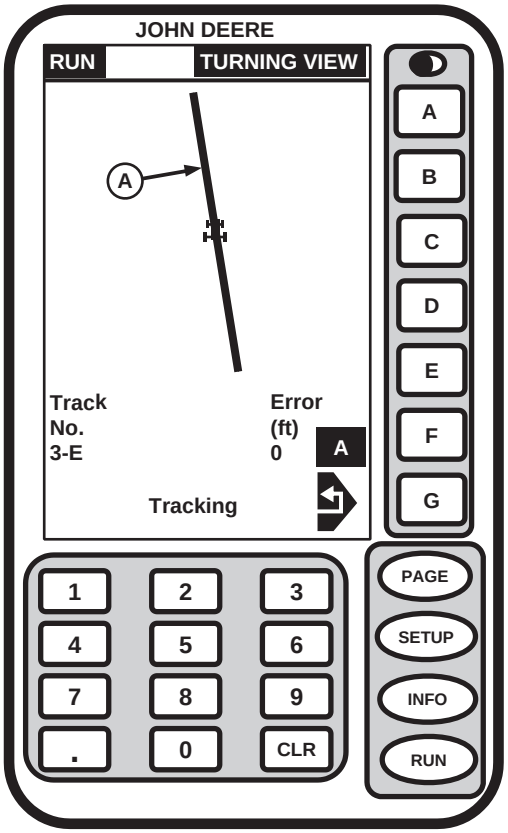
The AutoTrac active icon will appear at cell F on this page, when AutoTrac is activated.

When Turning View is activated, display will automatically change to turning view screen by turning vehicle more than 45° to track heading. (See SETUP - TRACKING - PAGE 2 in Setup Functions section.)

On turning screen machine is located on center of screen. Closest track (A) is shown as a bar across screen. Track number and error indications at bottom of screen are identical to those on RUN screen.

To exit turning view before completing a turn press G button.

A—Track



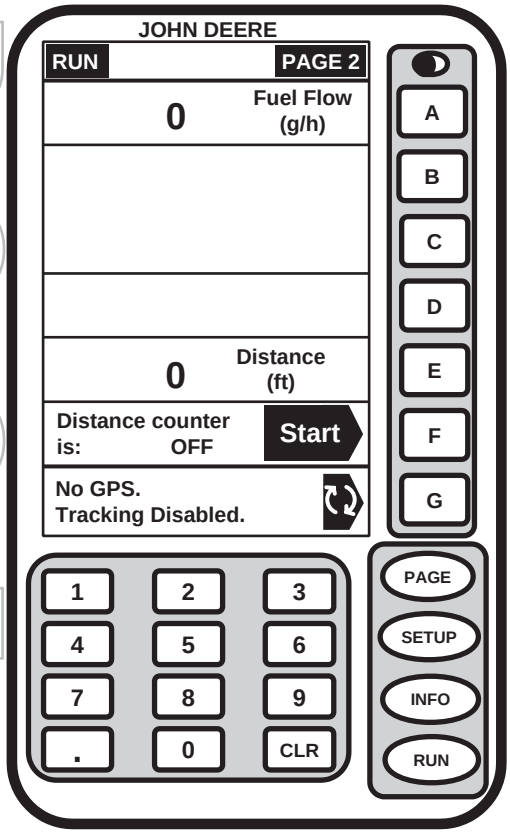
PC7360 –19–23OCT02

OUO6050,00011C2 –19–17OCT05–1/1

RUN - PAGE 2

RUN - PAGE 2 screen is a continuation of RUN - PAGE 1 screen. Press PAGE button to access this screen.

To turn distance counter on or off press letter button next to DISTANCE COUNTER .



PC7872 –19–03OCT03

OUO6050,00011C3 –19–11AUG05–1/1

Turn Predictor

Parallel Tracking

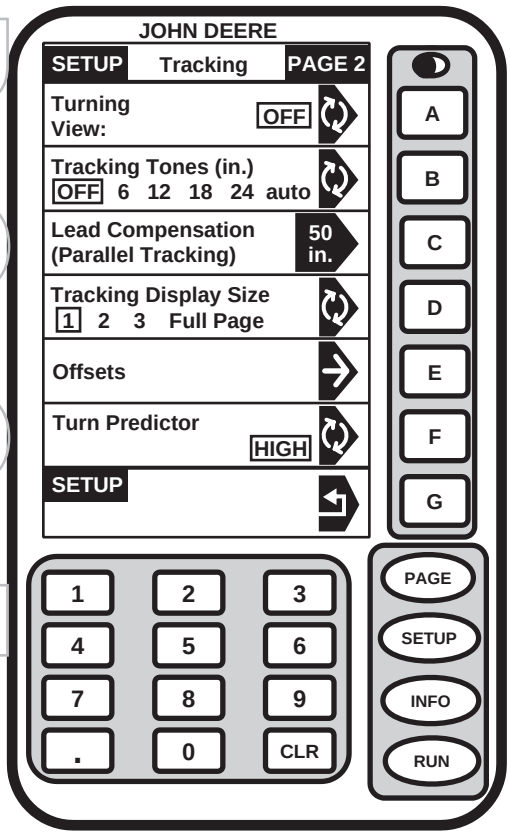
Turn Predictor will default to ON. It may be turned off in SETUP - TRACKING - PAGE 2 screen. TURN: OFF will be displayed on RUN full page. Once turned off, it will remain off through power cycles until manually turned back on by operator.

AutoTrac

NOTE: Turn Predictor will always be on for all vehicles without an operator presence switch on CAN line.

Turn Predictor will default to ON after every power cycle or after every seat switch timeout. It may be turned off in SETUP - TRACKING - PAGE 2 screen. TURN: OFF will be displayed on RUN full page. Once turned off, it will remain off only until next power cycle, seat switch timeout, or if manually turned back on by operator.

Whenever Display resets Turn Predictor back to ON after a seat switch timeout (operator out of seat for 7 seconds on tractors, 5 seconds on combines and sprayers), it will display a message to operator indicating that Turn Predictor has been reset to ON due to operator leaving seat. There will also be an option with caution message allowing operator to turn it back off again directly from this page.



PC8403 –19–26OCT04

Recording Turn Points

For a new turn point to be recorded for current track, vehicle must travel along track for more than 10 seconds, at a speed greater than 0.5 mph. A turn point will be recorded at point at which AutoTrac is deactivated or point in which heading error exceeds 45°.

Predicting Turn Points

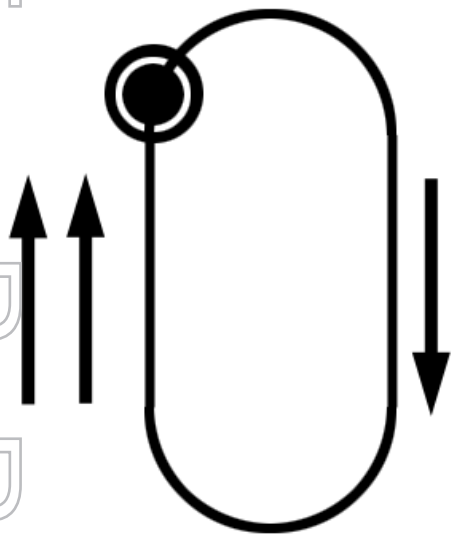
Continued on next page

To predict a turn, display must have at least one stored turn point that is within 8 tracks of current track and on same end of field that vehicle is moving towards. TURN: XXXX FT. (M) will be displayed on RUN full page as soon as a predicted turn point has been calculated for a newly acquired track. An advance notification, both audible (beep) and visual (TURN text flashing), will annunciate at approximately 10 seconds prior to actual predicted turn. A turn notification, both audible (two beeps) and visual (TURN text continues flashing), shall annunciate when GPS position crosses predicted turn point.

The following are ways software predicts turn points:

OUO6050,00011C4 –19–17OCT05–2/6

1. The end-point of current track if one exists.

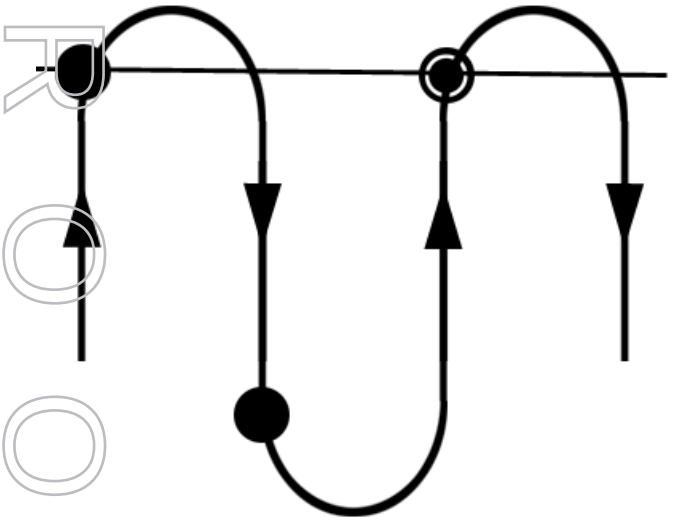


PC8216 –UN–28MAY04

Continued on next page

OUO6050,00011C4 –19–17OCT05–3/6

2. The intersection of current track and a perpendicular line through 1 stored turn point, if only 1 stored point exists within 8 closest tracks.

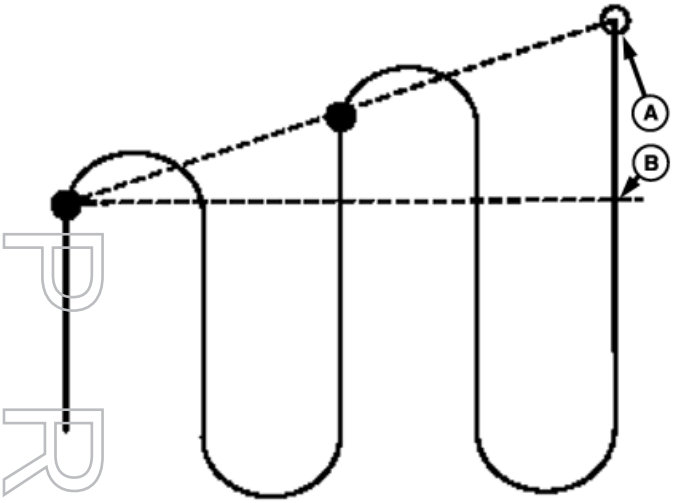


PC8217 –UN–28MAY04

OUO6050,00011C4 –19–17OCT05–4/6

3. The intersection of current track and line through 2 closest stored turn points, if 2 or more stored points exist within 8 closest tracks.

A—Point of Turn Prediction
B—NOT Point of Turn Prediction



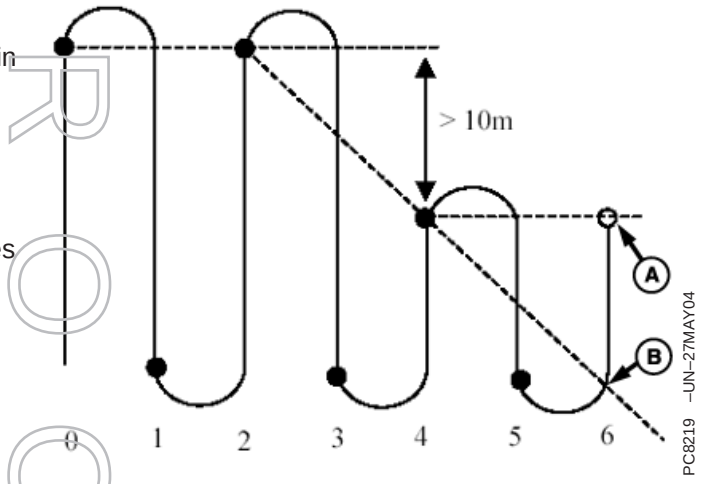
PC8218 –UN–27MAY04

Continued on next page

OUO6050,00011C4 –19–17OCT05–5/6

4. If 3 or more stored points exist within 8 closest tracks, closest point will be checked to make sure it falls within 10 meters of projected line through 2nd and 3rd closest points. If closest point is not within this distance, then turn prediction will be based only on perpendicular line through closest point.

During first 2 passes in field, and whenever vehicle moves to a new part of field that is more than 8 tracks away, TURN: NONE will be displayed on RUN full page since there are not sufficient points stored to make a turn prediction.



A—Point of Turn Prediction
B—NOT Point of Turn Prediction

Erasing Stored Turn Points

All turn points will be erased if

1. The operator changes fields.
2. The operator creates a new A-B line.
3. Power is turned off.

OUO6050,00011C4 –19–17OCT05–6/6

General Information

AutoTrac Accuracy

The overall AutoTrac system accuracy is dependent upon many variables. Equation looks like: AutoTrac System Accuracy = Signal accuracy + Vehicle Setup + Implement Setup + Field/Soil Conditions. Therefore, it is very important that receiver has gone through warm-up period upon start-up; vehicle is setup properly (ballasted according to vehicle operators manual, etc.), implement is setup to run properly (wear parts such as shanks, shovels, and sweeps are in good working condition) and that you understand how field/soil conditions affect system (loose soil requires more steering than firm soil, but firm soil can cause uneven draft loads).

Continued on next page

CAUTION: Do not use AutoTrac system on roadways. Always turn off (Deactivate) AutoTrac system before entering a roadway. Do not attempt to turn on (Activate) AutoTrac system while transporting on a roadway.

When system is activated remain alert and pay attention to surrounding environment. Take control of steering when necessary to avoid field hazards, bystanders, equipment or other obstacles. Stop operation if poor visibility conditions impair your ability to safely operate and steer machine.

IMPORTANT: The AutoTrac system is intended to aid operator in performing field operations more efficiently. Operator is always responsible for machine path and must continue to pay attention to surrounding environment while operating machine. Stop operation if poor visibility conditions impair your ability to identify people or obstacles in machine path.

Always operate machine from operator's seat. If provided, always use seat belt.

The AutoTrac system relies on GPS system operated by government of United States, which is solely responsible for its accuracy and maintenance. System is subject to changes that could affect accuracy and performance of all GPS equipment.

All operators must be familiar with AutoTrac system and operating characteristics prior to operation. The following is a suggested procedure for operator to become familiar with system:

1. Read and understand Operators Manual for GreenStar Guidance - Parallel Tracking and AutoTrac Assisted Steering Systems.

Continued on next page

2. Choose an open area free of hazards (ditches, buildings, etc.).

3. Set Track Spacing to 92.0 meters (300 ft). See SETUP section for details on setting up Tracking.

4. Set a Track 0 (A—B Line). (See SETUP section for details on setting up Tracking).

NOTE: Operate vehicle at a speed you are comfortable, recommend less than 8 km/h (5 mph).

5. Enable AutoTrac on display by turning Steer ON. (See Enabling system later in this section).

6. Press Resume switch activate AutoTrac. (See Activating system later in this section).

7. After driving a short distance, then turn steering wheel to turn vehicle off track to deactivate AutoTrac. (See Deactivating System later in this section).

8. Practice Activating AutoTrac at different distances before and after crossing track and at different angles. Increase and decrease speeds to simulate different operating conditions.

9. Reduce Track Spacing to acquire multiple tracks and continue practicing activating AutoTrac at different angles and varying speeds to understand how AutoTrac behaves under different conditions.

Always be prepared to resume manual control if AutoTrac does not perform expected maneuvers or machine course must be changed to avoid injury or property damage. Operator can regain manual steering by turning steering wheel or Disabling AutoTrac by turning Steer off on display. It is recommended practice to be as close as possible to desired track prior to activating AutoTrac. This will ensure correct track and direction are acquired.

Continued on next page

The AutoTrac basic system is intended to be used as an assistance tool to mechanical markers on planters. Operator must evaluate overall system accuracy to determine specific field operations where assisted steering may be used. This evaluation is necessary because accuracy required for various field operations may differ depending on farming operation. Because AutoTrac uses StarFire differential correction network along with Global Positioning System (GPS), slight shifts in position may occur over time.

To operate AutoTrac operator must set track 0 (similar to parallel tracking) and all tracks are drawn parallel to track 0 using track spacing. (See SETUP section for details on setting up and operating parallel tracking).

The AutoTrac system operating status can exist at three levels: ENABLED, ACTIVE, and INACTIVE.

After enabling AutoTrac (see Enabling AutoTrac), AutoTrac is activated by pressing resume switch on armrest (see Activating AutoTrac). To return to manual steering, operator must deactivate system (see Deactivating System).

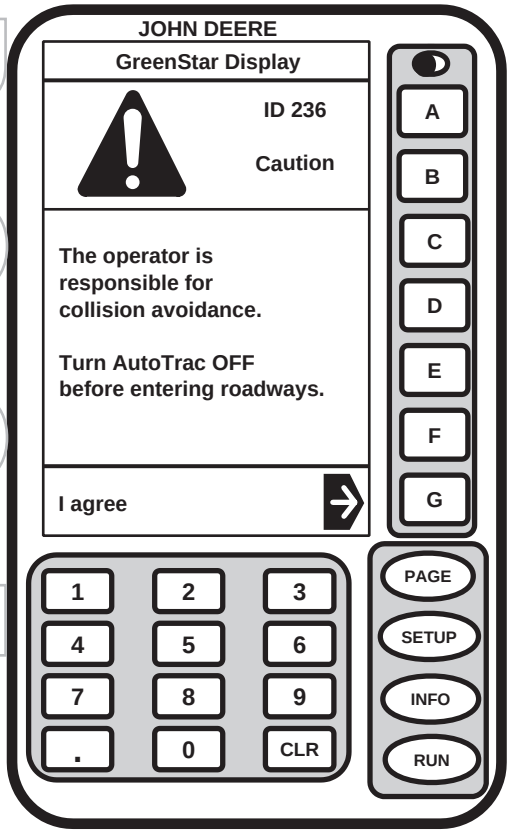
If required track can be shifted left, right or centered using shift track feature on display. (See Shift Track).

OUO6050,00011C5 –19–13OCT05–4/4

Start-Up Screen

Each time a machine equipped with AutoTrac is started, this screen will appear as a reminder of operator responsibilities when using AutoTrac steering system. To clear this screen press letter button next to I AGREE .

IMPORTANT: When starting machine with AutoTrac installed and this startup screen is not displayed, update AutoTrac software through www.stellarsupport.com or 1-888-GRNSTAR.



PC7963 –19–29OCT03

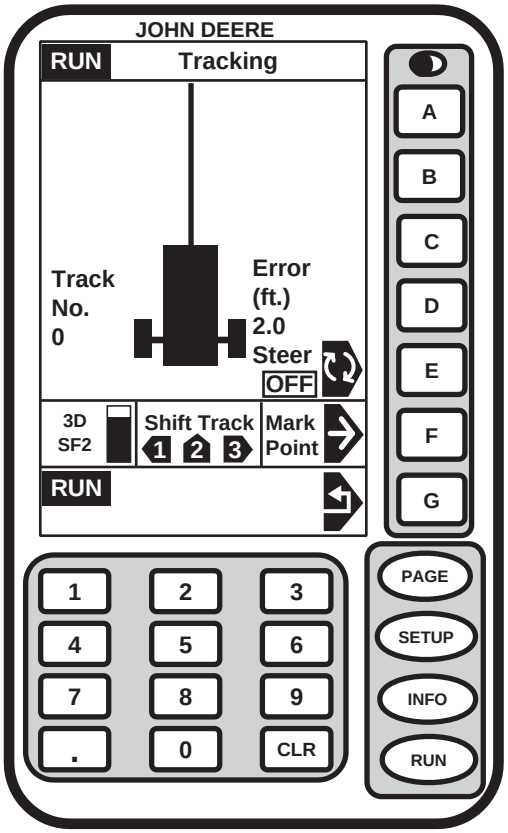
OUO6050,00011C6 –19–11AUG05–1/1

Enabling System

The system is enabled when ON is shown under STEER. System is disabled when OFF is shown under STEER. Press letter button next to STEER to toggle between enable/disable AutoTrac.

To enable system, all of the following criteria must be met:

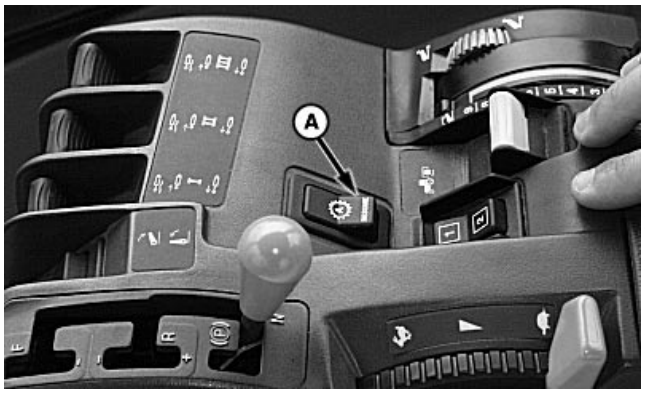
- AutoTrac KeyCard has been inserted into mobile processor.
- Tracking has been setup (see Setup Tracking).
- Tracking is ON.
- SSU is in normal operating mode.
- TCM must be installed, calibrated, and turned on.



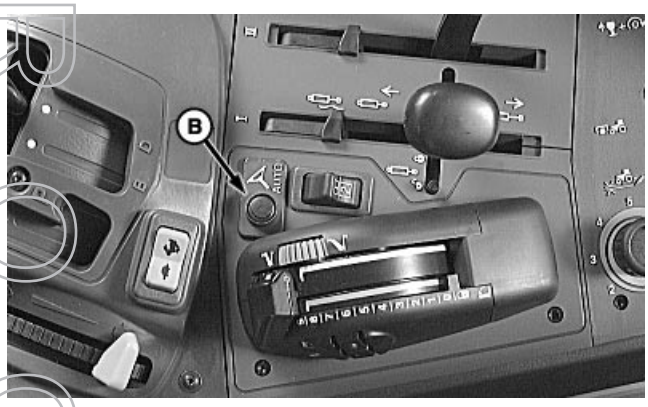
PC7973 –19–04NOV03

OUO6050,00011C7 –19–10OCT05–1/1

Activating System



8000 Series Resume Switch Shown



6020 Tractor AUTO Switch Shown

CAUTION: While AutoTrac is active operator is responsible for steering at end of path and collision avoidance.

After system has been ENABLED, operator must manually change system to ACTIVE status when steering assistance is desired.

NOTE: Activating AutoTrac will activate automatic power shift if it has been set. In 8020T, 9020T and wheel tractors, automatic power shift (APS) must be set up after enabling AutoTrac. If AutoTrac is enabled after automatic power shift has been set, APS must be reset.

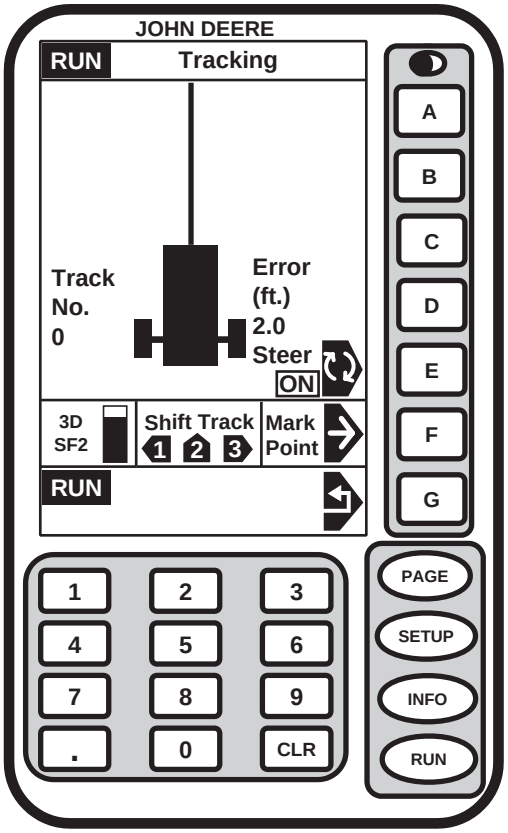
APS can be set either before or after enabling AutoTrac on 8010T, 8000T, and 9000T tractors.

Press resume switch (A) or AUTO switch (B) to activate AutoTrac. This will initiate assisted steering.

NOTE: Location of resume switch may vary depending upon which vehicle platform AutoTrac is being operated on.

In order to activate system following criteria must be met:

- Vehicle speed is greater than 0.5 km/h (0.3 mph).
- Forward vehicle speed is less than 30 km/h (18.6 mph) or
- Reverse vehicle speed is less than 10 km/h (6.0 mph).



A—Resume Switch

Continued on next page

- Vehicle heading within 80° of desired track on track tractors and within 45° of desired track on wheeled tractors.
- Operator is seated.
- TCM must be ON. (See Setup TCM for more information.)
- In reverse AutoTrac will remain active for 45 seconds. After 45 seconds the machine must be put in a forward gear before reverse will activate again.

CAUTION: Always turn off (Deactivate) AutoTrac system before entering a roadway. Do not attempt to turn on (Activate) AutoTrac system while transporting on a roadway. To turn off AutoTrac, from RUN - TRACKING screen toggle STEER button until OFF is displayed. (See Deactivating System for complete details on deactivating AutoTrac.)

OUO6050,00011C8 –19–11AUG05–2/2

Deactivating System

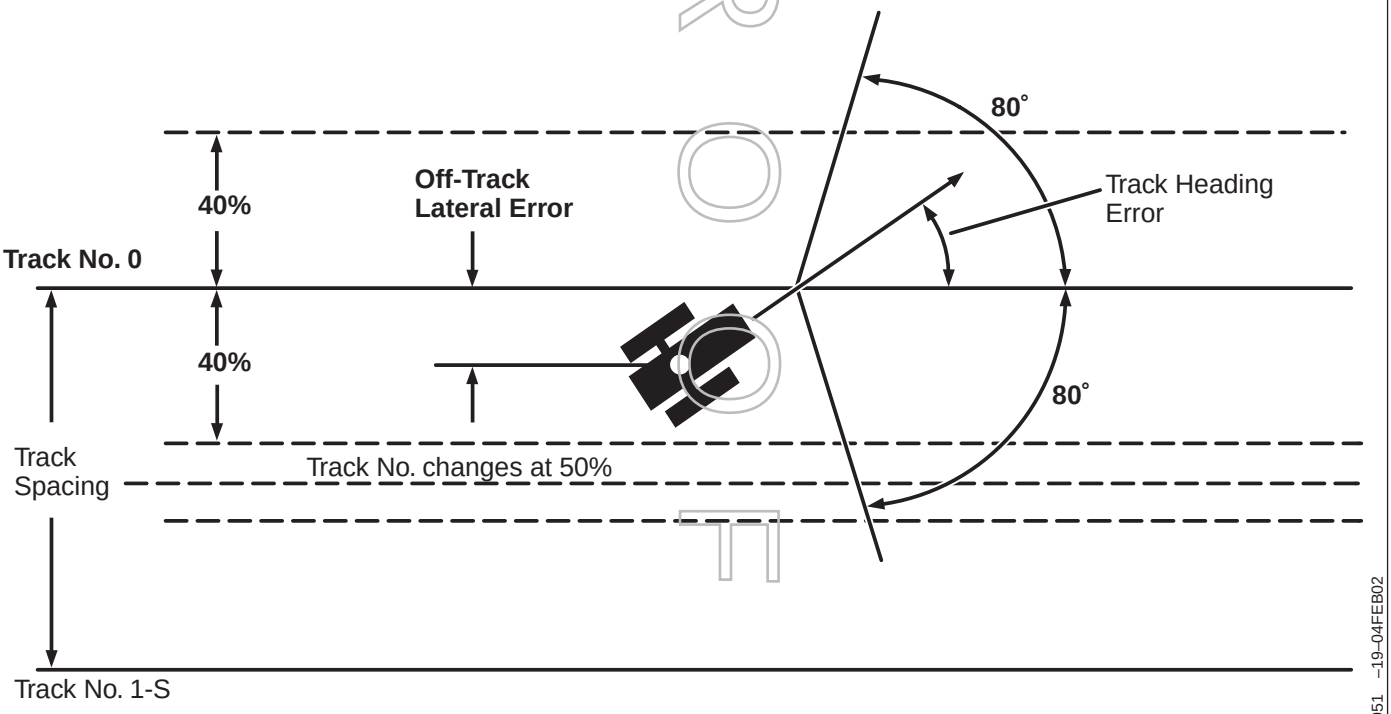
CAUTION: Always turn off (Deactivate) AutoTrac system before entering a roadway. Do not attempt to turn on (Activate) AutoTrac system while transporting on a roadway.

AutoTrac system can be made DEACTIVE by following methods:

- Turning steering wheel more than 10°.
- Slowing to speeds less than 0.5 km/h (0.3 mph).
- Exceeding forward speed of 30 km/h (18.6 mph).
- Exceeding reverse speed of 10 km/h (6.0 mph).
- Pressing letter button next to STEER on RUN - PAGE 1 screen.
- Operator out of seat for more than seven seconds.

OUO6050,00011C9 –19–17OCT05–1/1

Necessary Conditions for Activating AutoTrac



Once tractor is at end of row operator must turn system to next pass. By turning steering wheel, AutoTrac is deactivated. Operator must turn onto next track.

AutoTrac can be activated by pressing resume switch only after following conditions are met:

1. System is enabled (steering ON on RUN - PAGE 1 screen).
2. The machine is within 40% of track spacing.
3. **Track heading is within 45° of track on wheeled tractors, 80° of track on tracked tractors.**

OUO6050,00011CA –19–11AUG05–1/1

Shift Track

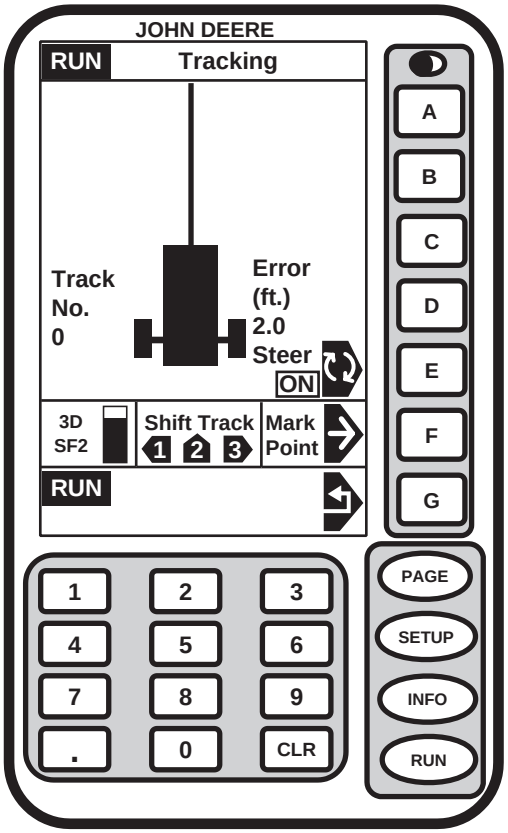
NOTE: Shift Track is only available in Full Page Mode. Since all tracks are based on original track 0, all tracks will be shifted by using this feature.

Shift track is used to adjust position of machine left, center or right of set track. Shift track can be used to compensate for GPS drift. Drift is inherent to any satellite-based, differentially corrected GPS system.

Shift Track allows an operator to move A—B line to right or left in hundredths of a meter (0.03) or one tenth of a foot (0.1) depending on selection of unit standard. An operator may also re-center displayed line on icon.

To move line to left, press 1 on numeric keypad. To move line to right, press 3 on numeric keyboard. Each time button is pressed, line will move three hundredths (0.03) of a meter or one tenth (0.1) of a foot to left or right. To re-center line on vehicle's current location press 2 on numeric keypad.

Shift Track can be used to compensate for GPS drift that occurs over time.



PC7974 –19–04NOV03

OUO6050,00011CB –19–11AUG05–1/1

General Information

AutoTrac Accuracy

The overall AutoTrac system accuracy is dependent upon many variables. Equation looks like: AutoTrac System Accuracy = GPS signal accuracy + Vehicle Setup + Implement Setup + Field/Soil Conditions. Therefore, it is very important that receiver has gone through warm-up period upon start-up; vehicle is setup properly, and that you understand how field/soil conditions affect system (loose soil requires more steering than firm soil).

Continued on next page

CAUTION: Do not use AutoTrac system on roadways. Always turn off (Deactivate) AutoTrac system before entering a roadway. Do not attempt to turn on (Activate) AutoTrac system while transporting on a roadway.

When system is activated remain alert and pay attention to surrounding environment. Take control of steering when necessary to avoid field hazards, bystanders, equipment or other obstacles. Stop operation if poor visibility conditions impair your ability to safely operate and steer machine.

IMPORTANT: The AutoTrac system is intended to aid operator in performing field operations more efficiently. Operator is always responsible for machine path and must continue to pay attention to surrounding environment while operating machine. Stop operation if poor visibility conditions impair your ability to identify people or obstacles in machine path.

Always operate machine from operator's seat. If provided, always use seat belt.

The AutoTrac system relies on GPS system operated by government of the United States, which is solely responsible for its accuracy and maintenance. System is subject to changes that could affect accuracy and performance of all GPS equipment.

All operators must be familiar with AutoTrac system and operating characteristics prior to operation. The following is a suggested procedure for operator to become familiar with system:

1. Read and understand Operators Manual for GreenStar Guidance - Parallel Tracking and AutoTrac Assisted Steering Systems.

Continued on next page

2. Choose an open area free of hazards (ditches, buildings, etc.).

3. Set Track Spacing to 92.0 meters (300 ft). See SETUP section for details on setting up Tracking.

4. Set a Track 0 (A—B Line). (See SETUP section for details on setting up Tracking).

NOTE: Operate vehicle at a speed you are comfortable, recommend less than 8 km/h (5 mph).

5. Enable AutoTrac on display by turning Steer ON. (See Enabling system later in this section).

6. Press Resume switch to activate AutoTrac. (See Activating system later in this section).

7. After driving a short distance, then turn steering wheel to turn vehicle off track to deactivate AutoTrac. (See Deactivating System later in this section).

8. Practice Activating AutoTrac at different distances before and after crossing track and at different angles. Increase and decrease speeds to simulate different operating conditions.

9. Reduce Track Spacing to acquire multiple tracks and continue practicing activating AutoTrac at different angles and varying speeds to understand how AutoTrac behaves under different conditions.

Always be prepared to resume manual control if AutoTrac does not perform expected maneuvers or machine course must be changed to avoid injury or property damage. Operator can regain manual steering by turning steering wheel or Disabling AutoTrac by turning Steer OFF on display. It is recommended practice to be as close as possible to desired track prior to activating AutoTrac. This will ensure correct track and direction are acquired.

Continued on next page

The operator must evaluate overall system accuracy to determine specific field operations where assisted steering may be used. This evaluation is necessary because accuracy required for various field operations may differ depending on farming operation. Because AutoTrac uses StarFire differential correction network along with Global Positioning System (GPS), slight shifts in position may occur over time.

To operate AutoTrac operator must set track 0 (similar to parallel tracking) and all tracks are drawn parallel to track 0 using track spacing. (See SETUP section for details on setting up and operating parallel tracking).

The AutoTrac system operating status can exist at three levels: ENABLED, ACTIVE, and INACTIVE.

After enabling AutoTrac (see Enabling AutoTrac), AutoTrac is activated by pressing resume switch on armrest (see Activating AutoTrac). To return to manual steering, operator must deactivate system (see Deactivating System).

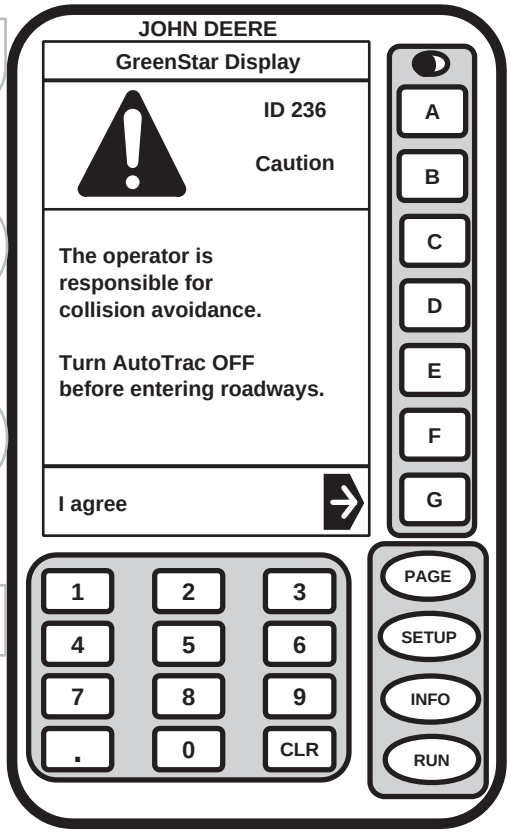
If required track can be shifted left, right or centered using shift track feature on display. (See Shift Track).

OUO6050,00011CC –19–13OCT05–4/4

Start-Up Screen

Each time a machine equipped with AutoTrac is started, this screen will appear as a reminder of operator responsibilities when using AutoTrac steering system. To clear this screen press letter button next to I AGREE .

IMPORTANT: When starting machine with AutoTrac installed and this startup screen is not displayed, update AutoTrac software through www.stellarsupport.com or 1-888-GRNSTAR.



PC7963 –19–29OCT03

OUO6050,00011CD –19–10OCT05–1/1

Enabling System

The system is enabled when ON is shown under STEER. System is disabled when OFF is shown under STEER. Press letter button next to STEER to toggle between enable/disable AutoTrac.

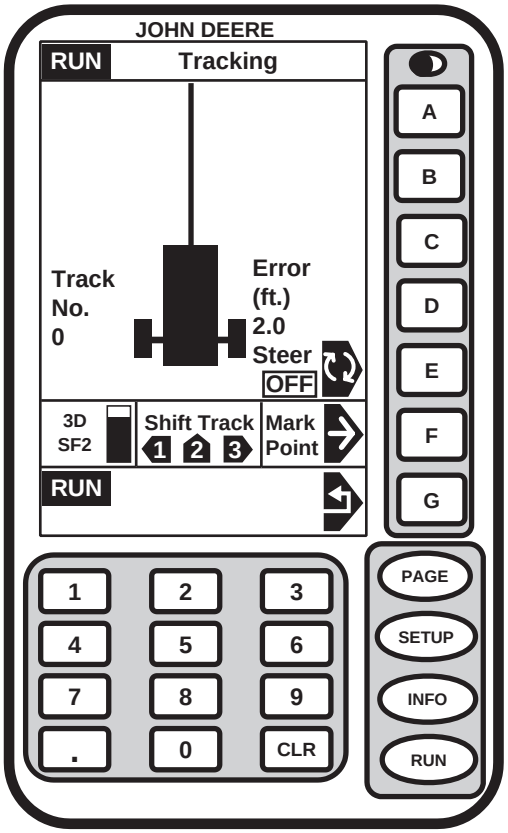
To enable system, all of the following criteria must be met:

- AutoTrac KeyCard has been inserted into mobile processor.
- Tracking has been setup. (See Setup Tracking).
- Tracking is ON.
- SSU is in normal operating mode.
- 4700 Series Sprayer is in 1st, 2nd, or 3rd range. 4900 Series Sprayer is in Field Mode
- Hydraulic oil is warmed to minimum specification.

Specification

Hydraulic Oil Minimum Temperature—Temperature ..... 10 °C (50 °F)

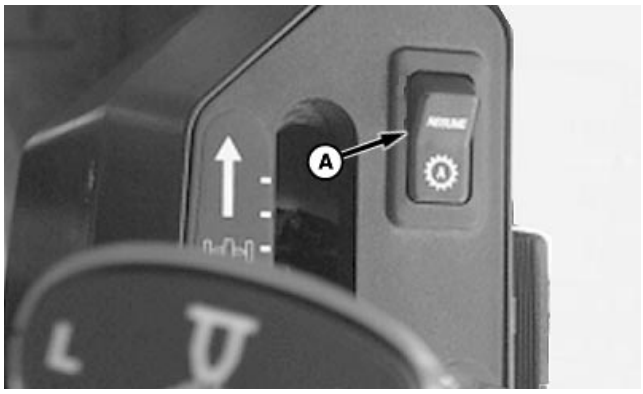
- TCM must be installed, calibrated, and turned on.



PC7973 –19–04NOV03

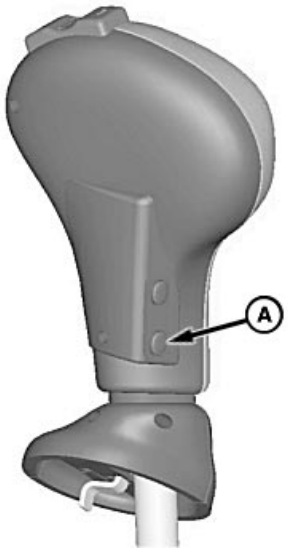
OUO6050,00011CE –19–10OCT05–1/1

Activating System



N63532 –UN–07AUG03

4700 Series Sprayer Resume Switch



PC7989 –UN–04NOV03

4900 Series Sprayer Resume Switch

CAUTION: While AutoTrac is active operator is responsible for steering at end of path and collision avoidance.

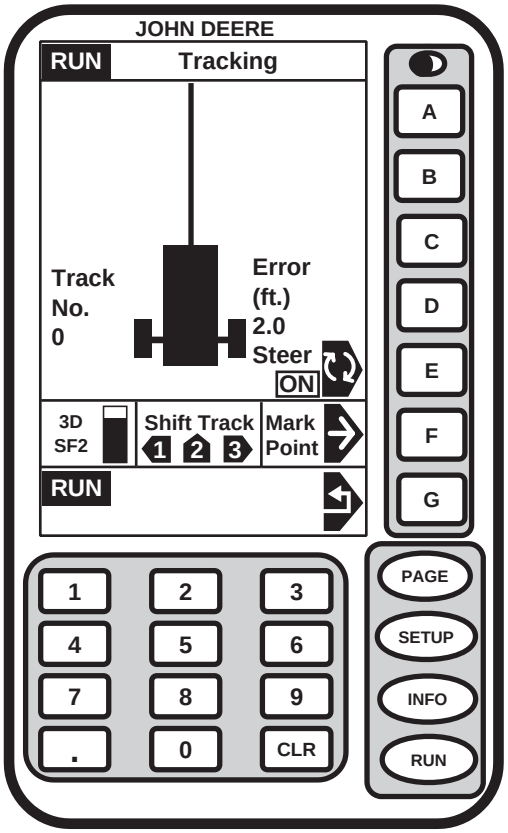
After system has been ENABLED, operator must manually change system to ACTIVE status when steering assistance is desired.

Press resume switch (A) to activate AutoTrac. This will initiate assisted steering.

In order to activate system the following criteria must be met:

- Sprayer hydro handle is forward.
- 4700 Series Sprayer is in 1st, 2nd, or 3rd range. 4900 Series Sprayer is in Field Mode
- Vehicle speed is greater than 1.5 km/h (0.9 mph).
- Vehicle speed is less than 37 km/h (23 mph).
- Vehicle heading is within 45° of desired track.
- Off track error is within 40 % of track spacing.
- Operator is seated.
- TCM must be ON. (See Setup TCM for more information.)

A—Resume Switch



PC7974 –19–04NOV03

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CAUTION: Always turn off (Deactivate) AutoTrac system before entering a roadway. Do not attempt to turn on (Activate) AutoTrac system while transporting on a roadway. To turn off AutoTrac, from RUN - TRACKING screen toggle STEER button until OFF is displayed. (See DEACTIVATING SYSTEM for complete details on deactivating AutoTrac.)

OUO6050,00011CF –19–17OCT05–2/2

Deactivating System

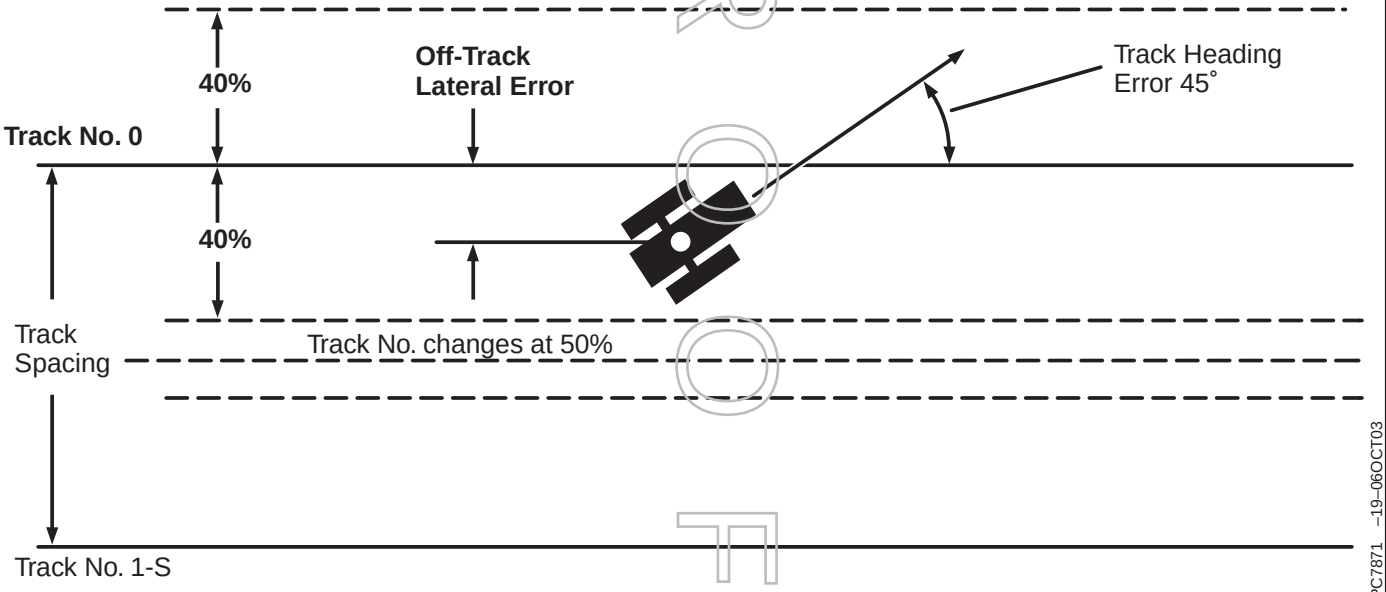
CAUTION: Always turn off (Deactivate) AutoTrac system before entering a roadway. Do not attempt to turn on (Activate) AutoTrac system while transporting on a roadway.

AutoTrac system can be made DEACTIVE by following methods:

- Turning steering wheel more than 10°.
- By placing hydro handle in neutral or reverse.
- Slowing to speeds less than 1.0 km/h (0.6 mph).
- Exceeding speed of 37 km/h (23 mph).
- Shifting speed to 4th range on 4700 Series Sprayers, shifting to transport mode in 4900 Series Sprayers.
- Pressing letter button next to STEER on RUN - PAGE 1 screen.
- Operator out of seat for more than 4 seconds.
- Track number is changed.

OUO6050,00011D0 –19–17OCT05–1/1

Necessary Conditions for Activating AutoTrac



Once machine is at end of row operator must turn system to next pass. By turning steering wheel, AutoTrac is deactivated. operator must turn onto next track.

AutoTrac can be activated by pressing resume switch only after following conditions are met:

1. System is enabled (steering ON on RUN - PAGE 1 screen).
2. The machine is within 40% of track spacing.
3. Track heading is within 45° of track error.

OUO6050,00011D1 –19–11AUG05–1/1

Shift Track

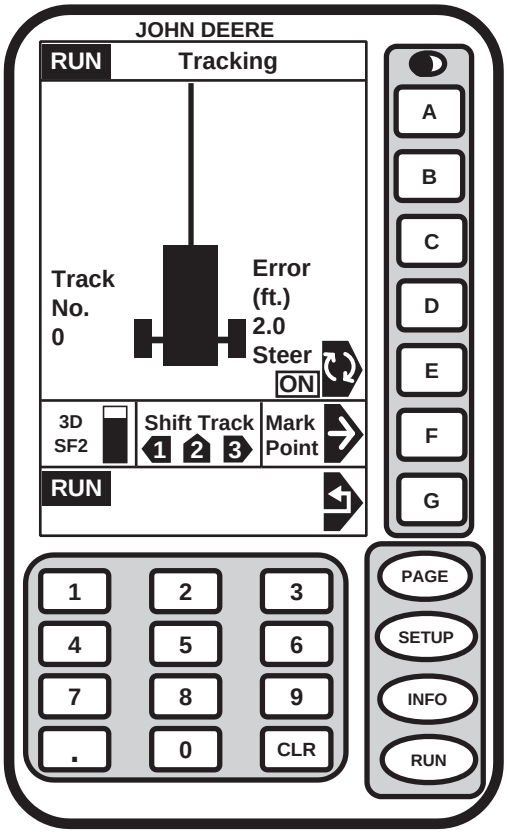
NOTE: Shift Track is only available in Full Page Mode. Since all tracks are based on original track 0, all tracks will be shifted by using this feature.

Shift track is used to adjust position of machine left, center or right of set track. Shift track can be used to compensate for GPS drift. Drift is inherent to any satellite-based, differentially corrected GPS system.

Shift Track allows an operator to move A—B line to right or left in hundredths of a meter (0.03) or one tenth of a foot (0.1) depending on selection of unit standard. An operator may also re-center displayed line on icon.

To move line to left, press 1 on numeric keypad. To move line to right, press 3 on numeric keyboard. Each time button is pressed, line will move three hundredths (0.03) of a meter or one tenth (0.1) of a foot to left or right. To re-center line on vehicle's current location press 2 on numeric keypad.

Shift Track can be used to compensate for GPS drift that occurs over time.



PC7974 –19–04NOV03

OUO6050,00011D2 –19–11AUG05–1/1

General Information

AutoTrac Accuracy

The overall AutoTrac system accuracy is dependent upon many variables. Equation looks like: AutoTrac System Accuracy = GPS signal accuracy + Vehicle Setup + Implement Setup + Field/Soil Conditions. Therefore, it is very important that receiver has gone through warm-up period upon start-up; vehicle is setup properly, and that you understand how field/soil conditions affect system (loose soil requires more steering than firm soil).

Continued on next page

CAUTION: Do not use AutoTrac system on roadways. Always turn off (Deactivate) AutoTrac system before entering a roadway. Do not attempt to turn on (Activate) AutoTrac system while transporting on a roadway.

When system is activated remain alert and pay attention to surrounding environment. Take control of steering when necessary to avoid field hazards, bystanders, equipment or other obstacles. Stop operation if poor visibility conditions impair your ability to safely operate and steer machine.

IMPORTANT: The AutoTrac system is intended to aid operator in performing field operations more efficiently. Operator is always responsible for machine path and must continue to pay attention to surrounding environment while operating machine. Stop operation if poor visibility conditions impair your ability to identify people or obstacles in machine path.

Always operate machine from operator's seat. If provided, always use seat belt.

The AutoTrac system relies on GPS system operated by government of the United States, which is solely responsible for its accuracy and maintenance. System is subject to changes that could affect accuracy and performance of all GPS equipment.

All operators must be familiar with AutoTrac system and operating characteristics prior to operation. The following is a suggested procedure for operator to become familiar with system:

1. Read and understand Operators Manual for GreenStar Guidance - Parallel Tracking and AutoTrac Assisted Steering Systems.

Continued on next page

2. Choose an open area free of hazards (ditches, buildings, etc.).

3. Set Track Spacing to 92.0 meters (300 ft). See SETUP section for details on setting up Tracking.

4. Set a Track 0 (A—B Line). (See SETUP section for details on setting up Tracking).

NOTE: Operate vehicle at a speed you are comfortable, recommend less than 8 km/h (5 mph).

5. Enable AutoTrac on display by turning Steer ON. (See Enabling system later in this section).

6. Press button 2 or 3 on multi-function handle to activate AutoTrac. (See Activating system later in this section).

7. After driving a short distance, then turn steering wheel to turn vehicle off track to deactivate AutoTrac. (See Deactivating System later in this section).

8. Practice Activating AutoTrac at different distances before and after crossing track and at different angles. Increase and decrease speeds to simulate different operating conditions.

9. Reduce Track Spacing to acquire multiple tracks and continue practicing activating AutoTrac at different angles and varying speeds to understand how AutoTrac behaves under different conditions.

Always be prepared to resume manual control if AutoTrac does not perform expected maneuvers or machine course must be changed to avoid injury or property damage. Operator can regain manual steering by turning steering wheel or Disabling AutoTrac by turning Steer OFF on display. It is recommended practice to be as close as possible to desired track prior to activating AutoTrac. This will ensure correct track and direction are acquired.

Continued on next page

The operator must evaluate overall system accuracy to determine specific field operations where assisted steering may be used. This evaluation is necessary because accuracy required for various field operations may differ depending on farming operation. Because AutoTrac uses STARFIRE differential correction network along with Global Positioning System (GPS), slight shifts in position may occur over time.

To operate AutoTrac operator must set track 0 (similar to parallel tracking) and all tracks are drawn parallel to track 0 using track spacing. (See SETUP section for details on setting up and operating parallel tracking).

The AutoTrac system operating status can exist at three levels: ENABLED, ACTIVE, and INACTIVE.

After enabling AutoTrac (see Enabling AutoTrac), AutoTrac is activated by pressing button 2 or 3 on multi-function handle (see Activating AutoTrac). To return to manual steering, operator must deactivate system (see Deactivating System).

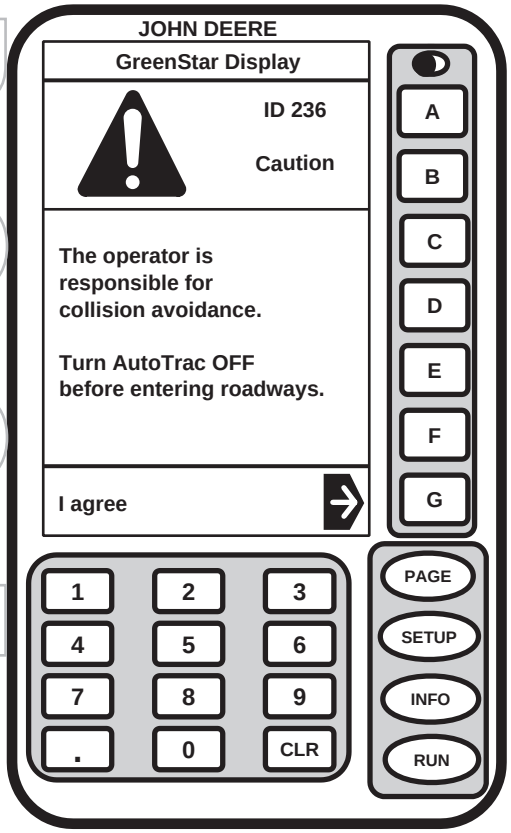
If required track can be shifted left, right or centered using shift track feature on display. (See Shift Track).

OUO6050,00011D3 –19–13OCT05–4/4

Start-Up Screen

Each time a machine equipped with AutoTrac is started, this screen will appear as a reminder of operator responsibilities when using AutoTrac steering system. To clear this screen press letter button next to I AGREE .

IMPORTANT: When starting machine with AutoTrac installed and this startup screen is not displayed, update AutoTrac software through www.stellarsupport.com or 1-888-GRNSTAR.



PC7963 –19–29OCT03

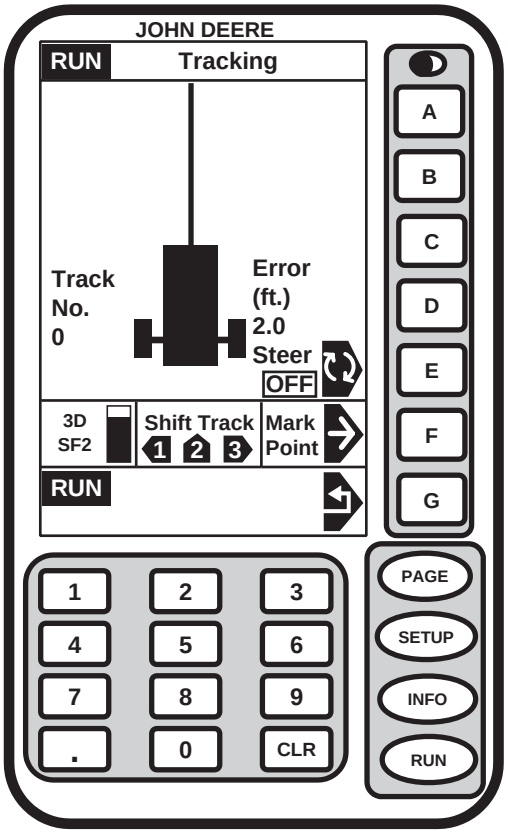
OUO6050,00011D4 –19–12AUG05–1/1

Enabling System

The system is enabled when ON is shown under STEER. System is disabled when OFF is shown under STEER. Press letter button next to STEER to toggle between enable/disable AutoTrac.

To enable system, all of the following criteria must be met:

- AutoTrac KeyCard has been inserted into mobile processor.
- Tracking has been setup (see Setup Tracking).
- Tracking is ON.
- SSU is in normal operating mode.
- TCM must be installed, calibrated, and turned on.



PC7973 –19–04NOV03

OUO6050,00011D5 –19–10OCT05–1/1

Activating System

CAUTION: While AutoTrac is active operator is responsible for steering at end of path and collision avoidance.

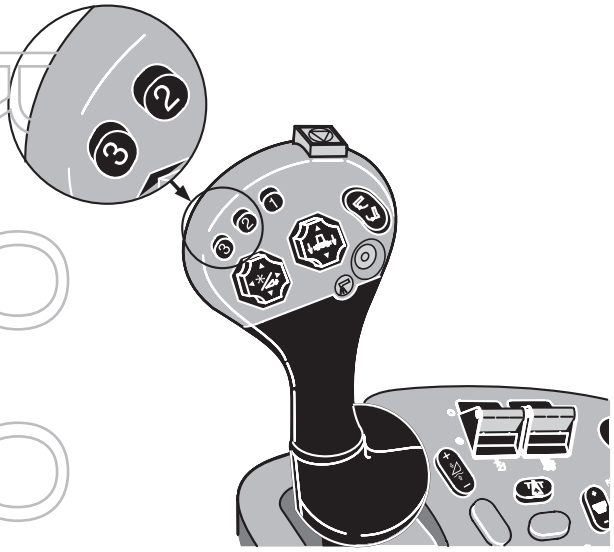
After system has been ENABLED, operator must manually change system to ACTIVE status when steering assistance is desired.

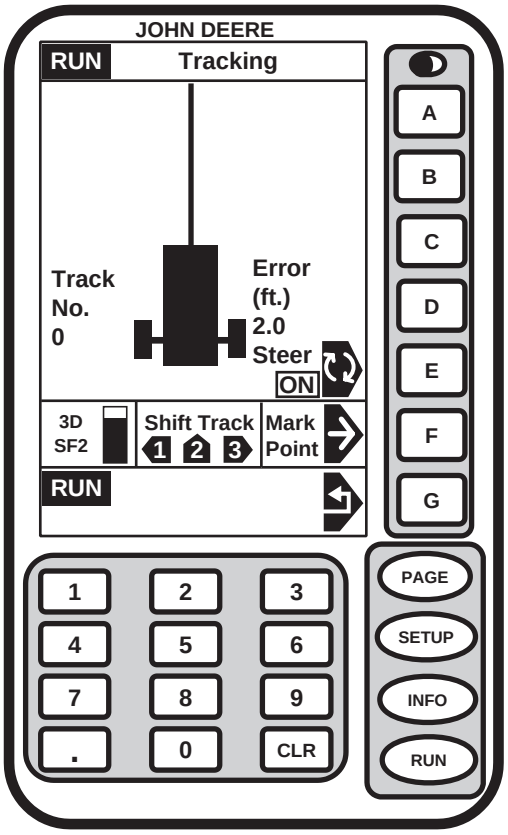
Press button 2 or 3 on multi-function handle to activate AutoTrac. This will initiate assisted steering.

In order to activate system following criteria must be met:

- Road Transport Switch is in field position.
- Header is engaged.
- Multi-function handle is forward.
- Vehicle speed is greater than 1.0 km/h (0.6 mph).
- Vehicle speed is less than 20 km/h (12 mph).
- Vehicle speed is less than 20 km/h (12 mph).
- Vehicle heading is within 45° of desired track.
- Off track error is within 40 % of track spacing.
- Operator is seated.
- TCM is on. (See Setup TCM for more information.)

CAUTION: Always turn off (Deactivate) AutoTrac system before entering a roadway. Do not attempt to turn on (Activate) AutoTrac system while transporting on a roadway. To turn off AutoTrac, from RUN - TRACKING screen, toggle STEER button until OFF is displayed. (See DEACTIVATING SYSTEM for complete details on deactivating AutoTrac.)





OUO6050,00011D6 –19–17OCT05–1/1

Deactivating System

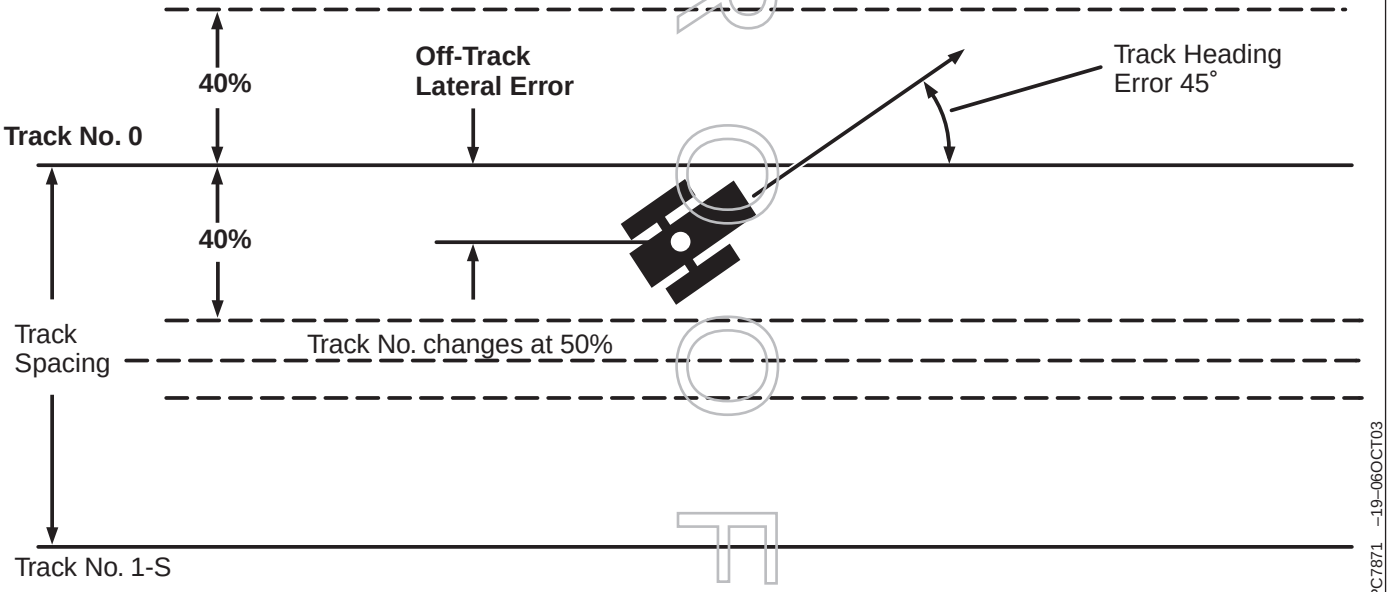
CAUTION: Always turn off (Deactivate) AutoTrac system before entering a roadway. Do not attempt to turn on (Activate) AutoTrac system while transporting on a roadway.

AutoTrac system can be made DEACTIVE by following methods:

- Disengaging header
- Turning steering wheel more than 10°
- Slowing to speeds less than 1.0 km/h (0.6 mph)
- Exceeding speed of 20 km/h (12 mph)
- Pressing letter button next to STEER on RUN - PAGE 1 screen.
- Operator out of seat for more than 7 seconds.
- Track number is changed.

OUO6050,00011D7 –19–17OCT05–1/1

Necessary Conditions for Activating AutoTrac



Once machine is at end of row operator must turn system to next pass. By turning steering wheel, AutoTrac is deactivated. Operator must turn onto next track.

AutoTrac can be activated by pressing resume switch only after following conditions are met:

1. System is enabled (steering ON on RUN - PAGE 1 screen).
2. The machine is within 40% of track spacing.
3. Track heading is within 45° of track error.

OUO6050,00011D8 –19–12AUG05–1/1

Shift Track

NOTE: Shift Track is only available in Full Page Mode. Since all tracks are based on original track 0, all tracks will be shifted by using this feature.

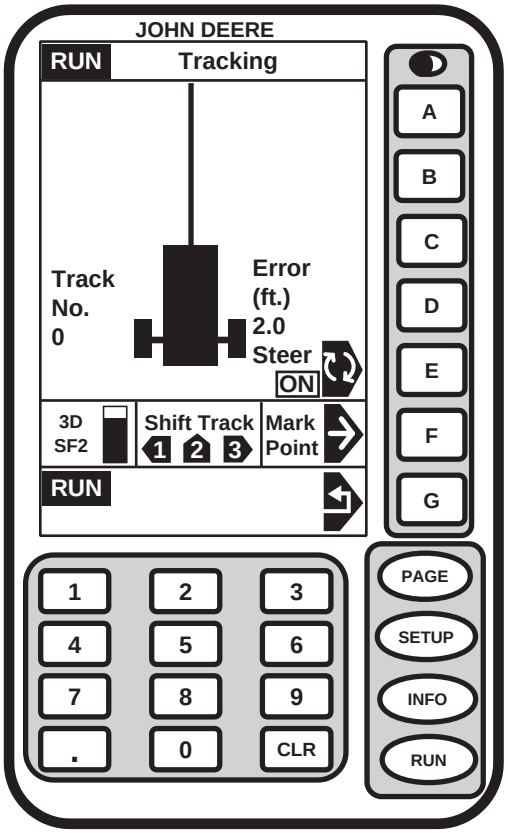
Shift Track increases system performance by compensating for GPS drift.

Shift track is used to adjust position of machine left, center or right of set track. Shift track can be used to compensate for GPS drift. Drift is inherent to any satellite-based, differentially corrected GPS system.

Shift Track allows an operator to move A—B line to right or left in hundredths of a meter (0.03) or one tenth of a foot (0.1) depending on selection of unit standard. An operator may also re-center displayed line on icon.

To move line to left, press 1 button on numeric keypad. To move line to right, press 3 button on numeric keyboard. Each time button is pressed, line will move three hundredths (0.03) of a meter or one tenth (0.1) of a foot to left or right. To re-center line on vehicle's current location press 2 button on numeric keypad.

Shift Track can be used to compensate for GPS drift that occurs over time.



PC7974 –19–04NOV03

OUO6050,00011D9 –19–12AUG05–1/1

General Information

AutoTrac Accuracy

The overall AutoTrac system accuracy is dependent upon many variables. Equation looks like: AutoTrac System Accuracy = Signal accuracy + Vehicle Setup + Implement Setup + Field/Soil Conditions. Therefore, it is very important that receiver has gone through warm-up period upon start-up; vehicle is setup properly (ballasted according to vehicle operators manual, etc.), implement is setup to run properly (wear parts such as shanks, shovels, and sweeps are in good working condition) and that you understand how field/soil conditions affect system (loose soil requires more steering than firm soil, but firm soil can cause uneven draft loads).

CAUTION: Do not use AutoTrac system on roadways. Always turn off (Deactivate) AutoTrac system before entering a roadway. Do not attempt to turn on (Activate) AutoTrac system while transporting on a roadway.

When system is activated remain alert and pay attention to surrounding environment. Take control of steering when necessary to avoid field hazards, bystanders, equipment or other obstacles. Stop operation if poor visibility conditions impair your ability to safely operate and steer machine.

IMPORTANT: The AutoTrac system is intended to aid operator in performing field operations more efficiently. Operator is always responsible for machine path and must continue to pay attention to surrounding environment while operating machine. Stop operation if poor visibility conditions impair your ability to identify people or obstacles in machine path.

Always operate machine from operator's seat. If provided, always use seat belt.

The AutoTrac system relies on GPS system operated by government of United States, which is solely responsible for its accuracy and maintenance. System is subject to changes that could affect accuracy and performance of all GPS equipment.

Excessive wear on steering components may impact accuracy. Make sure steering system components have proper tolerances. After installing AutoTrac Universal Steering Kit check steering system every 500 hours for proper tolerance and wear. Operator needs to tighten nut on steering wheel to manufacturer's specified torque. It is recommended to check and adjust after 10 hours of use.

All operators must be familiar with AutoTrac system and operating characteristics prior to operation. The following is a suggested procedure for operator to become familiar with system:

1. Read and understand Operators Manual for GreenStar Guidance - Parallel Tracking and AutoTrac Assisted Steering Systems.
2. Choose an open area free of hazards (ditches, buildings, etc.).
3. Set Track Spacing to 92.0 meters (300 ft). See SETUP section for details on setting up Tracking.

Continued on next page

4. Set a Track 0 (A—B Line). (See SETUP section for details on setting up Tracking).

NOTE: Operate vehicle at a speed you are comfortable, recommend less than 8 km/h (5 mph).

5. Enable AutoTrac on display by turning Steer ON. (See Enabling system later in this section).

6. Press Resume switch activate AutoTrac. (See Activating system later in this section).

7. After driving a short distance, then turn steering wheel to turn vehicle off track to deactivate AutoTrac. (See Deactivating System later in this section).

8. Practice Activating AutoTrac at different distances before and after crossing track and at different angles. Increase and decrease speeds to simulate different operating conditions.

9. Reduce Track Spacing to acquire multiple tracks and continue practicing activating AutoTrac at different angles and varying speeds to understand how AutoTrac behaves under different conditions.

Always be prepared to resume manual control if AutoTrac does not perform expected maneuvers or machine course must be changed to avoid injury or property damage. Operator can regain manual steering by turning steering wheel or Disabling AutoTrac by turning Steer off on display. It is recommended practice to be as close as possible to desired track prior to activating AutoTrac. This will ensure correct track and direction are acquired.

The AutoTrac basic system is intended to be used as an assistance tool to mechanical markers on planters. Operator must evaluate overall system accuracy to determine specific field operations where assisted steering may be used. This evaluation is necessary because accuracy required for various field operations may differ depending on farming operation. Because AutoTrac uses StarFire differential correction network along with Global Positioning System (GPS), slight shifts in position may occur over time.

To operate AutoTrac operator must set track 0 (similar to parallel tracking) and all tracks are drawn parallel to track 0 using track spacing. (See SETUP section for details on setting up and operating parallel tracking).

The AutoTrac system operating status can exist at three levels: ENABLED, ACTIVE, and INACTIVE.

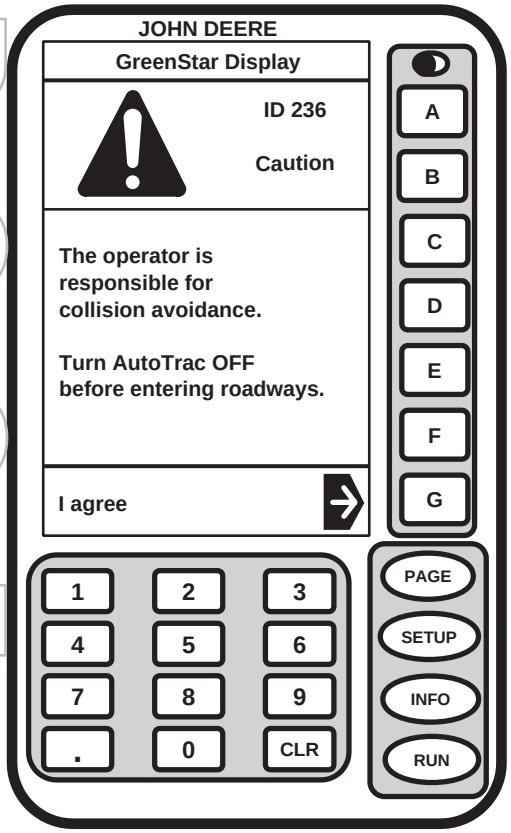
After enabling AutoTrac (see Enabling AutoTrac), AutoTrac is activated by pressing resume switch on AutoTrac Universal Steering Kit. To return to manual steering, operator must deactivate system (see Deactivating System).

OUO6050,00011DA –19–21OCT05–2/2

Start-Up Screen

Each time a machine equipped with AutoTrac is started, this screen will appear as a reminder of operator responsibilities when using AutoTrac steering system. To clear this screen press letter button next to I AGREE .

IMPORTANT: When starting machine with AutoTrac installed and this startup screen is not displayed, update AutoTrac software through www.stellarsupport.com or 1-888-GRNSTAR.



PC7963 –19–29OCT03

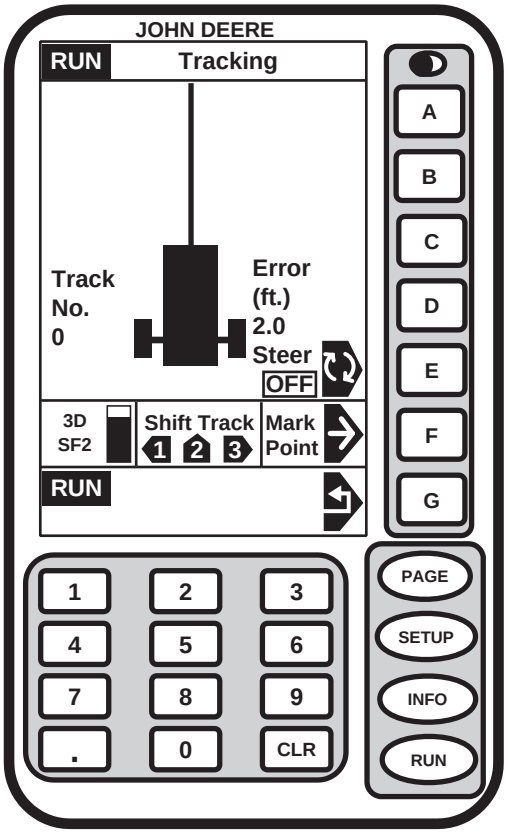
OUO6050,00011DB –19–20OCT05–1/1

Enabling AutoTrac Universal

The system is enabled when ON is shown next to STEER. The system is disabled when OFF is shown next to STEER. Press letter Button next to STEER to toggle between enable/disable AutoTrac.

To enable system all of the following must be met:

- AutoTrac KeyCard in Mobile Processor for Original GreenStar System or activated in the GS2 system
- Tracking is on and has been set up
- Operator presence mode selected
- TCM installed, calibrated, and turned on
- AutoTrac Universal Steering Kit harnesses are connected and powered up

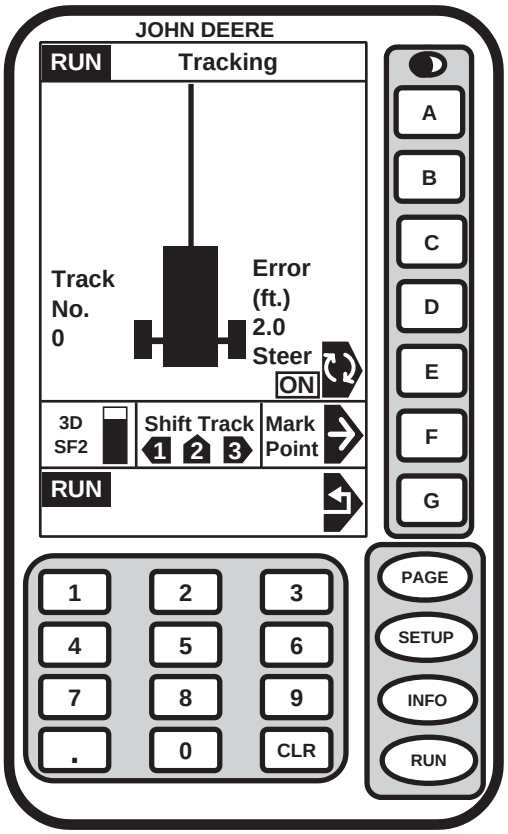


PC7973 –19–04NOV03

OUO6050,00012D1 –19–20OCT05–1/1

Activating System

PC8700 –UN–11AUG05



PC7974 –19–04NOV03

A—Resume Switch

CAUTION: While AutoTrac is active operator is responsible for steering at end of path and collision avoidance.

After system has been ENABLED, operator must manually change system to ACTIVE status when steering assistance is desired.

Press resume switch (A). This will initiate assisted steering.

In order to activate system following criteria must be met:

- Vehicle speed is greater than 0.5 km/h (0.3 mph).
- Forward vehicle speed is less than
  Tractor - 30 km/h (18.6 mph)
  Sprayer - 37 km/h (23 mph)
  Combine - 22 km/h (13.6 mph)
- Reverse vehicle speed is less than 10 km/h (6.0 mph).
- Vehicle within 80° of desired track.
- Operator is seated.
- In reverse AutoTrac will remain active for 45 seconds. After 45 seconds the machine must be put in a forward gear before reverse will activate again.
- Machine within 40% of track spacing.
- AutoTrac knows direction of travel.

Continued on next page

CAUTION: Always turn off (Deactivate) AutoTrac system before entering a roadway. Do not attempt to turn on (Activate) AutoTrac system while transporting on a roadway. To turn off AutoTrac, from RUN - TRACKING screen toggle STEER button until OFF is displayed. (See Deactivating System for complete details on deactivating AutoTrac.)

OUO6050,00011DD –19–21OCT05–2/2

Deactivating System

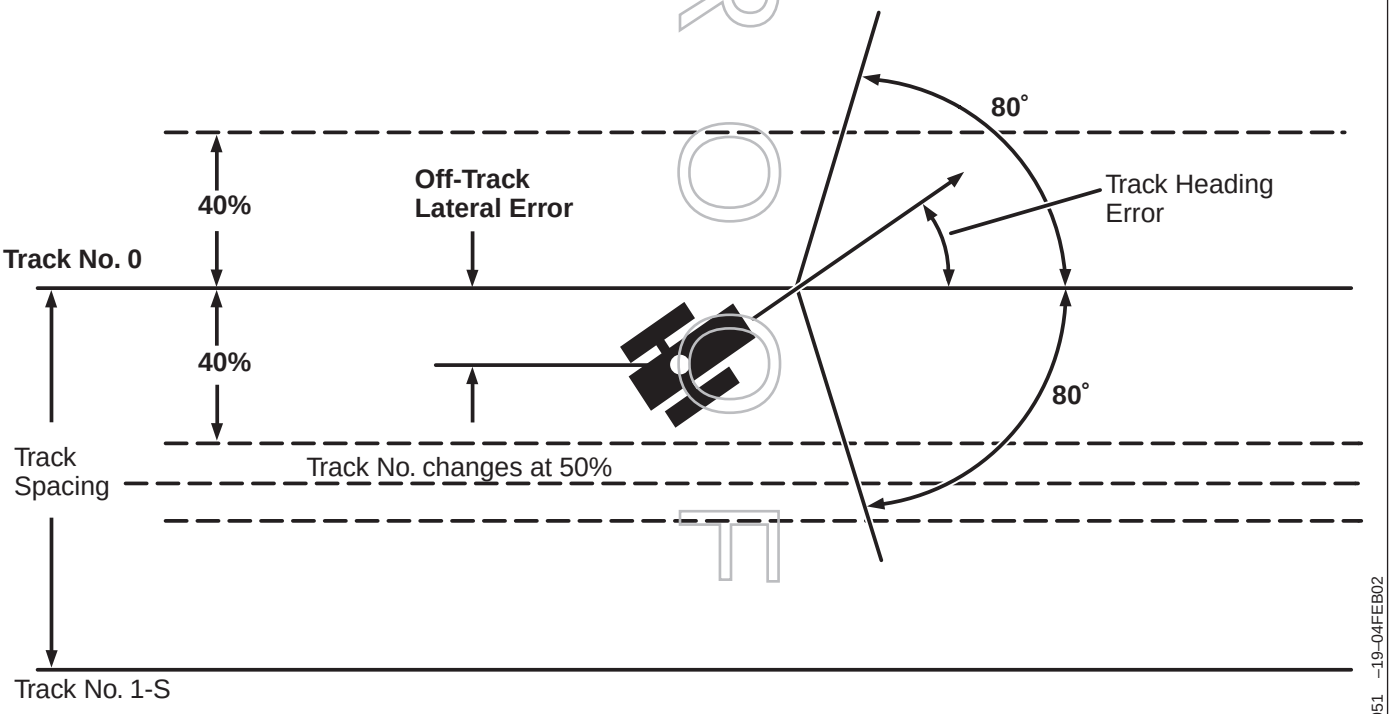
CAUTION: Always turn off (Deactivate) AutoTrac system before entering a roadway. Do not attempt to turn on (Activate) AutoTrac system while transporting on a roadway.

AutoTrac system can be made DEACTIVE by following methods:

- Turning steering wheel.
- Slowing to speeds less than 0.5 km/h (0.3 mph) for more than 15 seconds.
- Exceeding forward speed of
  Tractor - 30 km/h (18.6 mph)
  Sprayer - 37 km/h (23 mph)
  Combine - 20 km/h (12.4 mph)
- Exceeding reverse speed of 10 km/h (6.0 mph).
- Pressing letter button next to STEER on RUN screen.
- Operator out of seat for more than seven seconds if using seat switch or no activity detected by operator presence monitor for seven minutes.
- Operate in reverse for more than 45 seconds.

OUO6050,00011DE –19–17OCT05–1/1

Necessary Conditions for Activating AutoTrac



PC7051 –19–04FEB02

Once tractor is at end of row operator must turn system to next pass. By turning steering wheel, AutoTrac is deactivated. Operator must turn onto next track.

AutoTrac can be activated by pressing resume switch only after following conditions are met:

1. System is enabled (steering ON on RUN screen).
2. The machine is within 40% of track spacing.
3. Track heading is within 80° of track.

OUO6050,00011DF –19–12AUG05–1/1

Shift Track

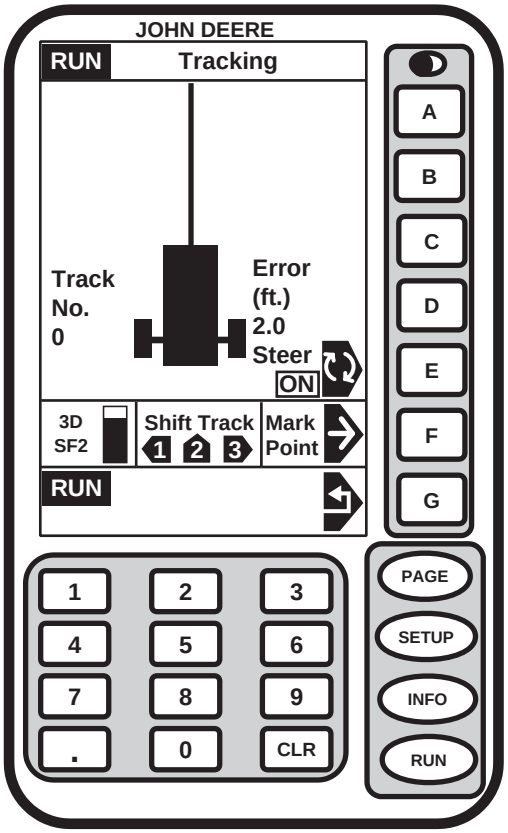
NOTE: Shift Track is only available in Full Page Mode. Since all tracks are based on original track 0, all tracks will be shifted by using this feature.

Shift track is used to adjust position of machine left, center or right of set track. Shift track can be used to compensate for GPS drift. Drift is inherent to any satellite-based, differentially corrected GPS system.

Shift Track allows an operator to move A—B line to right or left in 3 cm or a 1/10 of a foot depending on selection of unit standard. An operator may also re-center displayed line on icon.

To move line to left, press 1 on numeric keypad. To move line to right, press 3 on numeric keyboard. Each time button is pressed, line will move 3 cm or a 1/10 of a foot to left or right. To re-center line on vehicle's current location press 2 on numeric keypad.

Shift Track can be used to compensate for GPS drift that occurs over time.



PC7974 –19–04NOV03

OUO6050,00011E0 –19–12AUG05–1/1

INFO

Screen: INFO

Press: INFO

This screen is used to view general information of data on system.

Tracking

Information on Parallel Tracking can be accessed through this screen. Press letter button next to TRACKING to access screen.

AutoTrac

This section shows information for the AutoTrac Universal Steering kit and allows operator to test ATU steering motor.

StarFire Receiver

This selection shows information on StarFire receiver. (See RECEIVER section for detailed information) press letter button next to STARFIRE RECEIVER to select screen.

Perf Monitor

This screen shows detailed information on performance monitor. Press letter button next to PERF MONITOR to select screen.

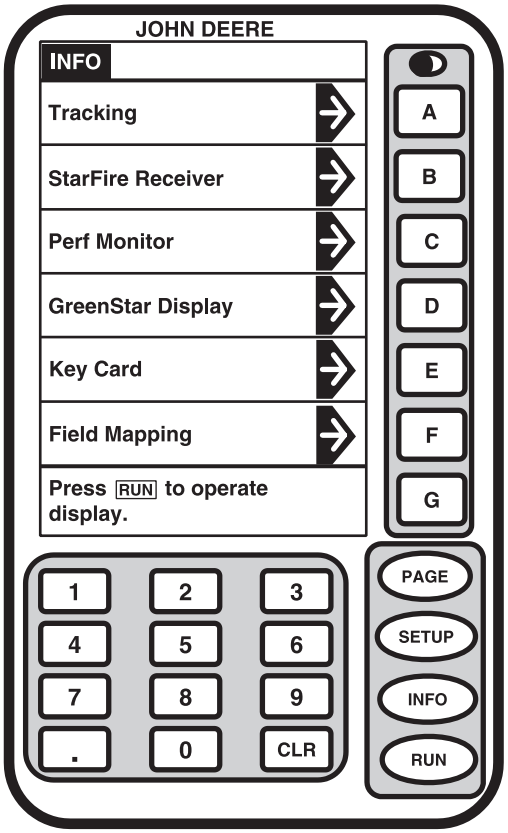
GreenStar Display

Information on this display is for factory use.

KeyCard

This selection shows information on KeyCard programs. Press letter button next to KEYCARD to select screen.

If s/w PF303140x or higher is loaded to display, tracking will not be displayed on this screen if a Parallel Tracking KeyCard is not inserted into mobile processor.



PC7008 –19–10JAN02

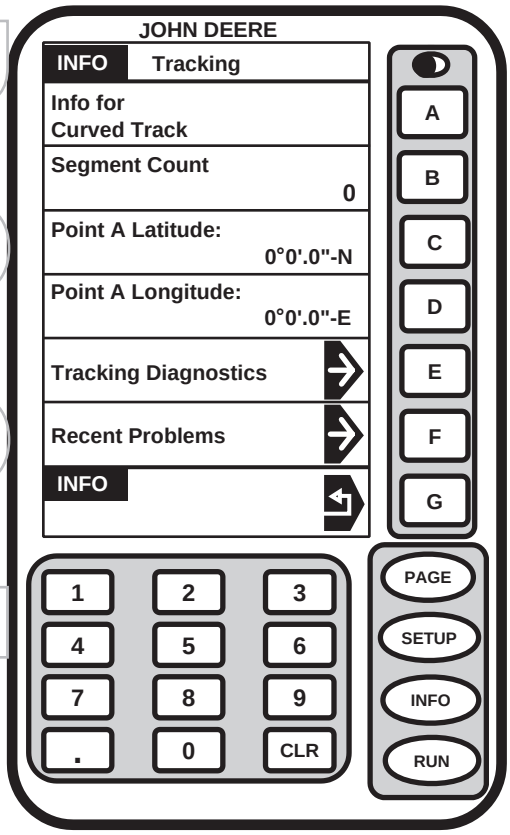
OUO6050,00011E1 –19–10OCT05–1/1

Tracking

Screen: INFO - TRACKING

Press: INFO >> TRACKING

This screen provides information on Straight Track, Row Finder or Curve Track. A recent problem selection is provided for diagnostic purposes. Press letter button next to RECENT PROBLEMS to access. This selection is available in all modes.



PC7282 –19–09OCT02

Continued on next page

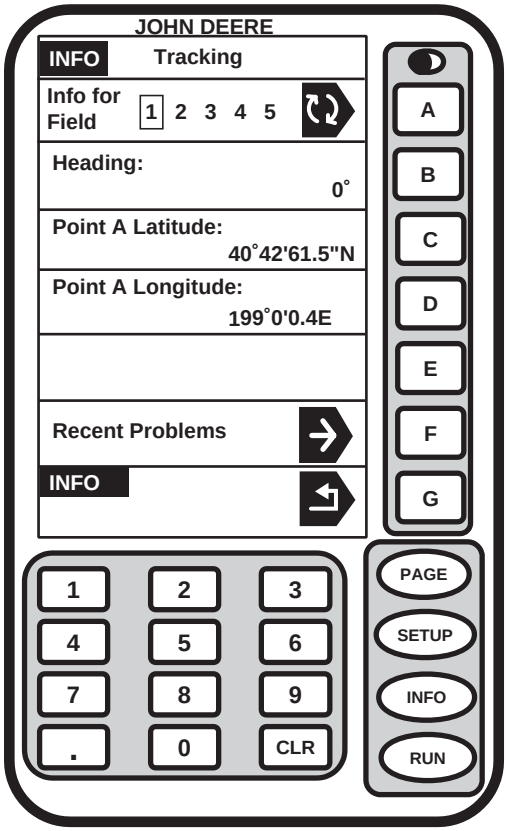
OUO6050,00011E2 –19–10OCT05–1/5

Straight Track

INFO - TRACKING screen allows operator to view basic data about Track 0.

NOTE: This is the same information presented on SETUP - PAGE 1 screen.

Information on different fields can be viewed by pressing letter button next to INFO FOR FIELD. When field number is changed in INFO - PAGE 1 screen, current field is not changed on RUN and SETUP screens. Press letter button next to INFO FOR FIELD to view information on heading and point A latitude and longitude for selected field.

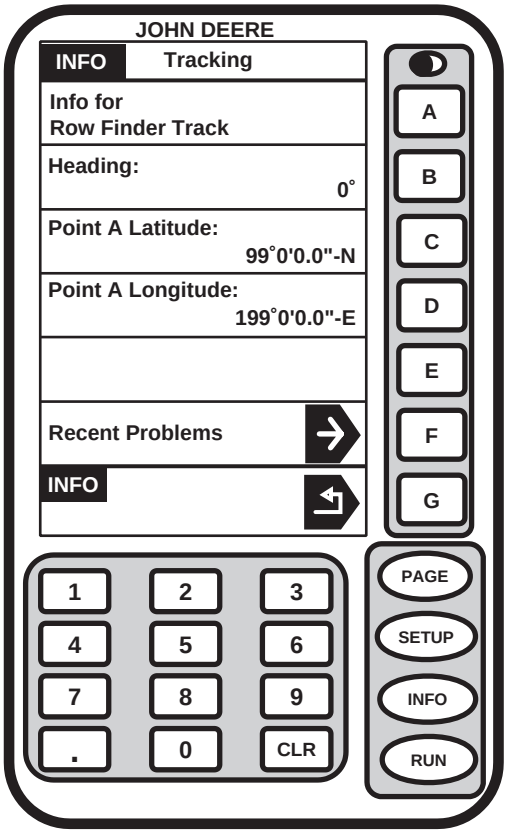


PC6988 –19–07JAN02

Continued on next page

Row Finder

This page shows current heading, point A latitude and longitude. This information shows what heading is in use after letter button next to SET ROW has been pressed on RUN screen.



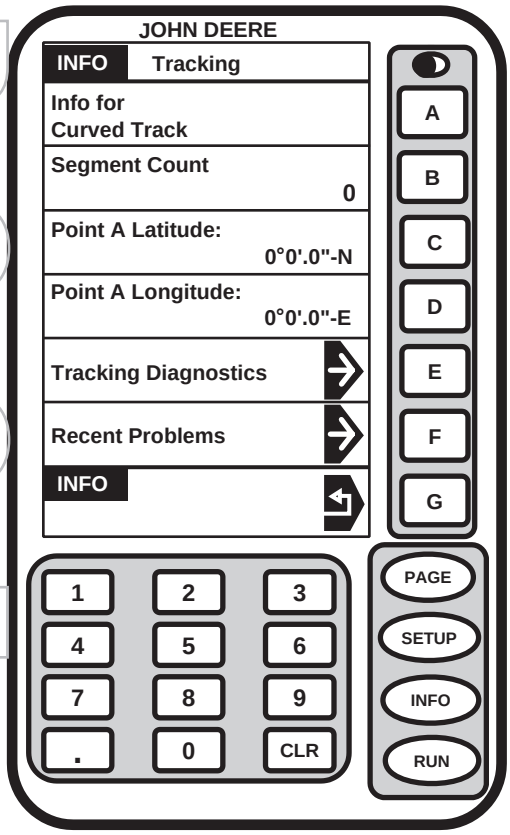
PC6989 –19–07JAN02

Continued on next page

OUO6050,00011E2 –19–10OCT05–3/5

Curve Track

SEGMENT COUNT cell on this screen shows how many segments are being used to determine direction and location of Curve Track. This cell can display up to 32,000 line segments. POINT A LATITUDE cell shows current latitude and longitude for point A.



PC7282 –19–09OCT02

Continued on next page

OUO6050,00011E2 –19–10OCT05–4/5

Screen: INFO - TRACKING DIAGNOSTICS

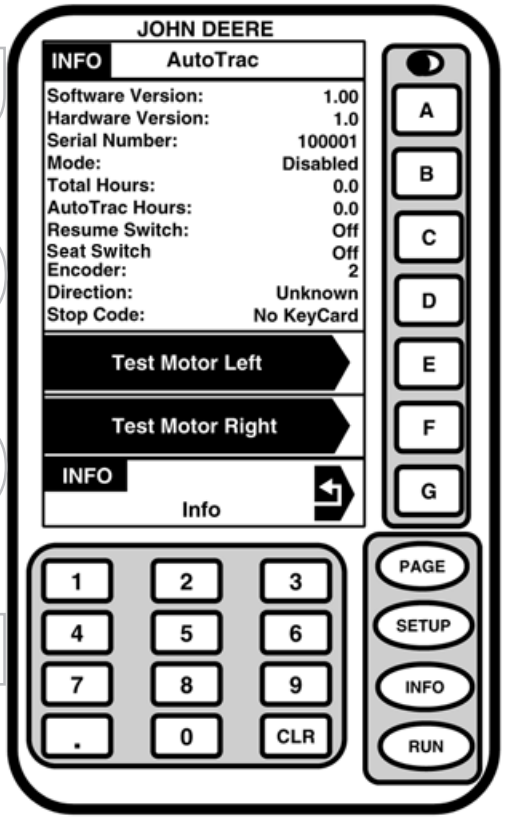
Press: INFO >> TRACKING >> TRACKING DIAGNOSTICS

This screen is used to help diagnose problems while operating in Curve track mode. Press letter button next to DISPLAY CONTOURS SEGMENT NUMBER to toggle between ON and OFF to display line segment count on RUN - PAGE 1 screen.

PC7283 –19–09OCT02

OUO6050,00011E2 –19–10OCT05–5/5

AutoTrac



PC8798 –19–21OCT05

- **Software Version** – Version of AutoTrac Universal software
- **Hardware Version** - Hardware Version Number
- **Serial Number** Serial number of the AutoTrac Universal
- **Mode** Status of AutoTrac: Disabled, Enabled, or Active
- **Total Hours** Hours the system has been powered up
- **AutoTrac Hours** Number of hours AutoTrac has been engaged
- **Resume Switch** Shows Resume Switch state. It will change from OFF to ON when resume switch is pressed.
- **Seat Switch** Shows OFF/ON.
- **Encoder** Represents the location of the steering wheel.

IMPORTANT: Encoder should be within +/- 500 when front wheels are straight ahead for proper performance. If wheels are straight and encoder is outside this range operator should drive straight until encoder is within these settings.

- **Direction** Indicates vehicle direction determined by AutoTrac Universal.

IMPORTANT: Operator must drive at least 1 mph and turn steering wheel 45° in one direction with at least SF1 signal. Direction should be determined within 3 seconds.

- **Stop code** Indicates why the system is not working or why AutoTrac disengaged. (See AUTOTRAC UNIVERSAL STOP CODES in Troubleshooting section.)
- **Test Motor Left** By pressing the “E” button the AutoTrac Universal motor will turn the steering wheel to the left. Used to test the motor to make sure it is working.
- **Test Motor Right** By pressing the “F” button the AutoTrac Universal motor will turn the steering wheel to the right. Used to test the motor to make sure it is working.

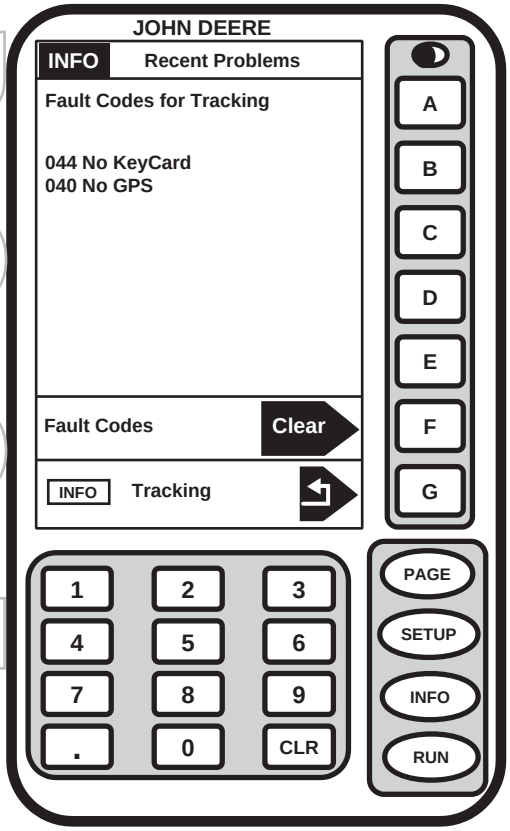
OUO6050,00011E3 –19–17OCT05–1/1

Recent Problems

Screen: INFO - RECENT PROBLEMS

Press: INFO >> TRACKING >> RECENT PROBLEMS

This screen displays last few fault codes encountered by processor. Press letter button next to CLEAR to clear codes or G button to return to INFO - TRACKING screen.



PC6410 –19–01JUN00

OUO6050,00011E4 –19–10OCT05–1/1

INFO - DIAGNOSTIC - PAGE 1

Screen: INFO - DIAGNOSTICS - PAGE 1

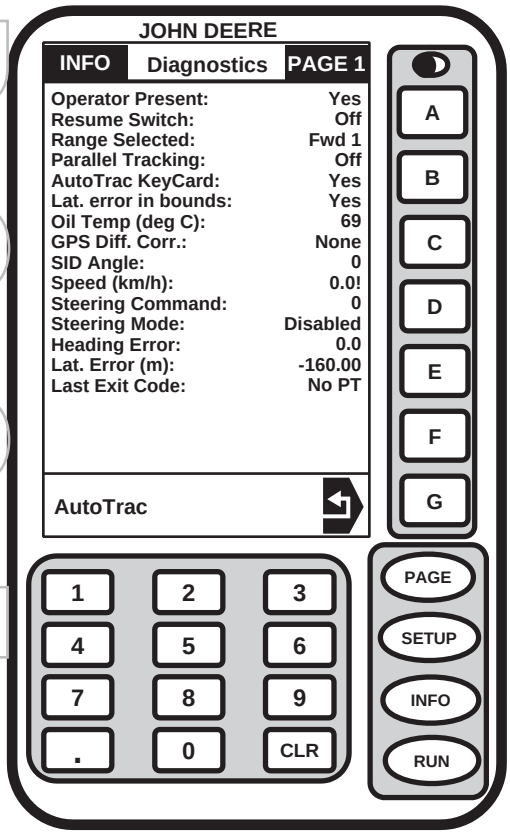
Press: INFO >> AUTOTRAC >> DIAGNOSTICS

1. Turn ignition key to ACCESSORY RUN position but DO NOT start engine.

2. Go to INFO - DIAGNOSTICS - PAGE 1.

3. Verify the following functions:

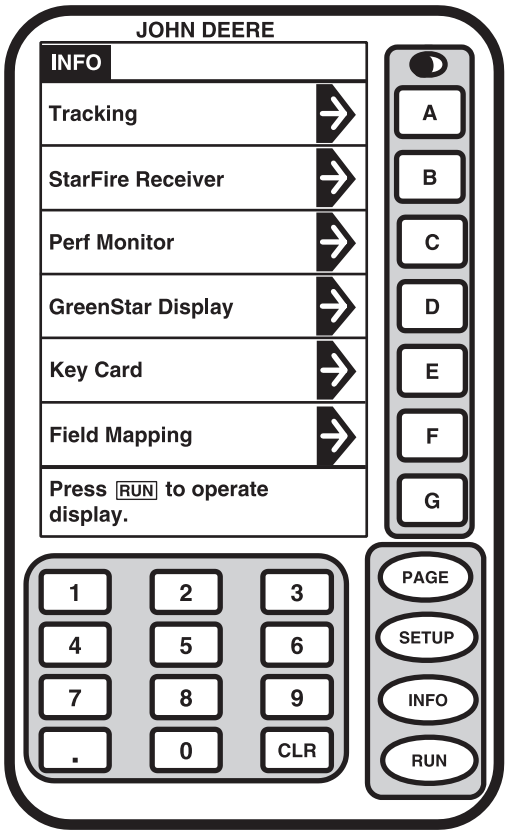
   - Insert keycard in mobile processor.
   - OPERATOR PRESENT displays YES and NO. Sit on seat, then stand up for 7 seconds to test operator presence switch.
   - RESUME SWITCH displays OFF and ON. Depress resume switch in front of hydro handle.
   - RANGE SELECTED displays FWD, PARK, and REV. Move hydro handle from forward position to park and reverse.



N63338 –19–25JUL03

OUO6050,00011E5 –19–12AUG05–1/1

Performance Monitor



PC7008 –19–10JAN02

PC6425 –19–19JUN00

Screen: INFO - PERF MONITOR

Press: INFO >> PERF MONITOR

This screen allows operator access to TOTALS and SERVICE HOURS screens.

Continued on next page

Totals

Screen: INFO - PERF MON TOTAL

Press: INFO >> PERF MONITOR >> TOTALS

This screens shows accumulated total machine area for counters 1 and 2 and accumulated distance.

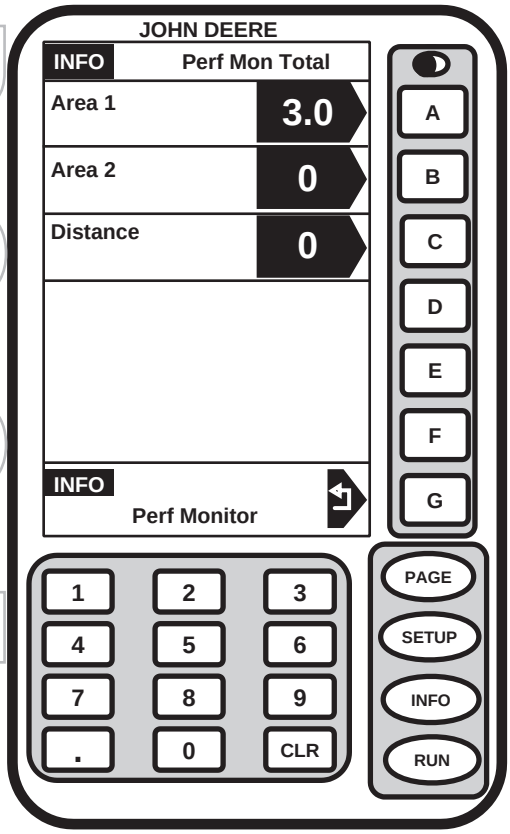
To change total area for Area 1, press letter button next to AREA 1 . Using numeric keypad, enter new area information. Press letter button next to AREA 1 again to enter and save information.

To change total area for Area 2, press letter button next to AREA 2 . Using numeric keypad, enter new area information. Press letter button next to AREA 2 again to enter and save information.

To change distance, press letter button next to DISTANCE . Using numeric keypad, enter new area information. Press letter button next to DISTANCE again to enter and save information.

Press G button to return to INFO - PERF MONITOR screen.

NOTE: If operating in a Combine, turn Performance Monitor off by going to SETUP - PERFORMANCE MONITOR screen, then toggle ON button to OFF.



PC7047 –19–22JAN02

Continued on next page

Service Hours

Screen: INFO - SERVICES HOURS

Press: INFO >> PERF MONITOR >> SERVICE HOURS

This screen shows time elapsed and interval time between machine services.

This screen is used to setup predetermined service intervals for machine. Two service intervals can be entered.

EXAMPLE: 50 hours is interval time required between services.

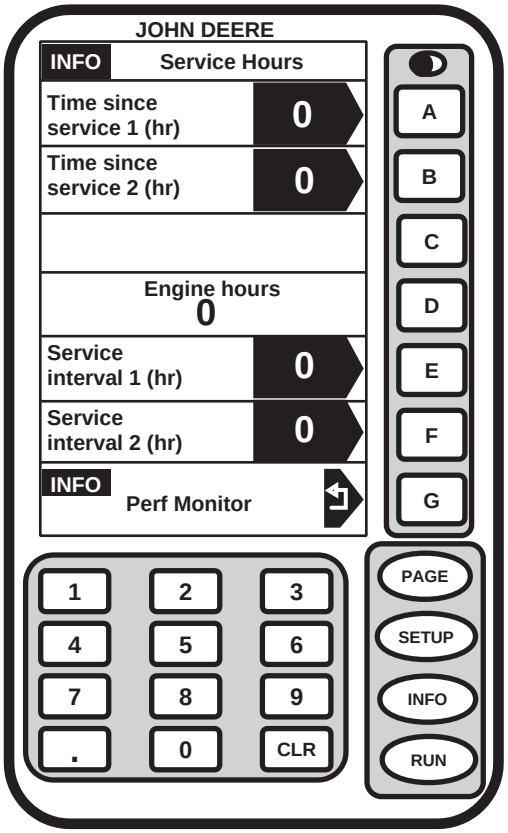
Set Service Interval 1 to 50 and Time Since Service 1 to 0. As hours are accumulated, Time Since Service 1 will increase. Once Time Since Service 1 is greater than Service Interval 1 a caution will appear.

To set Time Service 1:

Press letter button next to TIME SERVICE 1 , then using numeric keypad enter desired amount of time. Press letter button next to TIME SERVICE 1 again to enter and save information.

To set Time Service 2:

Press letter button next to TIME SERVICE 2 , then using numeric keypad enter desired amount of time. Press letter button next to TIME SERVICE 2 again to enter and save information.



PC6427 –19–19JUN00

Continued on next page

To set Service Interval 1:

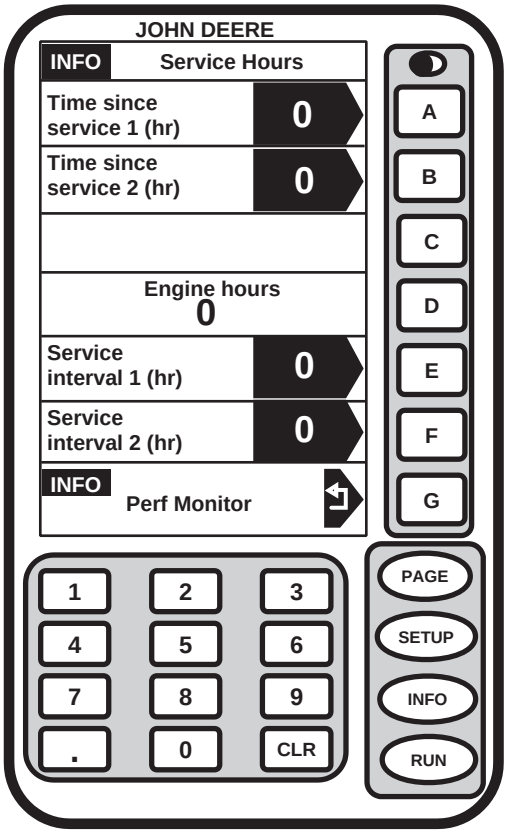
Press letter button next to SERVICE INTERVAL 1 , then using numeric keypad enter desired amount of time between services. Press letter button next to SERVICE INTERVAL 1 again to enter and save information.

To set Service Interval 2:

Press letter button next to SERVICE INTERVAL 2 , then using numeric keypad enter desired amount of time between services. Press letter button next to SERVICE INTERVAL 2 again to enter and save information.

Engine Hours

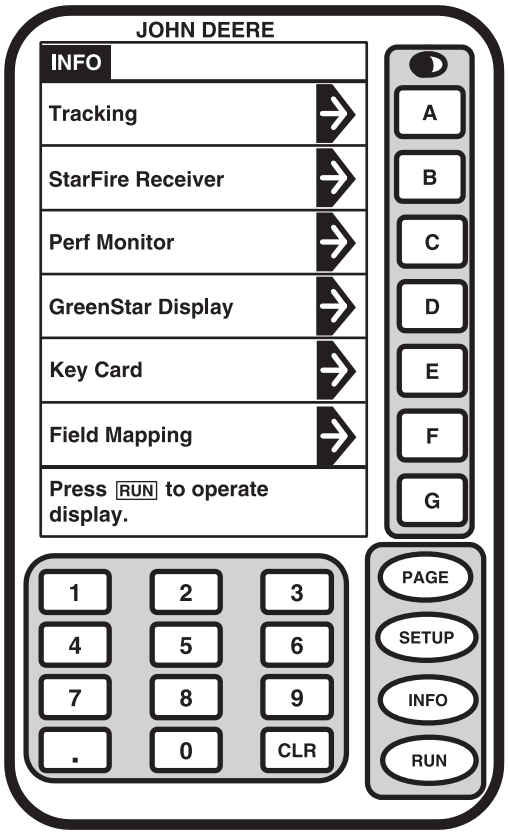
This section shows accumulated engine hours of machine as determined by CCD bus.



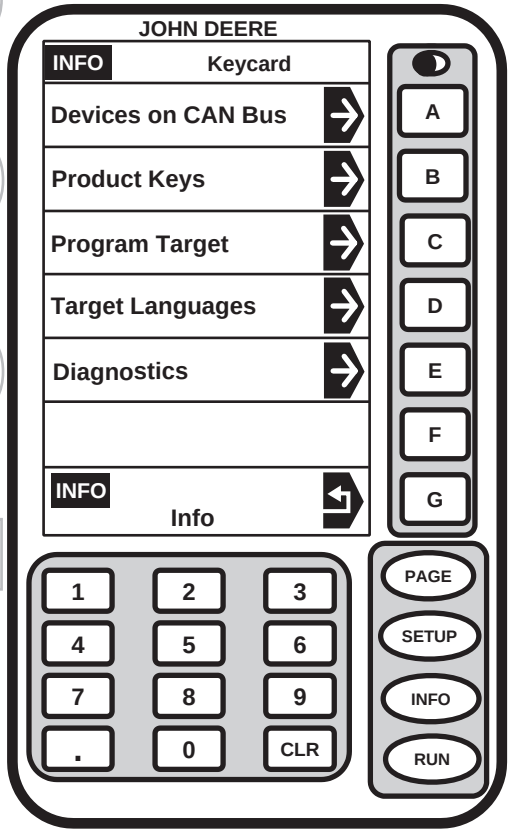
PC6427 –19–19JUN00

OUO6050,00011E6 –19–10OCT05–4/4

KeyCard



PC7008 –19–10JAN02



PC6804 –19–28AUG01

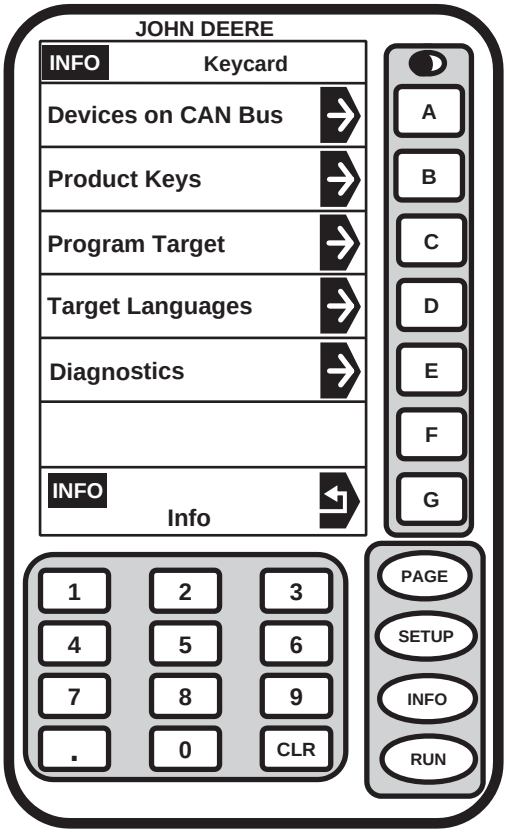
Screen: INFO - KeyCard

Press: INFO >> KEYCARD

This screen shows general information about KeyCard. Press desired selection button.

OUO6050,00011E7 –19–12AUG05–1/1

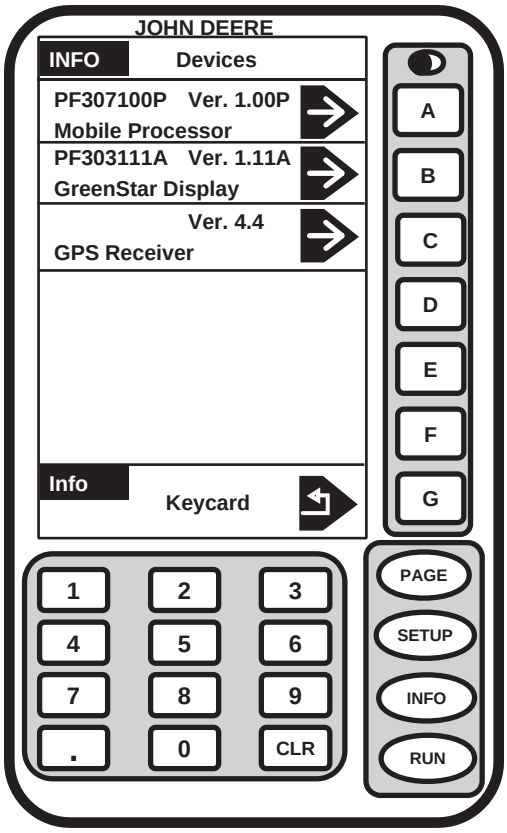
Devices



PC6804 –19–28AUG01

Screen: INFO - DEVICES

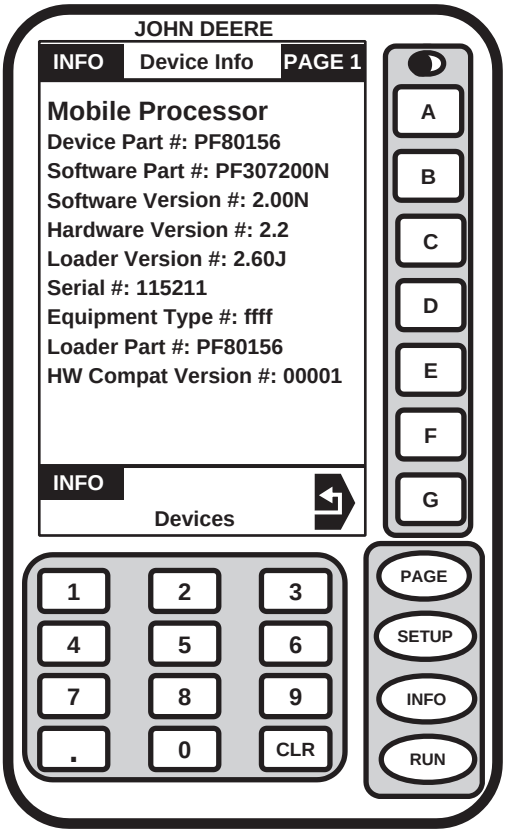
Press: INFO >> KEYCARD >> DEVICES ON CAN BUS



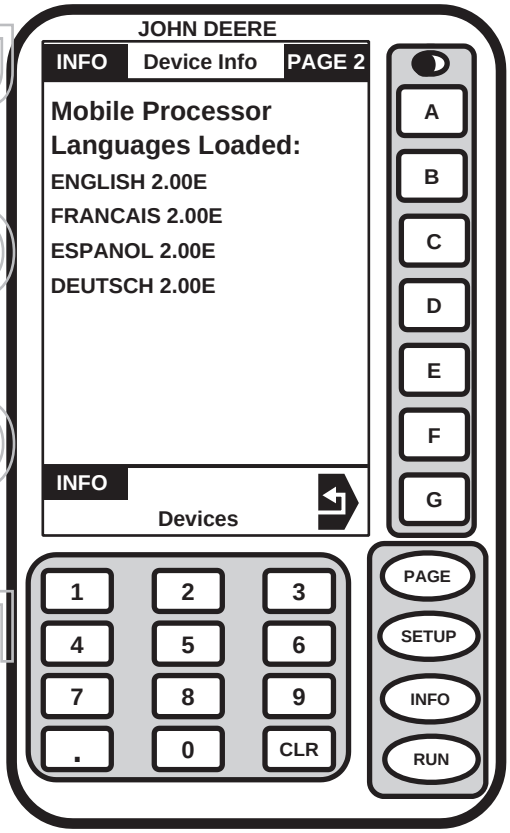
PC6442 –19–12SEP00

This screen shows devices currently connected to CAN bus. To access information on MOBILE PROCESSOR, GREENSTAR DISPLAY or GPS RECEIVER press desired selection button.

Continued on next page



PC7039 –19–22JAN02



PC7040 –19–22JAN02

Mobile Processor

Screen: INFO - DEVICE INFO - PAGE 1

Screen: INFO - DEVICE INFO - PAGE 2

Press: INFO >> KEYCARD >> DEVICES ON CAN BUS >> MOBILE PROCESSOR

NOTE: Press PAGE button to toggle between screens.

These screens show detailed information on mobile processor.

Device Part # —current part number for mobile processor.

Software Part # —current software part number for mobile processor.

Software Version # —current software version being used by mobile processor.

Hardware Version # —current hardware version being used by mobile processor.

Loader Version # —current loader software being used by mobile processor.

Serial # —current serial number of mobile processor.

Equipment Type # —unique identifier for application and is for factory use only.

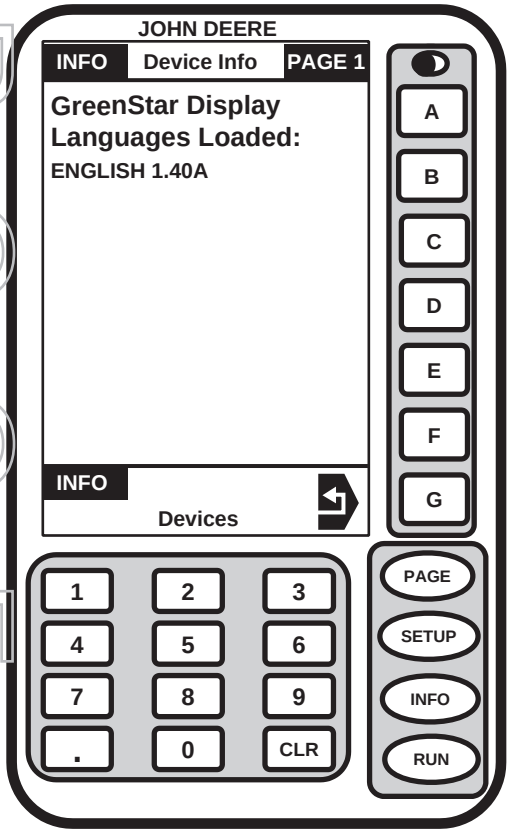
Loader Part # —current loader software part number.

HW Compat Version # —for factory use only.

Languages Loaded —languages and version number currently loaded on processor.

Continued on next page

PC7043 –19–22JAN02



PC7044 –19–22JAN02

Display

Screen: INFO - DEVICE INFO - PAGE 1

Screen: INFO - DEVICE INFO - PAGE 2

Press: INFO >> KEYCARD >> DEVICES ON CAN BUS >> GREENSTAR DISPLAY

NOTE: Press PAGE button to toggle between screens.

These screens show detailed information on GreenStar display.

Display Part # — Current part number for processor.

Software Part # — Current software part number being used by display.

Software Version # — Current software version being used by display.

Hardware Version # — Current hardware version being used.

Loader Version # — Current loader software being used by display.

Serial # — Current serial number of display.

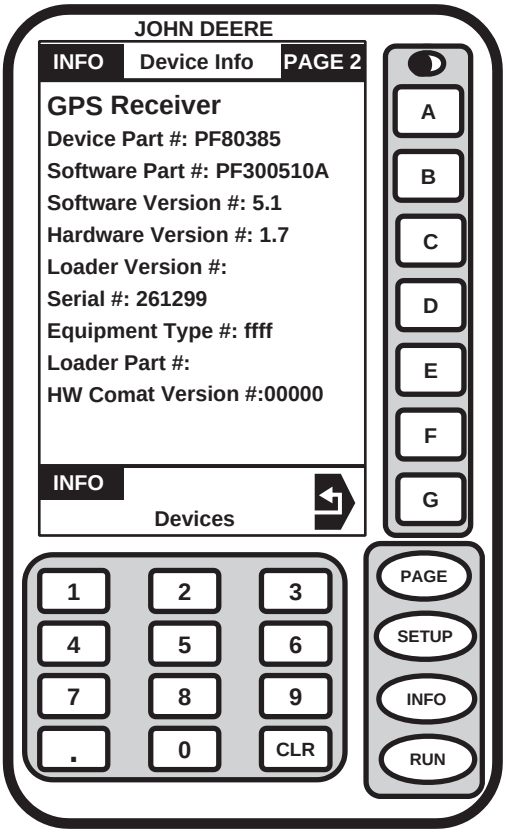
Equipment Type # — Unique identifier for application and is for factory use only.

Loader Part # — Current loader software part number.

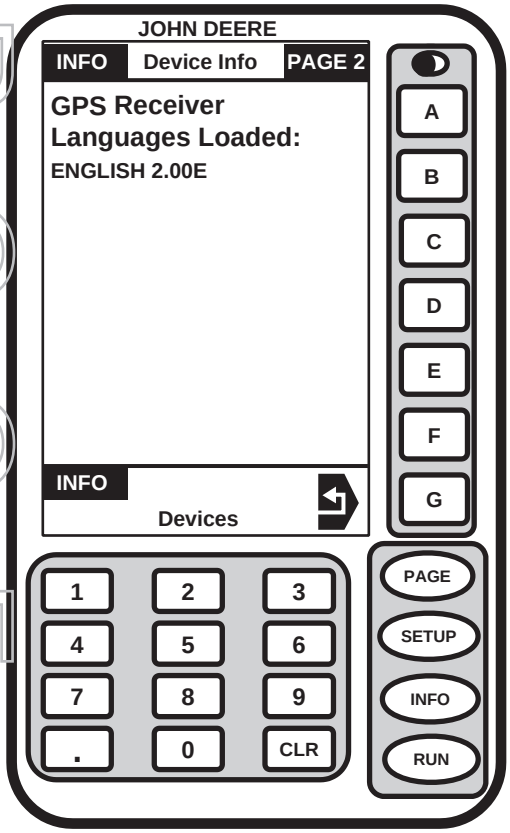
HW Compat Version # — For factory use only.

Languages Loaded — Languages and version number currently loaded on display.

Continued on next page



PC7041 –19–22JAN02



PC7042 –19–22JAN02

Receiver

Screen: INFO - DEVICE INFO - PAGE 1

Screen: INFO - DEVICE INFO - PAGE 2

Press: INFO >> KEYCARD >> DEVICES ON CAN BUS >> GPS RECEIVER

NOTE: Press PAGE button to toggle between screens.

These screens show detailed information on GPS receiver.

Device Part # — Part number of GPS receiver.

Software Part # — Current software part number for GPS receiver.

Software Version # — Current software version being used by GPS receiver.

Hardware Version # — Current hardware version being used by GPS receiver.

Serial # — Current serial number of GPS receiver.

Equipment Type # — Unique identifier for application and is for factory use only.

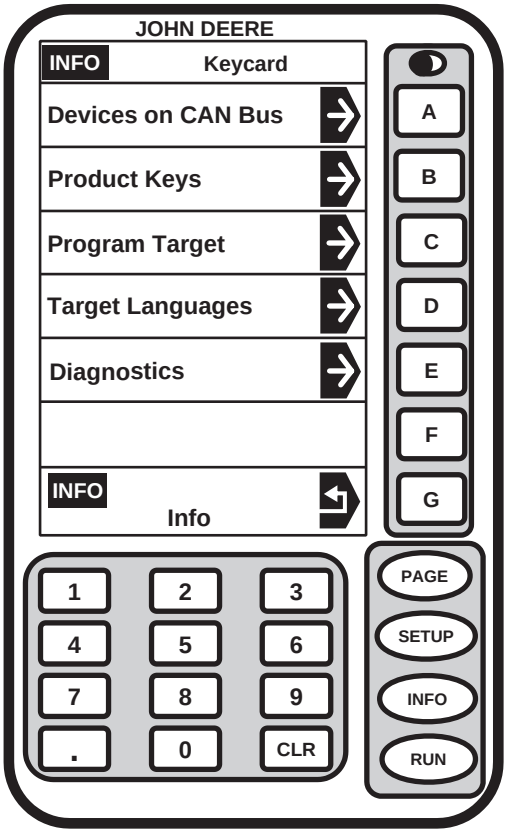
Loader Part Number — Current loader software part number.

HW Compat Version # — For factory use only.

Languages Loaded — Languages and version number currently loaded on processor.

OUO6050,00011E8 –19–12AUG05–4/4

Product Keys

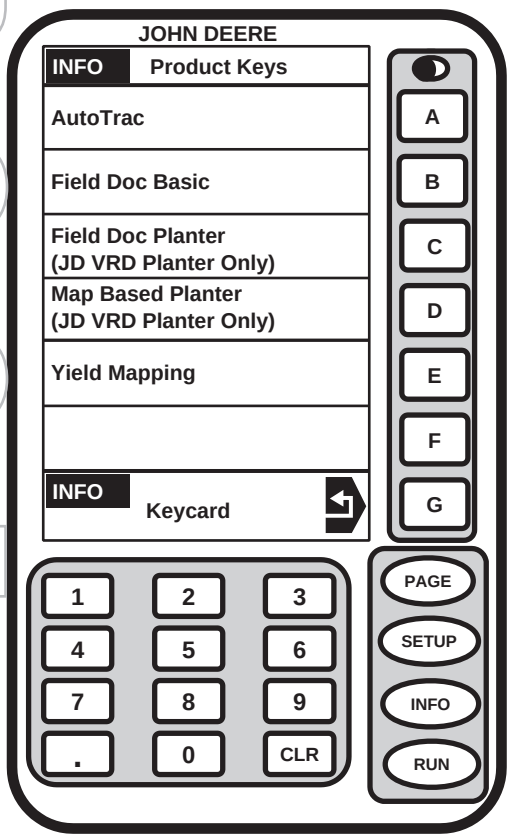


PC6804 –19–28AUG01

Screen: INFO - PRODUCT KEYS

Press: INFO >> KEYCARD >> PRODUCT KEYS

NOTE: The number of programs displayed on program target screen depends upon how many programs are loaded on KeyCard.



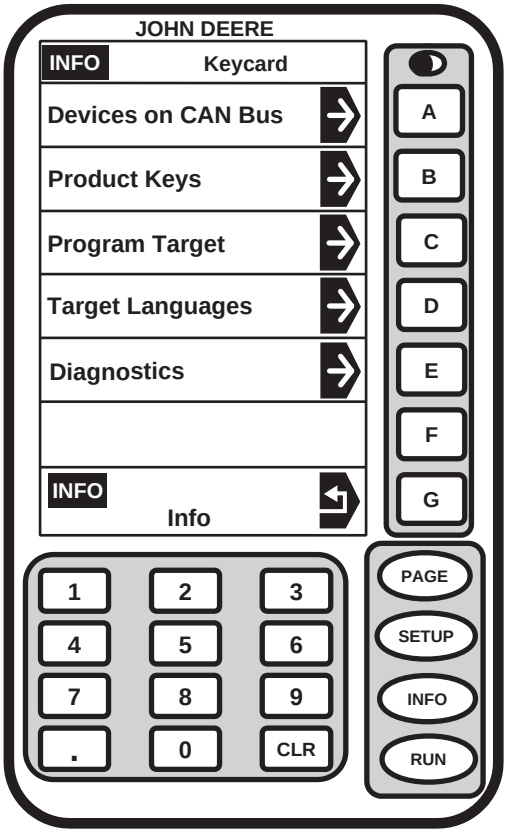
PC7302 –19–15OCT02

This screen shows current programs loaded on KeyCard.

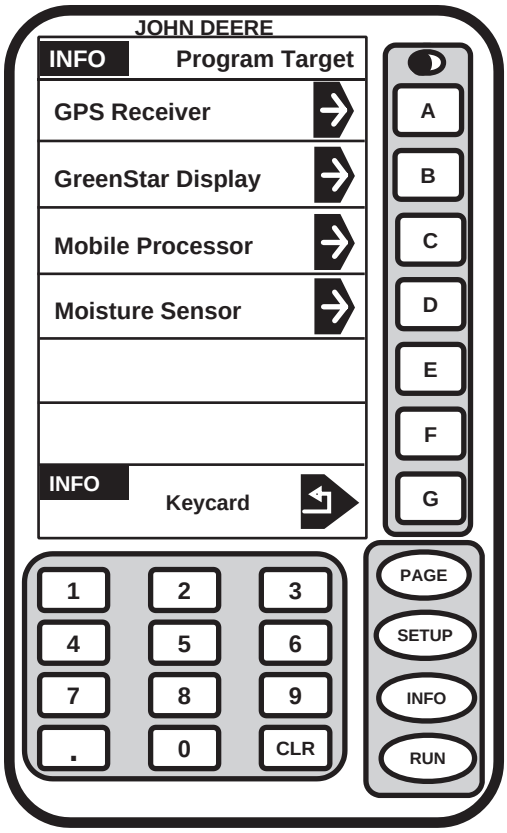
Press G button to return to INFO - KeyCard screen.

OUO6050,00011E9 –19–12AUG05–1/1

Program Target



PC6804 –19–28AUG01



PC7045 –19–22JAN02

Screen: INFO - PROGRAM TARGET

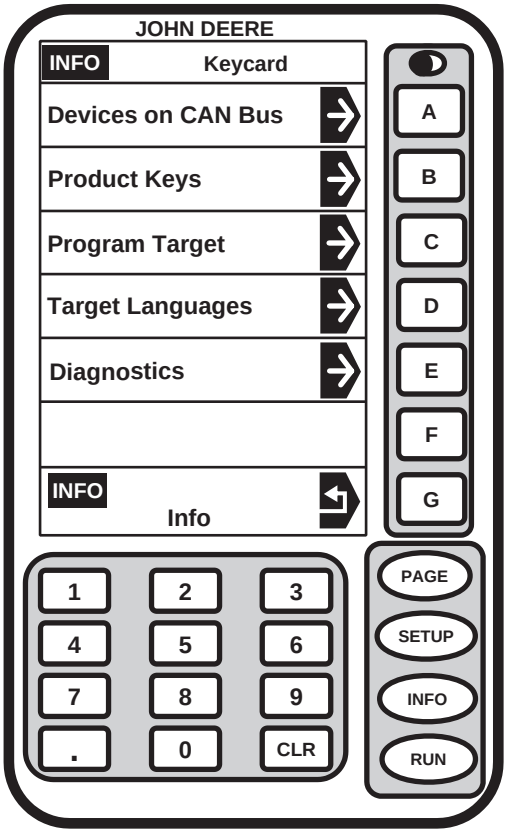
Press: INFO >> KEYCARD >> PROGRAM TARGET

NOTE: The number of programs displayed on program target screen depends upon how many programs are loaded on KeyCard.

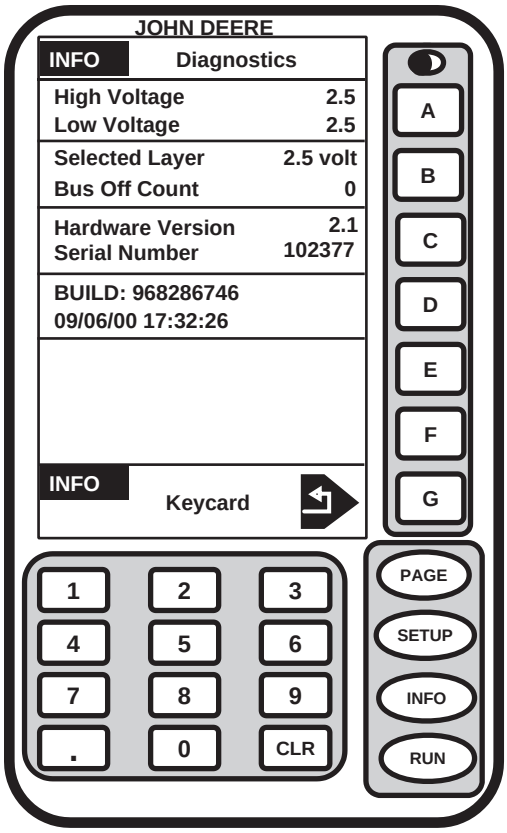
This screen allows operator to update software for mobile processor, display, GPS receiver, or moisture sensor. (See Re-programming To A Guidance System section for details).

OUO6050,00011EA –19–12AUG05–1/1

Diagnostics



PC6804 –19–28AUG01



PC6448 –19–12SEP00

Screen: INFO - DIAGNOSTICS

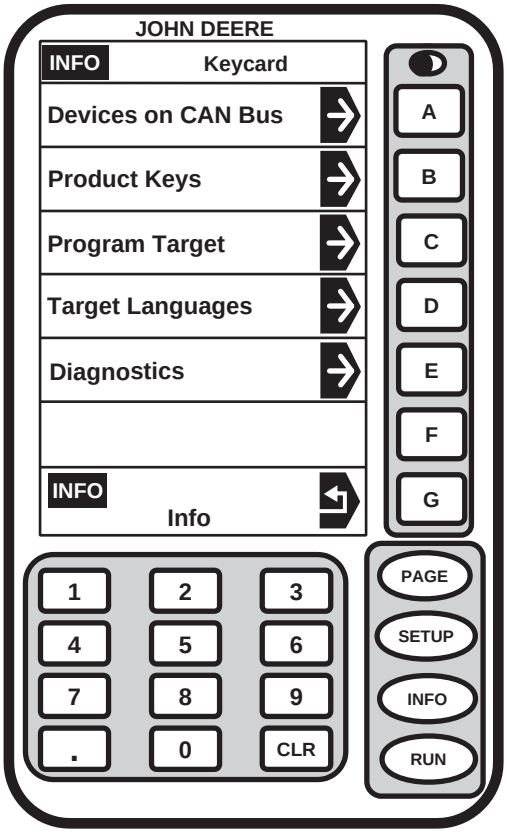
Press: INFO >> KEYCARD >> DIAGNOSTICS

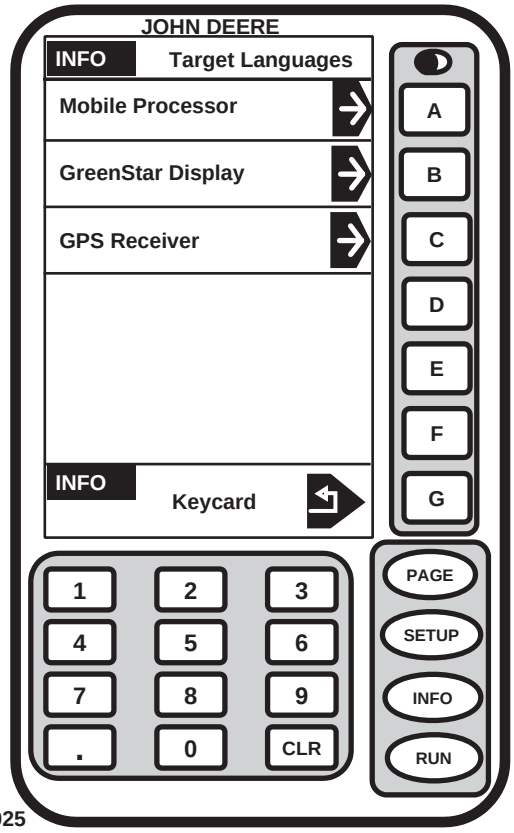
This screen can be used to help troubleshoot system if a problem occurs.

- **High Voltage/Low Voltage**
  High and low voltage as recorded by CAN bus.
- **Selected Layer/Bus Off Count**
  Selected CAN bus layer.
- **Hardware Version/Serial Number**
  Current hardware version and serial number of mobile processor.
- **Build**
  Build number and build date of mobile processor software.

OUO6050,00011EB –19–12AUG05–1/1

Target Language





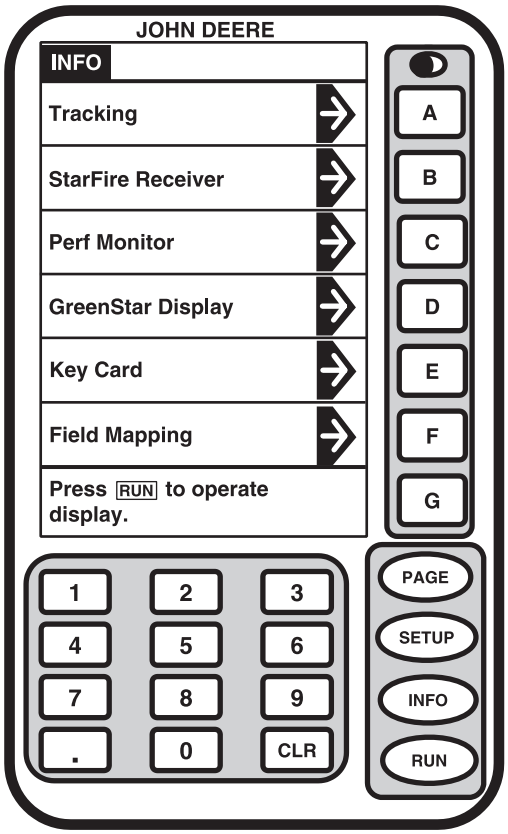
Screen: INFO - TARGET LANGUAGES

Press: INFO >> KEYCARD >> TARGET LANGUAGES

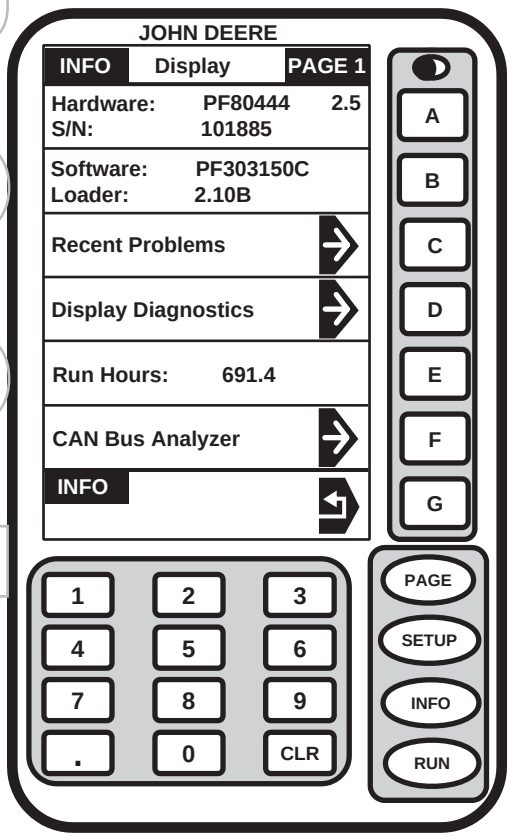
This screen is used to load additional languages to system. (See SETUP AND LOAD LANGUAGE in Load Language section.)

OUO6050,00011EC –19–12AUG05–1/1

Display



PC7008 –19–10JAN02



PC7317 –19–14OCT02

Screen: INFO - DISPLAY - PAGE 1

Press: INFO >> GREENSTAR DISPLAY

This screen shows detailed information about display. This information will help troubleshoot display if a problem occurs.

- **Hardware/Serial Number**
  This cell shows part number and serial number of display. It also shows CAN Bus Voltage being used by system (either 2.5 or 4.5).
- **Software/Loader**
  Software part number being used by display. This cell also shows version number of loader program being used by system.
- **Run Hours**
  This block shows current usage hours for display.

OUO6050,00011ED –19–12AUG05–1/1

Recent Problems

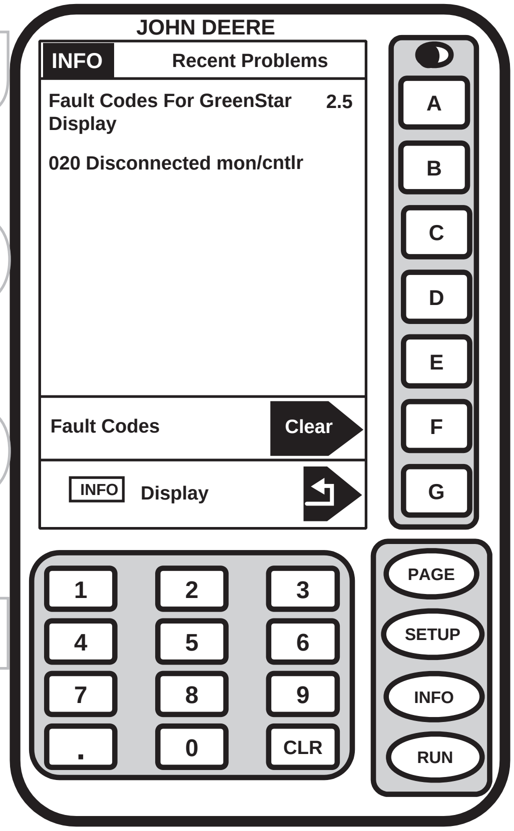
Screen: INFO - RECENT PROBLEMS

Press: INFO >> GREENSTAR DISPLAY >> RECENT PROBLEMS

This cell shows recent problems encountered by display.

To view RECENT PROBLEMS cell :

1. Press C button to view listing of recent problems.
2. Press letter button next to CLEAR to clear all fault codes.
3. Press G button to return to INFO - DISPLAY screen.



H63052 –19–15MAR00

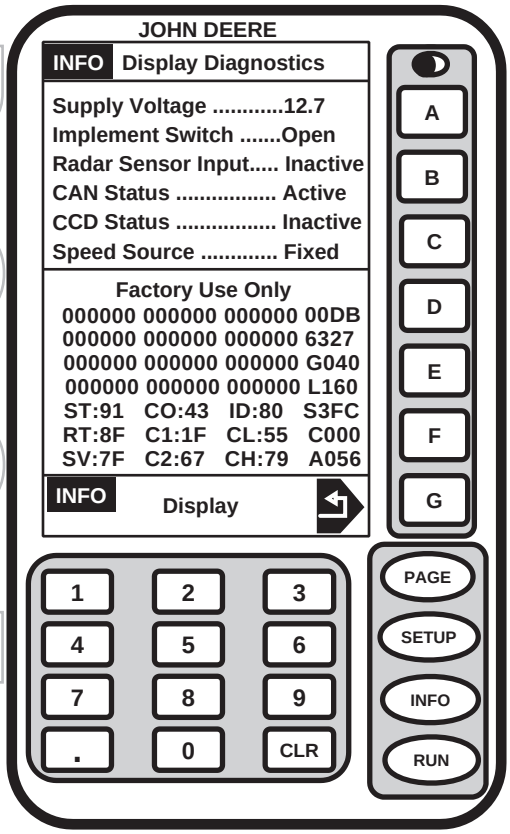
OUO6050,00011EE –19–10OCT05–1/1

Display Diagnostics

Screen: INFO - DISPLAY DIAGNOSTICS

Press: INFO >> GREENSTAR DISPLAY >> DISPLAY DIAGNOSTICS

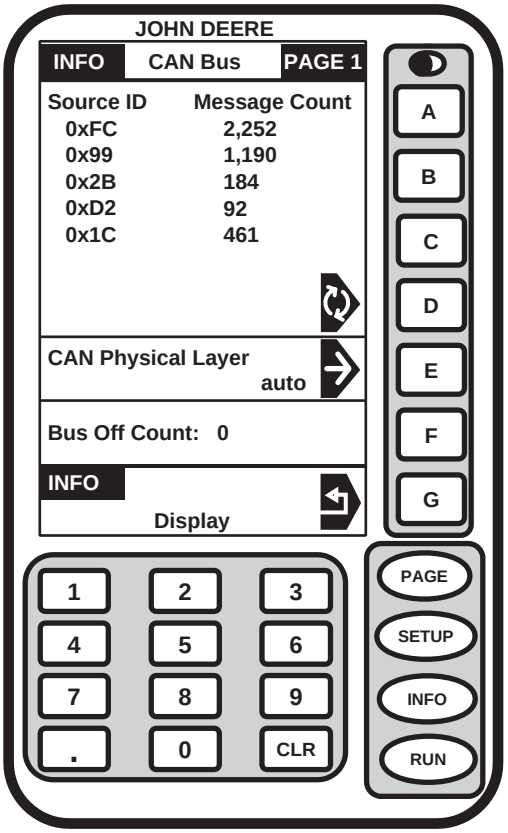
This screen shows detailed information about system. This information can be used to help troubleshoot system if a problem occurs.



PC6440 –19–12SEP00

OUO6050,00011EF –19–12AUG05–1/1

CAN Bus Analyzer



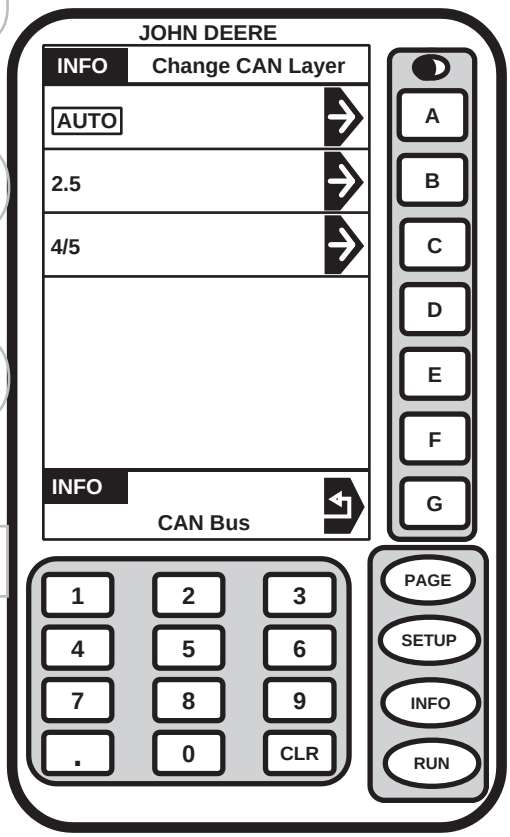
PC7293 –19–14NOV02

IMPORTANT: If CAN Bus voltage is manually changed it will automatically be reset to AUTO at system power up.

Screen: INFO - CAN BUS - PAGE 1

Press: INFO >> GREENSTAR DISPLAY >> CAN BUS ANALYZER

This screen is used by factory in order to help with diagnosing system.



PC7294 –19–09OCT02

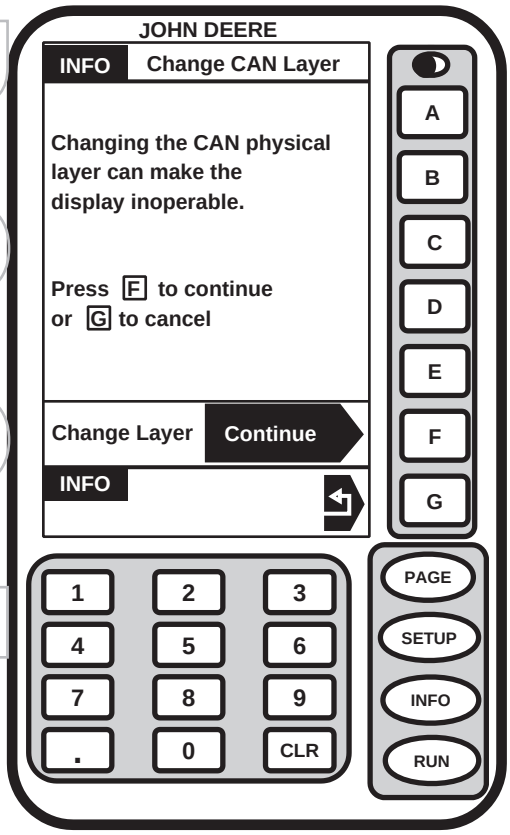
Screen: INFO - CHANGE CAN LAYER screen

Press: INFO >> GREENSTAR DISPLAY >> CAN BUS ANALYZER >> CAN PHYSICAL LAYER

This screen is used to change CAN Bus layer by pressing desired selection button.

Continued on next page

A warning screen will be displayed when changing CAN Bus layer. Press letter button next to CONTINUE to proceed or G button to cancel.



PC7295 –19–09OCT02

OUO6050,00011F0 –19–12AUG05–2/2

StarFire iTC Receiver

Receiver is located on cab of machine. It receives global positioning and differential correction signal through a single receiver and integrates signal for use with system.

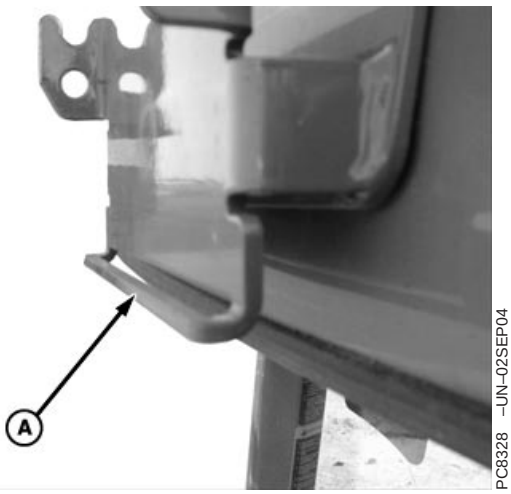
Terrain Compensation Module (TCM) is integrated into receiver and is a navigational aid used with receiver to enhance vehicle position and course parameters that GPS provides. TCM corrects for vehicle dynamics such as roll on side-slopes, rough terrain or varying soil conditions.

OUO6050,00011F1 –19–12AUG05–1/4

StarFire iTC Mounting Instructions

1. Verify that vehicle side receiver bracket bar (A) is not bent inward or outward.

A—Bracket Bar

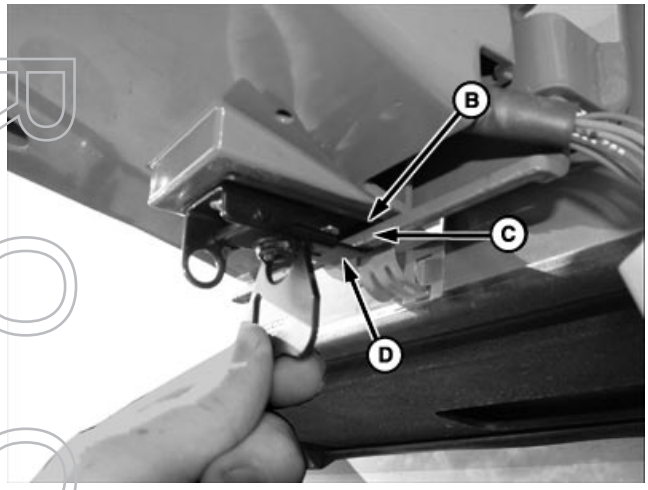


PC8328 –UN–02SEP04

Continued on next page

OUO6050,00011F1 –19–12AUG05–2/4

PC8327 –UN–31AUG04



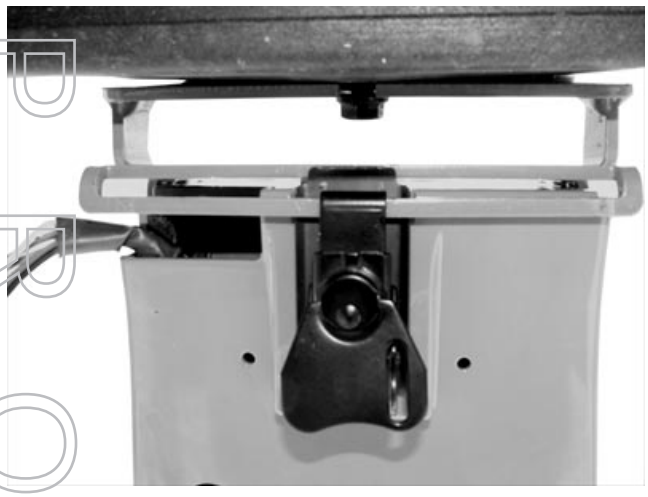
PC8329 –UN–31AUG04

A—Mounting Peg **B—Metal Tab** **C—Bracket Bar** **D—Receiver Latch**

2. Position StarFire iTC on bracket. Align mounting pegs (A) on receiver with notches in vehicle bracket. Ensure pegs are firmly seated in notches and metal tab (B) is above bracket bar (C).
3. Position receiver latch (D) around bracket bar. Turn latch handle to tighten latch around bracket bar. Bracket bar should compress slightly.

OUO6050,00011F1 –19–12AUG05–3/4

4. Fold latch handle upwards against receiver.



PC8330 –UN–31AUG04

OUO6050,00011F1 –19–12AUG05–4/4

Auto-Update

NOTE: To acquire latest version of software visit www.StellarSupport.com, call 1-888GRNSTAR, or contact your John Deere dealer.

When KeyCard is installed in mobile processor and power is ON, system will check version of software on mobile processor, display, and receiver. If KeyCard contains a more recent version of software, system will ask if operator wants to update with most recent version. Follow on screen procedures to update software. (See Automatic Software Load).

OUO6050,00011F2 –19–12AUG05–1/1

Manual Software Update

NOTE: Whenever new or revised software programs are available, it will be necessary to load new software to system.

Use this procedure if automatic software load does not work.

To acquire latest version of software call 1-888GRNSTAR, or via Internet at www.stellarsupport.com or contact your John Deere dealer.

1. Install KeyCard containing new software in top slot of mobile processor.
2. Turn ignition key to RUN position.

NOTE: To cancel new software load press G.

3. **Press:** SETUP >> KEYCARD

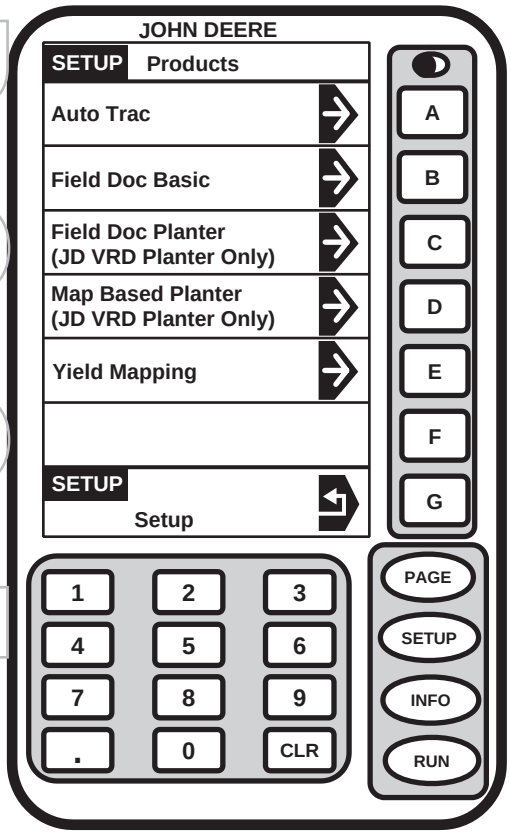
   Press letter button next to desired selection on SETUP - PRODUCTS screen.

4. Wait until WARNING PROGRAMMING screen appears and follow directions on screen.

   DO NOT REMOVE PC CARD

   DO NOT REMOVE POWER

5. Press letter button next to OK.
6. You may proceed as usual.



PC7413 –19–11NOV02

SETUP - PRODUCTS

OUO6050,00011F3 –19–12AUG05–1/1

StarFire Receiver

IMPORTANT: If a SF2 correction signal is being used, accuracy of system may continue to increase after SF2 is verified on screen. There may be a slight shift in position between two modes. If machine was receiving SF2 when it was shut down, warm-up period will not occur unless it has been shut down for longer that time specified for HOURS ON AFTER SHUTDOWN.

IMPORTANT: The first time StarFire iTC is powered up, it may take up to 15 minutes for receiver to acquire updated GPS almanac.

OUO6050,00011F4 –19–12AUG05–1/1

SETUP-GPS-PAGE 1

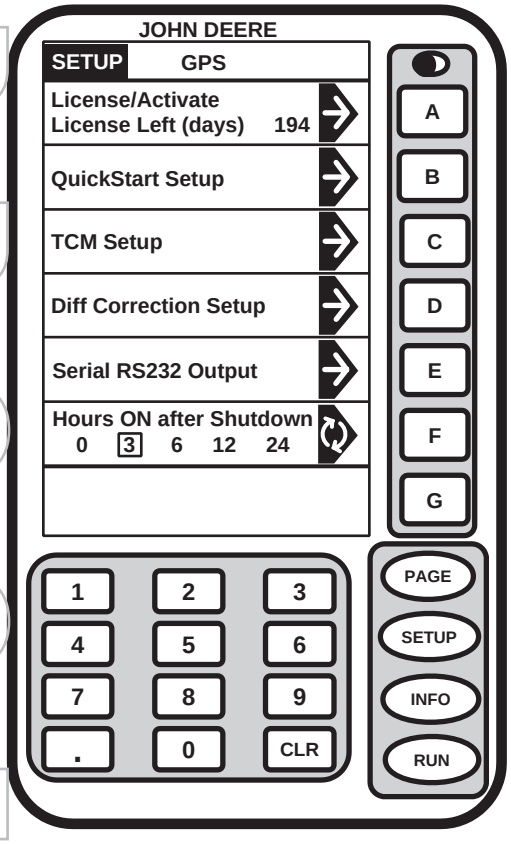
Screen: SETUP - GPS

Press: SETUP >> STARFIRE RECEIVER

The following items can be setup in SETUP - GPS

- License/Activate
- QuickStart Setup
- TCM Setup
- Differential Correction Setup
- Hours on after shutdown

Press corresponding button to access option being changed.



PC8322 –19–09AUG04

OUO6050,00011F5 –19–12AUG05–1/1

Overview: SF2/RTK Activations, SF2 Subscription

StarFire iTC is offered in 2 configurations: SF1 World Solution and SF2 Ready.

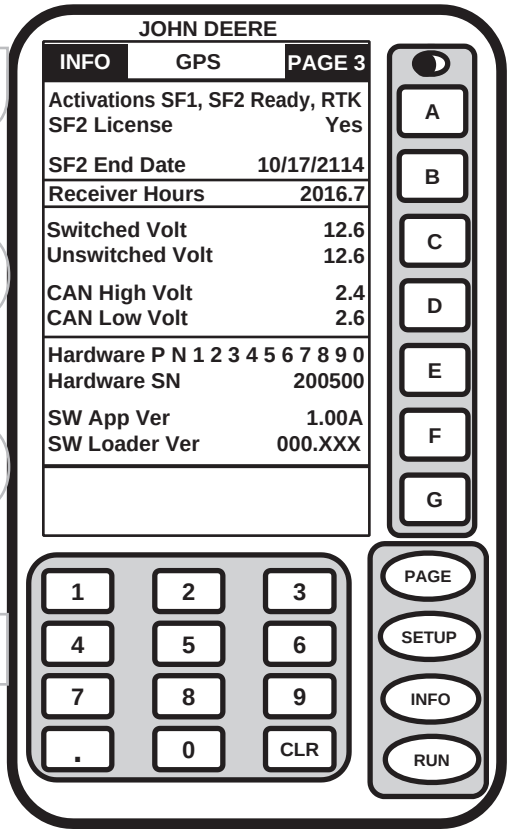
SF1 World Solution: SF1 is a no-charge satellite-based differential correction signal offered exclusively by John Deere, delivering accuracy adequate for non row crop applications. SF1 StarFire iTC can be upgraded to SF2-Ready by visiting your John Deere dealer, calling Customer Care Center, or visiting StellarSupport and purchasing SF2 Ready activation.

NOTE: Serial port GPS information (NMEA) is only outputted for SF1 when connected to a GreenStar system.

SF2 Ready: SF2 is a +/- 4 in. pass to pass differential correction signal provided exclusively by John Deere. While StarFire iTC can be ordered SF2 Ready, SF2 Ready activation must be obtained by visiting www.StellarSupport.com or by calling 888-GRN-STAR (COMAR order number and receiver serial number are needed) and manually entered into receiver. Once activation has been entered, SF2 license can be purchased for either a 3, 6, 12, 24, or 36 month period.

NOTE: StarFire iTC must be SF2 Ready prior to upgrading receiver to RTK.

RTK: RTK is the highest accuracy correction signal. It requires use of a local base station and radio communication equipment. Each receiver used in the RTK system must be activated for RTK. This activation exists for the life of the receiver and can be transferred.



PC8331 –19–22SEP04

INFO - GPS - PAGE 3

Continued on next page

OUO6050,00011F6 –19–12AUG05–1/3

Obtaining and Entering SF2 or RTK activation and SF2 license

NOTE: Receiver serial number is required to obtain SF2 Ready or RTK activation codes. SF2 Ready and RTK also require corresponding COMAR order number if purchased from your John Deere dealer.

1. **Press:** INFO >> STARFIRE RECEIVER >> PAGE >> PAGE

   Locate serial number (Hardware SN).

NOTE: A 24-digit activation code will be provided by www.StellarSupport.com or Customer Care Center, either through postal service or E-mail.

For RTK customers only: RTK activation is purchased as part of each RTK base station and vehicle bundle. To obtain 24 digit RTK activation code, visit StellarSupport.com or call 1-888-GRN-STAR and provide COMAR order number for RTK system and receiver serial numbers.

2. Login to www.stellarsupport.com or call 1-888-GRN-STAR (North America only) to obtain activation code.

Continued on next page

NOTE: Enter 24 digit activation code number in three cells that have eight zero digits.

3. **Screen:** SETUP - STARFIRE LICENSE

   Press: SETUP >> STARFIRE RECEIVER >> LICENSE/ACTIVATE

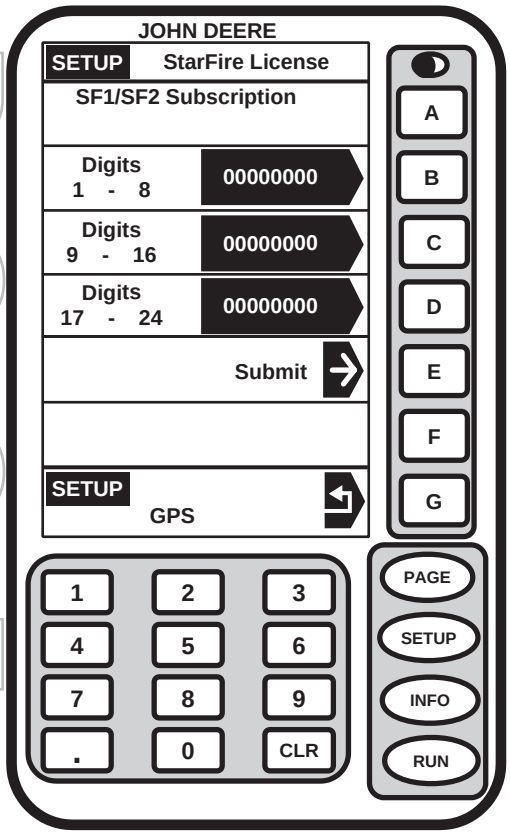
   Press letter button next to DIGITS 1—8 and enter first eight digits of activation code. Press letter button next to DIGITS 1—8 again to enter value.

4. Press letter button next to DIGITS 9—16 and enter second eight digits of activation code. Press letter button next to DIGITS 9—16 again to enter value.

5. Press letter button next to DIGITS 17—24 and enter last eight digits of activation code. Press letter button next to DIGITS 17—24 again to enter value.

6. Press letter button next to SUBMIT.

7. Press letter button next to SETUP to return or SETUP button to continue setup operations.



PC8147 –19–24AUG04

SETUP - STARFIRE LICENSE

License Expired Warning

NOTE: Three 24 hour grace periods are available when current license expires. This is provided to allow sufficient time for customer to renew a license. Grace period signal will be SF 2 differential correction signal.

If license expires while operating or since last operated, a warning screen will appear.

Warning screen can be cleared by pressing letter button next to CONTINUE or a grace period can be activated by pressing letter button next to USE 1 if needed.

OUO6050,00011F6 –19–12AUG05–3/3

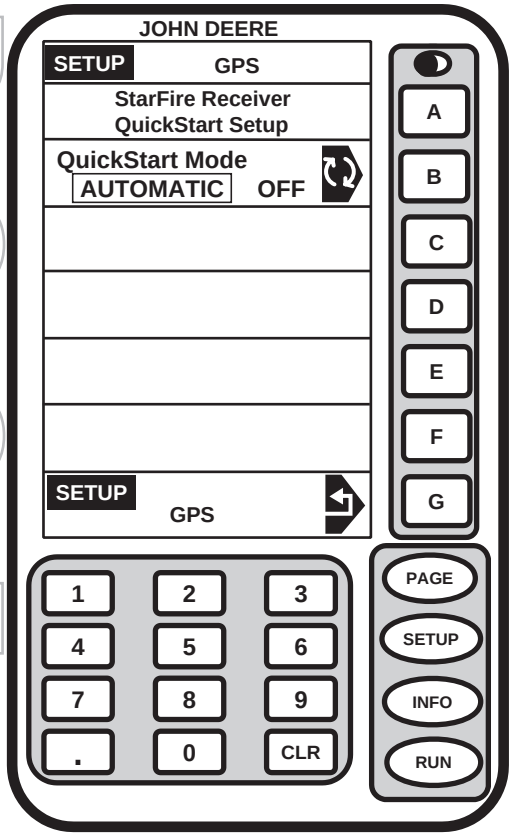
QuickStart Setup

Screen: SETUP - GPS

Press: SETUP >> STARFIRE RECEIVER >> QUICKSTART SETUP

QuickStart reduces amount of time required before full accuracy is achieved. If QuickStart is activated (automatic mode) and receiver has SF2 when it is powered down, a position is saved for future QuickStart. If power is restored to receiver within time period defined under HOURS ON AFTER SHUTDOWN, QuickStart won't be needed since receiver power was never disrupted. If duration has exceeded HOURS ON AFTER SHUTDOWN, QuickStart will be initiated. Saved position will be used to bypass startup warm up period that is usually required. Receiver cannot move while this QuickStart is taking place. It may take up 6 minutes for QuickStart to complete. User will be notified on screen when it's done.

To activate automatic mode Press letter button next to QUICKSTART MODE to toggle between AUTOMATIC and OFF.



PC7950 –19–22OCT03

Select QuickStart Mode

OUO6050,00011F7 –19–12AUG05–1/1

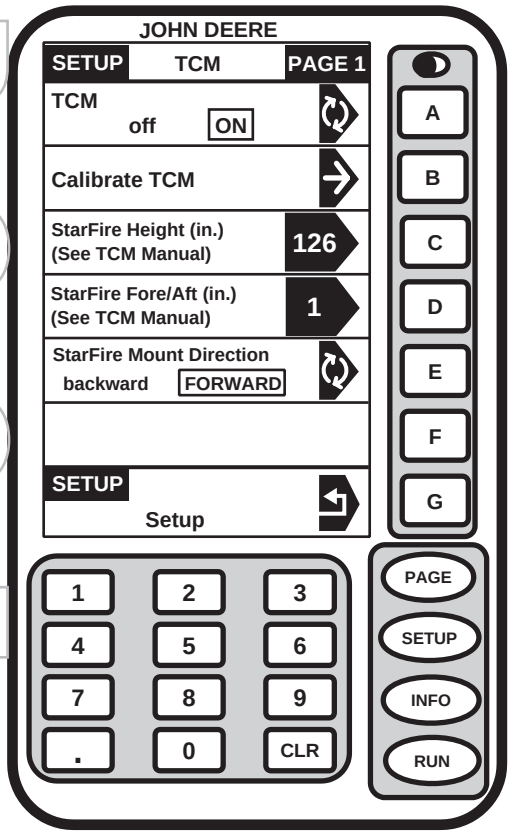
Setup—TCM

Screen: SETUP - TCM

Press: SETUP >> STARFIRE RECEIVER >> TCM SETUP

This screen allows operator to:

- Turn TCM ON/OFF
- Calibrate TCM for zero degree roll angle
- Manually insert height of receiver
- Manually insert fore/aft
- Change mounting direction of receiver



PC7548 –19–27MAR03

OUO6050,00011F8 –19–12AUG05–1/1

ON/OFF—TCM

NOTE: There is no indication on Run Pages if TCM is ON or OFF.

TCM will default to ON when cycling power.

Press letter button A to toggle between ON and OFF selection will appear boxed and in capital letters.

When TCM is turned off , StarFire GPS messages will not be corrected for vehicle dynamics or side slopes.

OUO6050,00011F9 –19–12AUG05–1/1

Mounting Direction—TCM

NOTE: Receivers attached to tractors, sprayers, and combines are typically in FORWARD position.

Receivers attached to GATORS are typically in BACKWARD position.

Mounting direction is direction receiver is facing.

This setting defines mounting orientation of receiver. TCM uses this setting to determine correct direction of vehicle roll.

A StarFire receiver that extends forward from attaching bracket in direction of vehicle travel is in **FORWARD** mounting direction.

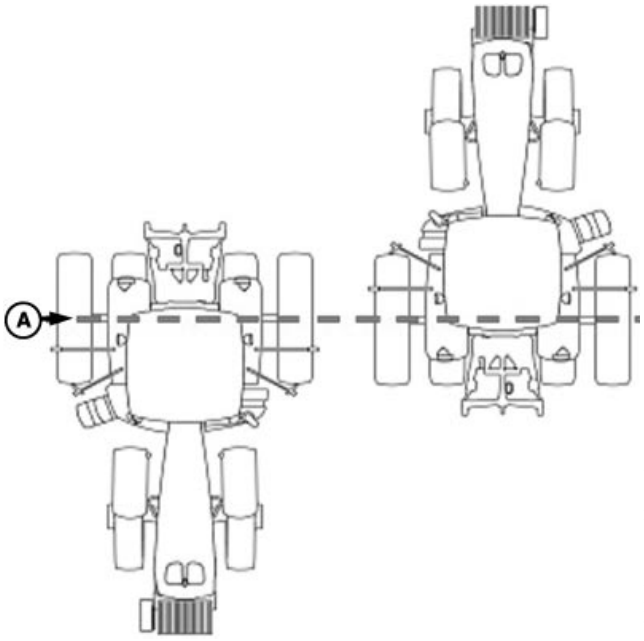
A StarFire receiver that extends backward from attaching bracket away from direction of vehicle travel is in **BACKWARD** mounting direction.

Desired selection will appear boxed and in capital letters.

Press letter button next to STARFIRE MOUNT DIRECTION and select desired mounting direction, backward or forward.

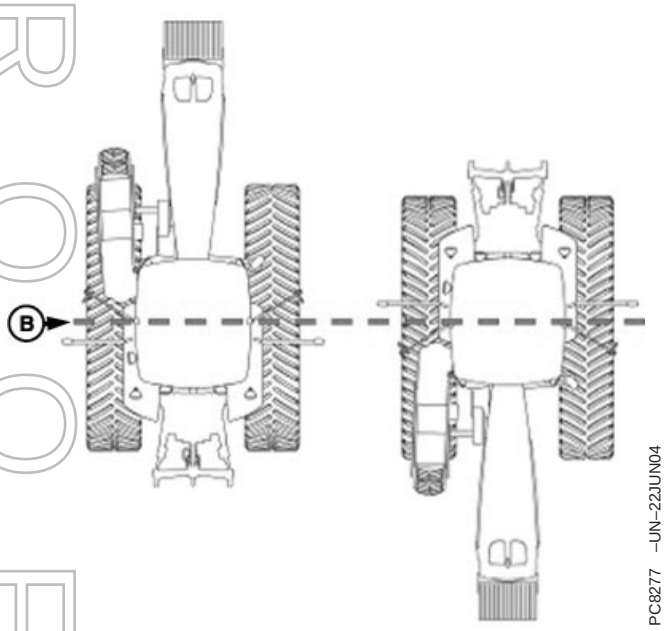
OUO6050,00011FA –19–12AUG05–1/1

Calibrate Level—TCM



Floating Front Axle Vehicles

A—Rear Axle



Fixed-Axis Wheels Or Tracks Vehicles

B—Vehicle Pivot Point

NOTE: Calibrate receiver when it is attached or reattached to machine. Receiver does not require recalibration until removed from machine and reattached.

Positioning Machine during Calibration

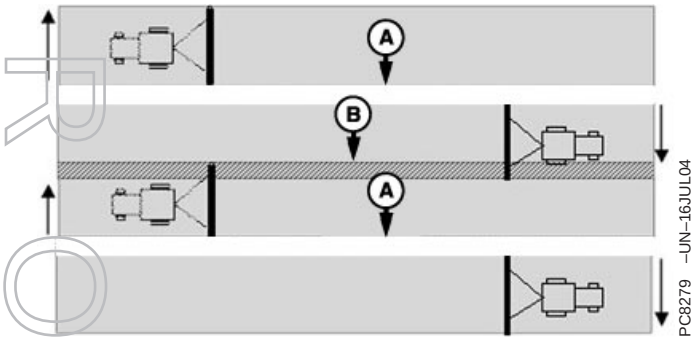
IMPORTANT: When calibrating, it is important that TCM is at same angle when facing either direction. If roll angle is a positive 2° when facing one direction, vehicle needs to be a negative 2° when facing opposite direction. To position TCM at same angle it is important when turning vehicle around and facing other direction that tires are placed in correct location. Once vehicle is parked on a hard flat surface, note location of tires on ground. When turning around use following instructions:

- **Floating Front Axle Vehicles (MFWD, ILS, TLS)—put rear axle/wheels in same location when performing 2 point calibration. See above diagram for Floating Front Axle Vehicles.**
- **Fixed-Axis Wheels Or Tracks Vehicles (Track Tractors, 9000 and 9020 Series Wheel Tractors, 4700 and 4900 Series Sprayers,)—Place all in same location when facing either direction. See above diagram for Fixed-Axis Wheels Or Tracks Vehicles.**

Continued on next page

Calibration Surface

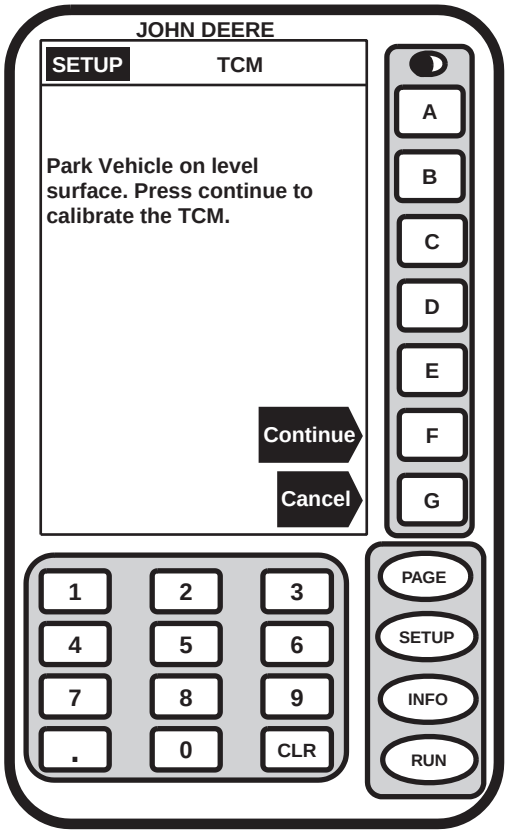
IMPORTANT: Vehicle must be on a hard, flat level surface for calibration. If TCM is not calibrated on a level surface or TCM mounting angle is not level in relation to vehicle angle (StarFire mounting bracket or vehicle cab being slightly offset, uneven tire pressures from one side to other, etc.) operator may see offset during operation. This offset could look like a consistent skip (A) or overlap (B) in pass-to-pass operation. To eliminate offset, re-calibrate on a level surface, drive down a pass, turn around and drive down same pass in opposite direction. If vehicle does not follow same pass, measure offset distance and enter in implement offset in SETUP - TRACKING - PAGE 2. See implement offset section. After initial calibration of TCM, it is not necessary to calibrate again unless TCM angle in relation to vehicle has changed. For example, tire pressure has been lowered on one side of vehicle causing vehicle angle in relation to ground to change.



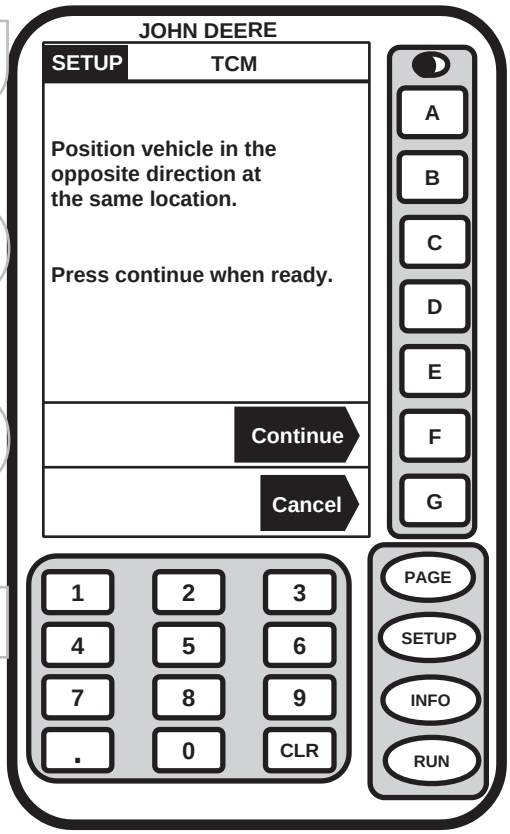
A—Skip
B—Overlap

Continued on next page

OUO6050,00011FB –19–12AUG05–2/4



PC8151 –19–31MAR04



PC8000 –19–11NOV03

Screen: SETUP - TCM

Press: SETUP >> STARFIRE RECEIVER >> TCM SETUP >> CALIBRATE LEVEL

1. Once vehicle is on a hard, level surface and has come to a complete stop (cab is not rocking), Press letter button next to CONTINUE.

NOTE: While calibrating, TCM will provide a warning if it detects vehicle roll angle is greater than 10° relative to internal axis of TCM. If vehicle is on a level surface and yet warning is displayed, check mounting orientation of TCM and verify it is aligned within 10° of vehicle axis.

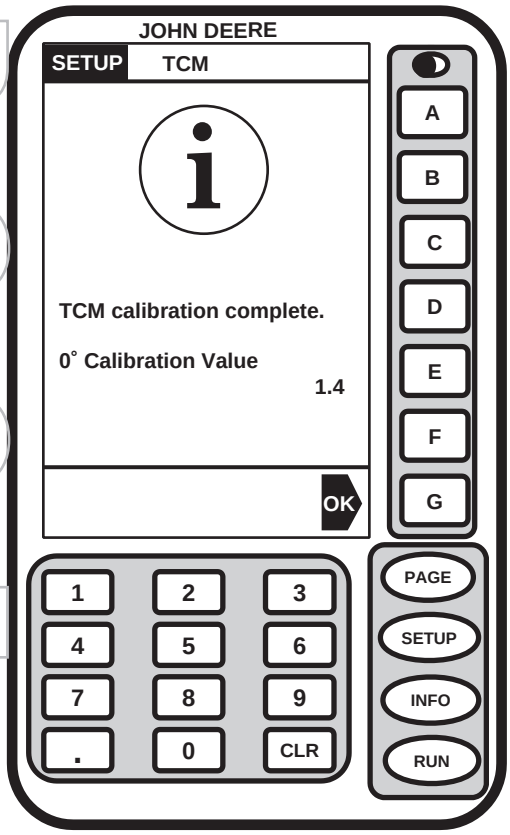
2. Turn vehicle 180° to face opposite direction. Ensure that tires are in proper location for fixed or floating front axle.
3. Ensure vehicle has come to a complete stop (cab is not rocking) and Press letter button next to CONTINUE.

Continued on next page

OUO6050,00011FB –19–12AUG05–3/4

4. Press letter button next to OK.

5. Once finished, a calibration value will be displayed. 0° calibration value is the difference between the factory calibration value and actual calibration value which was just determined.



PC8001 –19–11NOV03

OUO6050,00011FB –19–12AUG05–4/4

Height—TCM

IMPORTANT: Under or over compensation for vehicle roll angles will occur if height is incorrectly entered during setup (i.e. on a 10° slope with a StarFire height error of 12 inches will result in a position offset of 2 inches on ground).

Factory default setting is “126”. On some AutoTrac-equipped vehicles, height value will be automatically detected and entered during power up. Because this dimension is critical for proper operation of TCM and can vary due to vehicle configuration and tire sizes, operator should still measure actual distance to be entered each time TCM is installed on a different vehicle.

Height is measured from ground to top of StarFire Dome.

NOTE: Use chart for example StarFire Height values.

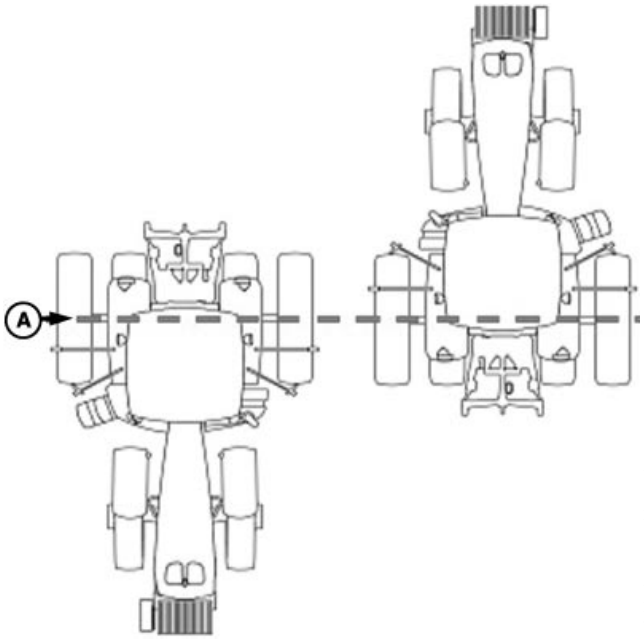
Press letter button next to STARFIRE HEIGHT and enter height using numeric keypad.

Press letter button next to STARFIRE HEIGHT again to save number.

NOTE: Chart figures are approximate heights.

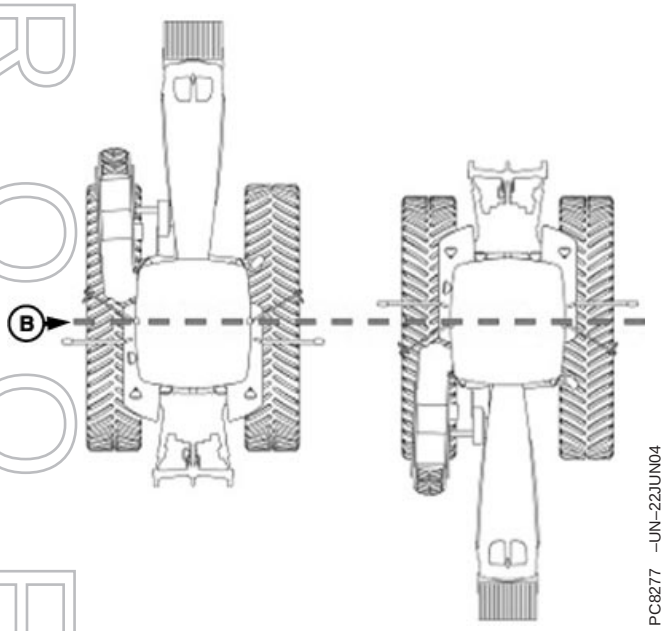
John Deere Vehicle	StarFire Height cm (in.)
6000 Series Tractors	280 cm (111 in.)
7000 Series Tractors	305 cm (120 in.)
8000 Series Tractors	320 cm (126 in.)
8000T Series Tractors	320 cm (126 in.)
9000 Series Tractors	361 cm (142 in.)
9000T Series Tractors	356 cm (140 in.)
4700 Series Sprayers	389 cm (153 in.)
4900 Series Sprayers	396 cm (156 in.)
Combine	396 cm (156 in.)

Fore/Aft—TCM



Floating Front Axle Vehicles

A—Pivot Point—Floating Front Axle Vehicles-



Fixed Axis Wheels or Tracks Vehicles

B—Pivot Point—-Fixed Axis Wheels or Tracks Vehicles

TCM Fore/Aft value is distance that receiver is located from pivot point of tractor.

On some AutoTrac-equipped vehicles, fore/aft value will be automatically detected and entered during power up.

- Fore/Aft value is shown **without** black text box—Automatically detected and cannot be changed.
- Fore/Aft value is shown **with** black text box—Must be entered manually.

Perform following procedure to select and manually enter value. Use chart to select StarFire Fore/Aft values if necessary.

If using TCM for Parallel Tracking on a vehicle not listed in chart, then enter "1" for fore/aft setting.

Press letter button next to STARFIRE FORE/AFT and enter value using numeric keypad.

Press letter button next to STARFIRE FORE/AFT again to save entered value.

Recommended StarFire Fore/Aft values For John Deere Vehicles

John Deere Vehicle	StarFire Fore/Aft cm (in.)
6000 Series Tractors	75 cm (29 in.)
7000 Series Tractors	75 cm (29 in.)
8000 Series Tractors	75 cm (29 in.)
8000T Series Tractors	3 cm (1 in.)
9000 Series Tractors	-51 cm (-20 in.)
9000T Series Tractors	3 cm (1 in.)
4700 Series Sprayers	203 cm (80 in.)
4900 Series Sprayers	257 cm (101 in.)
Combine	140 cm (55 in.)

Differential Correction Setup

Differential correction is the process by which GPS accuracy is improved. (See OVERVIEW: SF1/SF2 ACTIVATIONS, SF2 SUBSCRIPTION in this section.)

Screen: SETUP - DIFF CORRECTION

Press: SETUP >> STARFIRE RECEIVER >> DIFF CORRECTION SETUP

(See RTK section for RTK Setup.)

IMPORTANT: DO NOT change default StarFire Correction Frequency unless instructed to do so by your John Deere Dealer or by John Deere Ag Management Solutions.

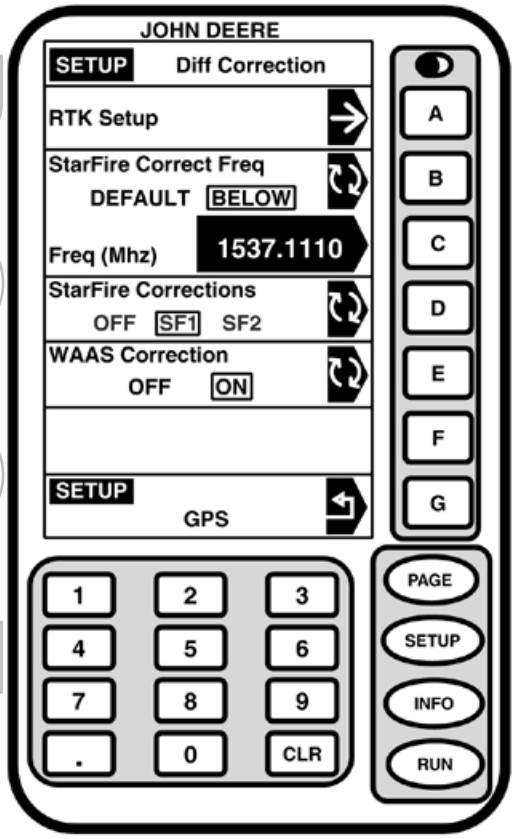
NOTE: Some information will only appear when receiver has a license.

Press letter button next to STARFIRE CORRECT FREQ to toggle between DEFAULT and BELOW.

When STARFIRE CORRECT FREQ is set to BELOW—press letter button next to FREQ (MHz) then input a frequency.

Press letter button next to STARFIRE CORRECTION to toggle between OFF, SF1, and SF2. If toggled to OFF, StarFire will not receive SF1 or SF2 correction signals. If receiver does not have a valid SF2 license then SF2 will not appear on screen.

Press letter button next to WAAS CORRECTION to toggle between OFF and ON. If toggled to OFF, StarFire will not receive WAAS correction signals.



PC8546 –19–10MAY05

OUO6050,00011FE –19–12AUG05–1/1

Serial RS232 Output

Screen: SETUP - SERIAL PORT

Press: SETUP >> STARFIRE RECEIVER >> SERIAL RS232 OUTPUT

NOTE: NMEA serial port data is outputted for SF1 only when connected to a GreenStar system. NMEA serial port data is always outputted for SF2 and RTK.

These settings are only for NMEA serial port messages for communication with **non-GREENSTAR systems**.

Serial port baud output rates are: 4800, 9600, 19200 and 38400.

The following items can be setup in SETUP - SERIAL PORT screen:

- Serial Port Baud Rate
- Serial Port Output Rate
- GGA Port Message
- GSA Port Message
- RMC Port Message
- VTG Port Message
- ZDA Port Message

Press letter button next to desired cell, toggle to desired selection.

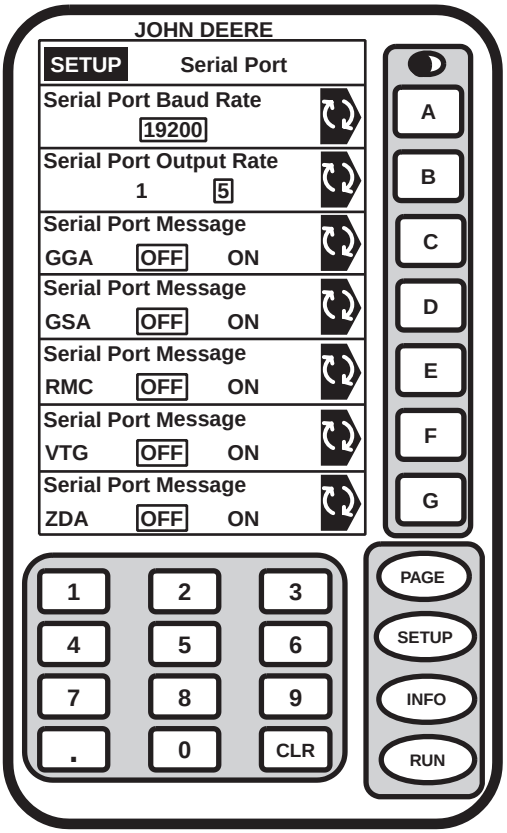
Serial Port Output Rate

NOTE: Serial port settings do not affect GreenStar applications.

Press letter button next to SERIAL PORT OUTPUT RATE to toggle/select from 1 to 5 Hz.

Serial Port Messages

Press letter button next to SERIAL PORT MESSAGE to toggle/select between ON and OFF.



SETUP - SERIAL PORT

PC8155 –19–31MAR04

OUO6050,00011FF –19–12AUG05–1/1

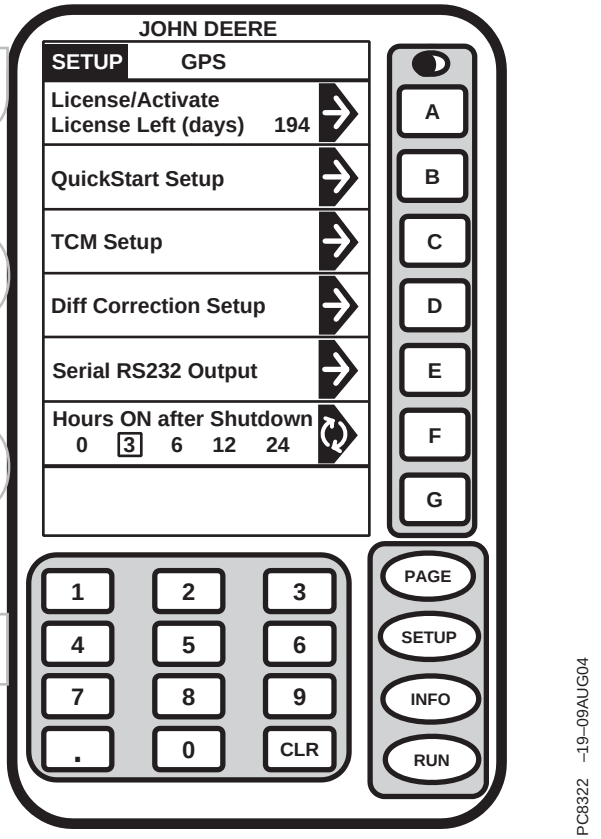
Hours On After Shutdown

Screen: SETUP - GPS

Press: SETUP >> STARFIRE RECEIVER

Button next to HOURS ON AFTER SHUTDOWN defines how long receiver remains powered after ignition is turned off (0, 3, 6, 12 or 24 hours). If ignition is turned on within number of hours defined, receiver will re-establish full SF2 accuracy within a few seconds (assuming it had SF2 when ignition was turned off).

Operator can select amount time in hours system will stay on. Press letter button next to HOURS ON AFTER SHUTDOWN to toggle between settings. Setting from factory is 3 hours.



OUO6050,0001200 –19–12AUG05–1/1

Operating Mode—RTK

IMPORTANT: Before starting SETUP procedures, enter RTK activation number, see Enter RTK Activation section.

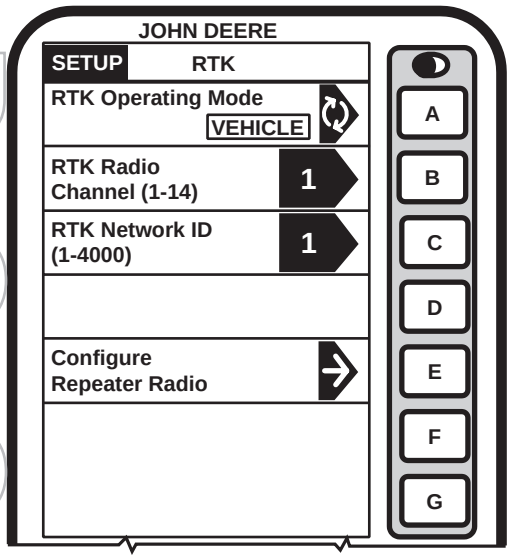
NOTE: Radio can function in four different modes:

- *Vehicle*
- *Quick Survey Base Mode*
- *Absolute Base Mode*
- *Off*

Screen: SETUP - RTK

Press: SETUP >> STARFIRE RECEIVER >> DIFF CORRECTION SETUP >> RTK SETUP

Press letter button next to RTK OPERATION MODE and toggle to desired selection.



PC8337 –19–18OCT04

Suggested Base Station Mode For Operation	
Quick Survey Base Mode	**Absolute Base Mode**
Custom Operations	Drip Tape
Tillage	Strip Till
Broad-acre Seeding	Controlled Traffic
	Row Crop

Vehicle Mode: Select for receiver on vehicle.

Quick Survey Base Mode: Select if exact location of guidance tracks do not need to be stored for future applications. If Quick Survey Base Mode is used to establish rows or paths that will be used at a later date, location of Track 0 must be saved using Current Field setting in Tracking Setup (see AutoTrac Operator's Manual). When Current Field is recalled, a one-time use of Shift Track feature will be needed to align vehicle on previous tracks. See Setup Quick Survey Base Mode section.

Continued on next page

OUO6050,0001201 –19–12AUG05–1/2

Absolute Survey Base Mode: Select if exact location of guidance tracks need to be stored for future guidance applications without relying on visual reference for track position to align using Shift Track feature. Track 0 must be stored using Current Field in Tracking Setup in order to follow previously used tracks. Absolute Base Mode requires 24-hour self survey to be conducted on location before first use. After survey is completed, base station will then transmit corrections. If base station is moved to another position and then returned to original surveyed position, it is very important that base station is mounted in exact same position. Any difference between original surveyed position and mounted position will result in offset of corrected position. For this reason, it is important to mount receiver to a fixed position like building or post mounted in concrete.

OFF Mode: This mode disables all RTK functionality in receiver. RTK Operating Mode must be OFF for normal SF2 operation on SF2-licensed receiver.

OUO6050,0001201 –19–12AUG05–2/2

Quick Survey Mode—RTK

NOTE: Display is not required after base station receiver has been configured to operate in Quick Survey Base Mode and RTK Radio Channel/Network ID have been set.

Connect display to base station.

Screen: SETUP - RTK

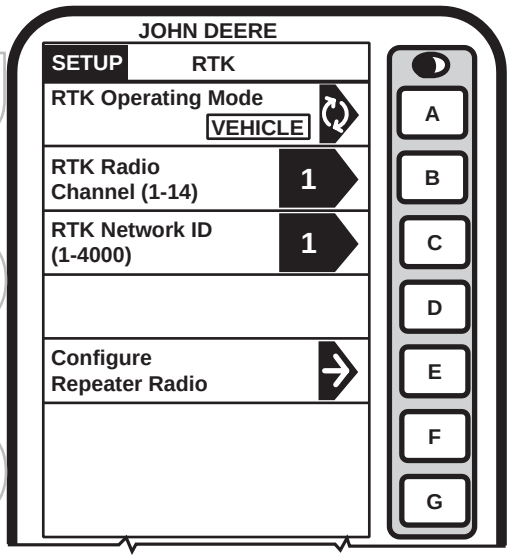
Press: SETUP >> STARFIRE RECEIVER >> DIFF CORRECTION SETUP >> RTK SETUP

NOTE: Quick Survey Base Mode allows base station to broadcast corrections after receiver calculates GPS position.

If power is removed from base station (but not moved) power can be restored and same base station position will be used for corrections. If previously used Track 0 is recalled in Parallel Tracking/Auto Trac no Shift Track will be needed.

If power is removed and base station is moved, a new position will be calculated when power is restored. If previously used Track 0 is recalled in Parallel Tracking/Auto Trac, use Shift Track. (See AutoTrac Operator's Manual for Shift Track procedures.)

Press letter button next to RTK OPERATING MODE and toggle to QUICK SURVEY BASE MODE.



PC8338 –19–18OCT04

OUO6050,0001202 –19–12AUG05–1/1

Absolute Mode—RTK

IMPORTANT: Absolute Base Mode requires base receiver to be mounted in a rigid position. Tripod is not recommended.

NOTE: Display is not required after base station receiver has been configured to operate in Absolute Survey Base Mode and RTK Radio Channel/Network ID have been set.

Connect display to base station.

Screen: SETUP - RTK

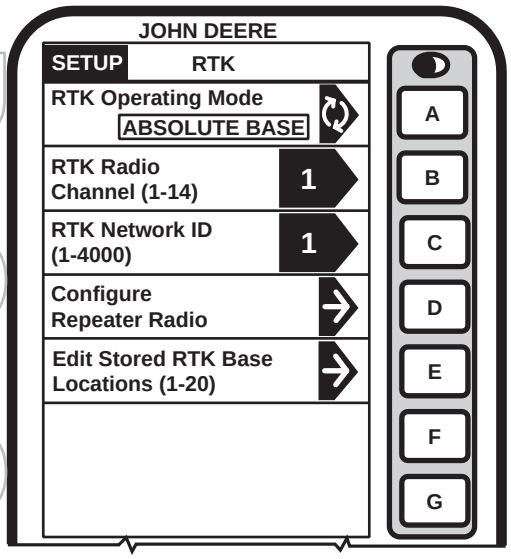
Press: SETUP >> STARFIRE RECEIVER >> DIFF CORRECTION SETUP >> RTK SETUP

Press letter button next to RTK OPERATING MODE and toggle to ABSOLUTE SURVEY BASE MODE.

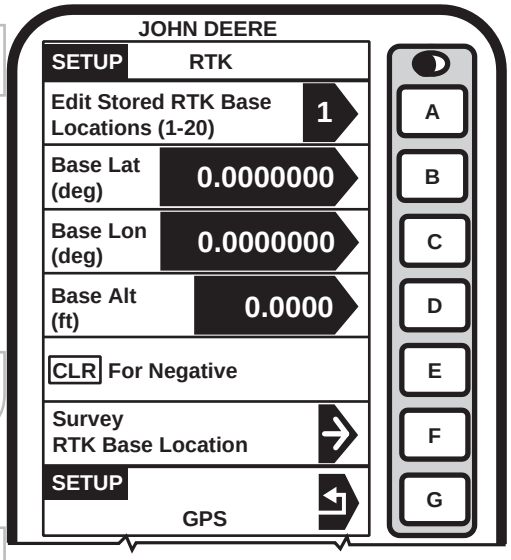
Press letter button next to EDIT STORED RTK BASE LOCATION (1-20) and SETUP - RTK screen will be displayed.

NOTE: Enter unique location number each time base station is moved to new mounting location (i.e. location 1 = West 40, Field location 2 = North 80, Field location 3 = Farm shop).

Press letter button next to EDIT STORED RTK BASE LOCATION (1-20) and enter desired location number.



PC8339 –19–18OCT04



PC8340 –19–18OCT04

Continued on next page

Not known coordinates: Press letter button next to SURVEY RTK BASE LOCATION.

NOTE: After (24 hour) self survey is complete, base station coordinates will automatically be stored and associated with base location number (1-20). Verify base station coordinates, see RTK INFO Pages.

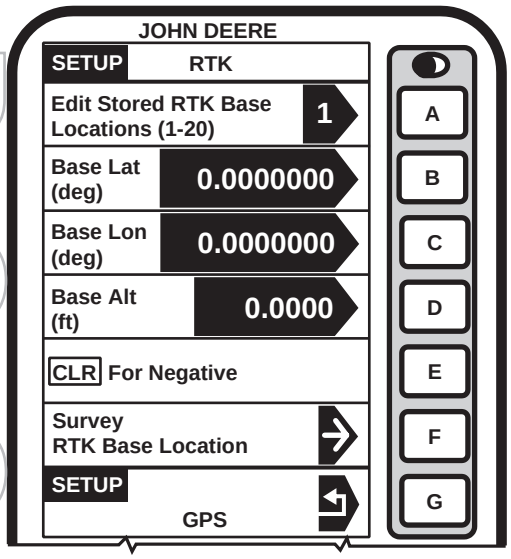
Press letter button next to START SELF SURVEY. Display can be removed while survey is in progress.

After 24 hour survey is complete, base station will automatically store surveyed coordinates and begin transmitting corrections. Manually record coordinates and elevation and store in safe location. These coordinates may be used to enter previously surveyed base station location into different receiver.

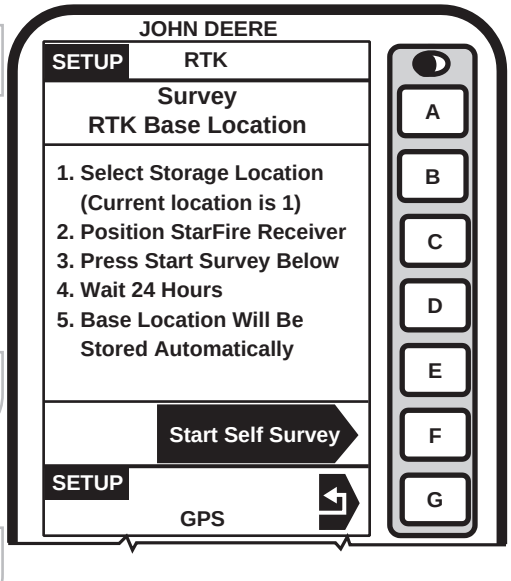
NOTE: Absolute Base Mode, coordinates may be manually entered, if known from previous survey.

Known Location: Press letter button next to BASE (LATITUDE, LONGITUDE AND ALTITUDE) and enter values for;

- Base Lat (deg)
- Base Lon (deg)
- Base Alt (ft)



PC8340 –19–18OCT04



PC8341 –19–18OCT04

OUO6050,0001203 –19–12AUG05–2/2

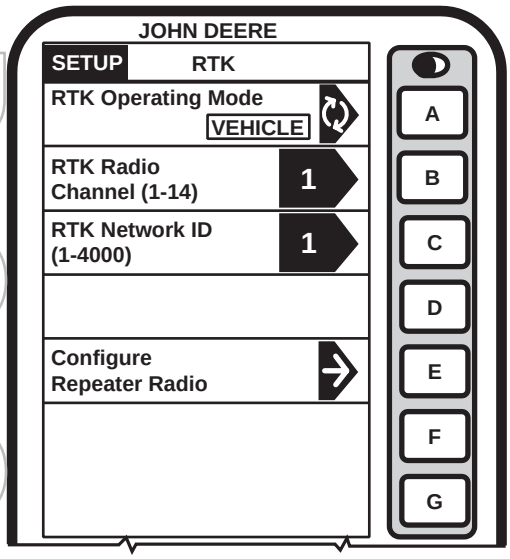
Radio Channel—RTK

NOTE: 14 channels are available. Default channel is 1.

Screen: SETUP - RTK

Press: SETUP >> STARFIRE RECEIVER >> DIFF CORRECTION SETUP >> RTK SETUP

Radio channel may be changed if other RTK systems are operating in area and interference is causing decreased base station communication performance.



OUO6050,0001204 –19–12AUG05–1/1

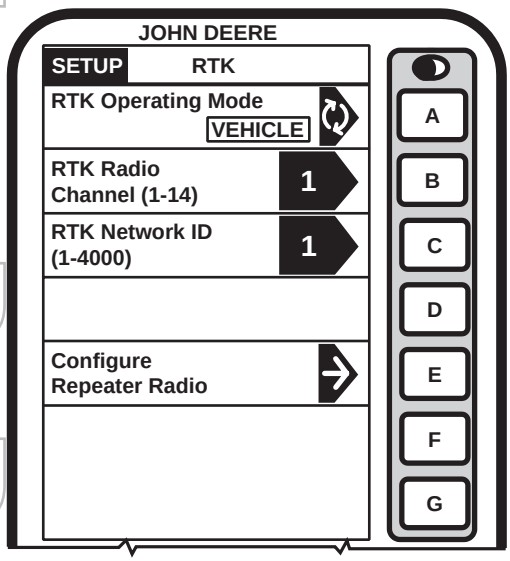
Network ID—RTK

NOTE: 4000 network ID's are available, default ID is 1.

Screen: SETUP - RTK

Press: SETUP >> STARFIRE RECEIVER >> DIFF CORRECTION SETUP >> RTK SETUP

Network ID for base station and vehicle receiver must match. If more than one base station with same Network ID numbers are within range, vehicle may lock on to either one of base stations. To prevent this from happening, be sure to use unique network ID.



OUO6050,0001205 –19–12AUG05–1/1

Repeater—RTK

NOTE: The radio can be configured to act separately as repeater. A repeater is required if obstructions (i.e. trees, hills, etc.) exist between base station and vehicle(s).

A repeater consists of:

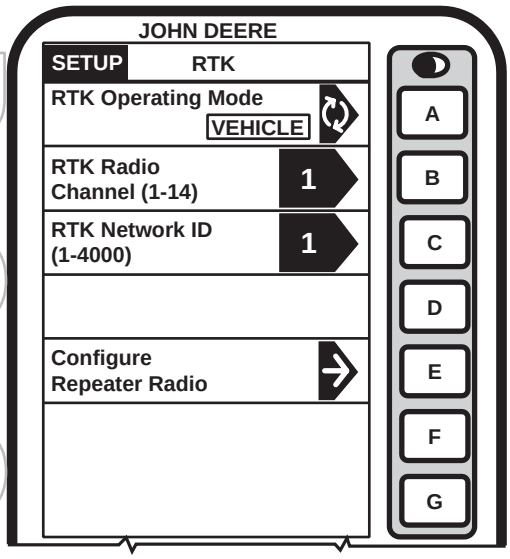
- *Radio (configured as a repeater)*
- *Harness*
- *Mounting Bracket*
- *12 Volt Power Source*

To configure radio as repeater:

Screen: SETUP - RTK

Press: SETUP >> STARFIRE RECEIVER >> DIFF CORRECTION SETUP >> RTK SETUP

1. Connect radio to receiver RTK harness.
2. Check that receiver has GPS position calculated.
3. Check that base station, vehicle, and repeater have same radio channel and network ID.
4. Press letter button next to CONFIGURE REPEATER RADIO.
5. Radio will configure as repeater.
6. Disconnect repeater from receiver and wiring harness.
7. Reconnect original radio.



PC8337 –19–18OCT04

OUO6050,0001206 –19–18OCT05–1/1

Operating Vehicle—RTK

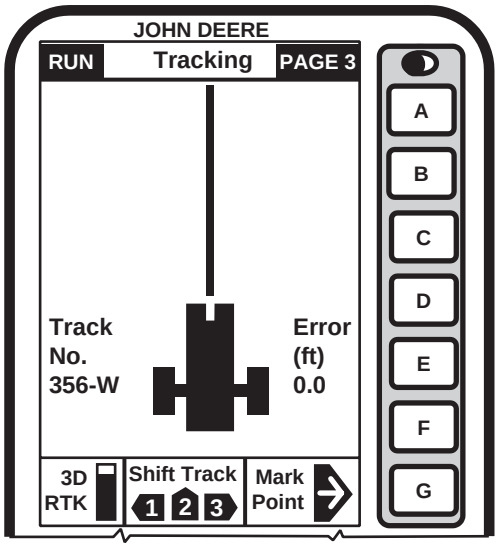
IMPORTANT: The base station receiver and vehicle receiver must be setup before operating RTK. See Setup sections for setup procedures.

When vehicle receiver is powered-up, No GPS, No Diff will be displayed on RUN - TRACKING - PAGE screen until an initial position is determined. When base station transmits correction signal, 3D RTK will be displayed on RUN - TRACKING - PAGE screen.

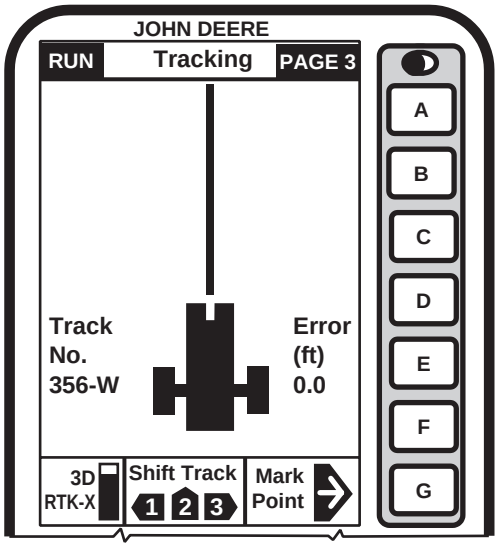
NOTE: If communication loss is WITHIN first hour of base station operation, Extend Mode will provide RTK accuracy for two minutes.

Communication loss AFTER first hour of base station operation, Extend Mode will provide RTK accuracy for 15 minutes.

Extend Mode (RTK-X): If communication between base station and vehicle radio is lost for more than 10 seconds, vehicle receiver will automatically switch to Extend Mode and will maintain RTK accuracy for a period of time. If base station has been powered for less than one hour, Extend Mode will be available for 2 minutes. If base station receiver has been powered for more than one hour, 15 minutes of Extend Mode will be available. If base station communication is not re-established after Extend period, receiver will default to WAAS in North America, or NO DIFF where WAAS is not available.



PC7981 –19–18NOV03

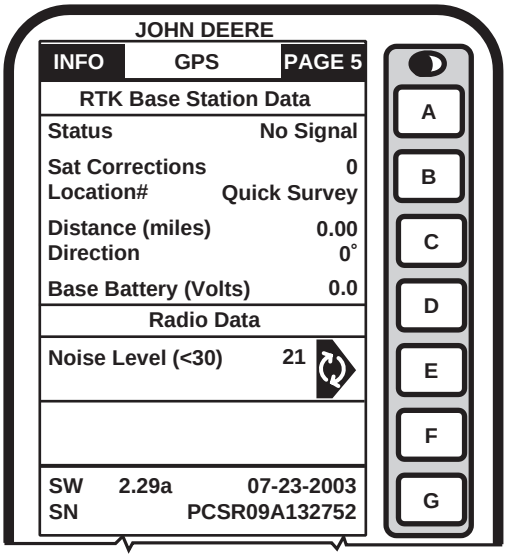


PC8029 –19–18NOV03

X Extend Mode

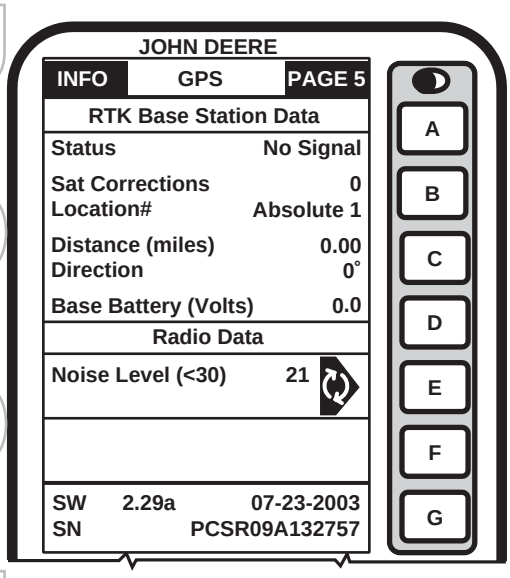
OUO6050,0001207 –19–12AUG05–1/1

INFO Pages, Base Station—RTK



PC8428 –19–16JUN05

Quick Survey



PC8429 –19–06DEC04

Absolute Survey

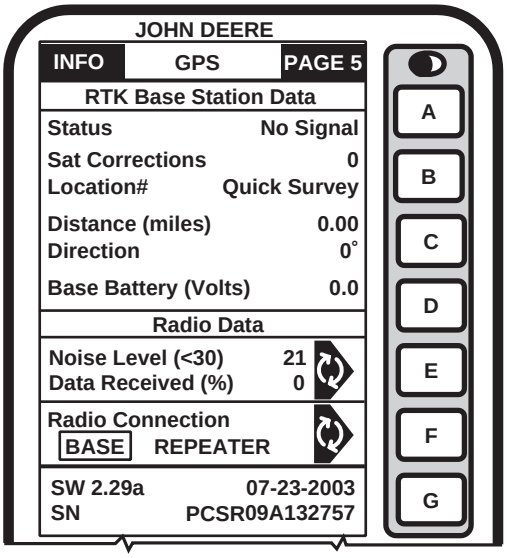
Screen: INFO - GPS - PAGE 5

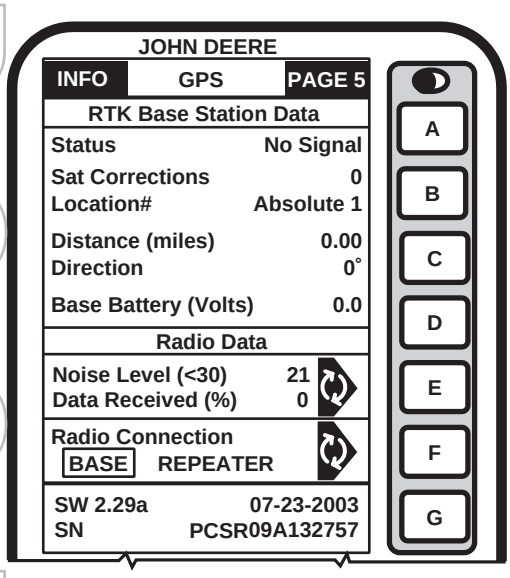
This screen allows operator to view:

- **Status**
  - – OK - Base Station is transmitting correction.
  - – No Stored Base - 24 hour self survey is required for current location.
  - – Initializing - Receiver is initializing radio, acquiring GPS signal.
  - – Self Survey - 24 hour self survey in progress.
- **Sat Corrections** - Indicates number of GPS satellites for which base station is transmitting correction.
- **Distance** - Difference between base station location (known position) and location indicated by uncorrected GPS.
- **Direction** - Direction from base station location (known position) to location indicated by uncorrected GPS.
- **Base Battery (volts)** - Base Station voltage.
- **Noise Level** - Level of noise, interference, that is detected at radio.
- **SW** - Version of radio software
- **SN** - Serial number of radio connected to receiver.

OUO6050,0001208 –19–12AUG05–1/1

INFO Pages, Vehicle—RTK





Absolute Survey

Screen: INFO - GPS - PAGE 5

This screen allows operator to view:

- **Status**
  - – OK - Base Station is transmitting correction.
  - – No Stored Base - 24 hour self survey is required for current location.
  - – Initializing - Receiver is initializing radio, acquiring GPS signal.
  - – Self Survey - 24 hour self survey in progress at base station.
  - – No Signal - Vehicle radio is not receiving signal from base station.
- **Sat Corrections** - Indicates number of GPS satellites for which base station is transmitting correction.
- **Distance** - Distance from base station to vehicle receiver.
- **Direction** - Direction in degrees to base station.
- **Base Battery (volts)** - Base Station voltage.
- **Noise Level** - Level of noise, interference, that is detected at radio. Press E button to refresh noise level.

NOTE: For Data Received (%): Value less than 100 % indicates an obstruction between base station radio and vehicle radio.

ONLY 10 % IS REQUIRED FOR NORMAL OPERATION.

If percent of received correction is 0, and noise level is higher than 30, check for potential radio interference sources such as two-way radios, power lines, ect.

- **Data Received (%)** - Percent of received correction to vehicle from base station.
- **Radio Connection** - Indicates source of correction. If there is no connection, this will toggle between base and repeater.
- **SW** - Version of radio software.
- **SN** - Serial number of radio connected to receiver.

OUO6050,0001209 –19–12AUG05–1/1

INFO - GPS - PAGE 1

Screen: INFO - GPS - PAGE 1

Press: INFO >> STARFIRE RECEIVER

This screen shows information and status of incoming GPS and differential correction signals. No information on this screen can be changed. It is for viewing only.

Date and Time: This cell shows date and time for Greenwich Mean time.

Lat: This cell displays vehicle location latitude coordinates with respect to Equator (north or south).

Lon: This cell shows vehicle location longitude coordinates with respect to Prime Meridian (east or west).

NOTE: Toggle button allows operator to change the way latitude and longitude are displayed between degrees, minutes, seconds and decimal degrees.

Altitude: This cell shows height of receiver, measured from top of dome, in meters (feet) above sea level.

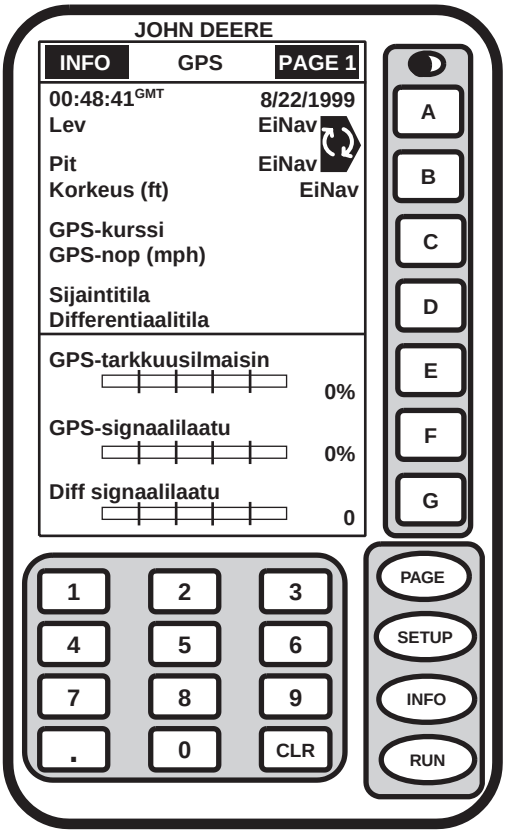
GPS Course: This cell displays direction of travel, in degrees, relative to true north (zero degrees) as measured by receiver. Angle is measured in clockwise direction.

NOTE: Course and speed normally show small speeds and various courses even when machine is not moving.

GPS Speed: This cell shows ground speed of machine in kilometers per hour (mile per hour) as measured by receiver.

Position Mode: This cell indicates whether receiver is calculating a 3D position, 2D position, or no position (no nav). It also shows status of differential signal: SF 1 (StarFire 1 differential), SF 2 (StarFire 2 differential).

Differential Mode: This cell shows status of GPS signal: 2-D (two dimensional with latitude and longitude of vehicle) or 3-D (three dimensional with altitude, latitude, and longitude of vehicle).



PC8336 –19–02SEP04

INFO - GPS - PAGE 1

Continued on next page

GPS Accuracy Indicator: StarFire iTC includes GPS Accuracy Indicator (GPS AI). GPS AI gives indication of GPS position accuracy achieved by receiver, and is displayed as a percentage (0-100%). GPS AI is displayed on RUN Page of Parallel Tracking (Figure 1), AutoTrac, and Field Doc and INFO – GPS – Page 1 (Figure 2).

When receiver is initially powered, GPS AI will display 0%. As receiver acquires satellites and calculates a position, GPS AI will increase as accuracy improves. Acceptable guidance performance for Parallel Tracking and AutoTrac is achieved when GPS AI displays 80% or greater. This may take up to 20 minutes. GPS accuracy is affected by many factors. If 80% accuracy or greater is not achieved within 25 minutes, consider following possibilities:

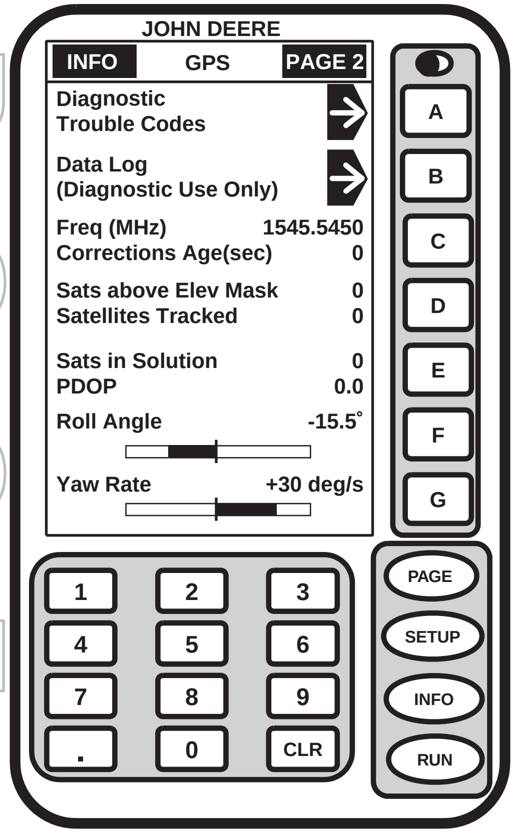
- Unobstructed view of sky – trees, buildings, or other structures may block receiver from receiving signals from all available satellites
- L1/L2 signal to noise ratio (SNR) – radio interference from 2-way radios or other sources may cause low SNR
- Satellite position in sky – poor GPS satellite geometry can reduce accuracy
- Number of satellites above elevation mask – this is total number of GPS satellites available to your receiver that are above 7° elevation mask
- Number of satellites in solution – this is total number of satellites that are being used by receiver to calculate a position

GPS Signal Quality: This cell shows quality of signals being received from constellation of GPS satellites.

Differential Signal Quality: This cell shows quality of differential correction signal being received by receiver.

OUO6050,000120A –19–12AUG05–2/2

INFO - GPS - PAGE 2



PC8137 –19–31MAR04

INFO - GPS - PAGE 2

Screen: INFO - GPS - PAGE 2

Press: INFO >> STARFIRE RECEIVER >> PAGE

Diagnostic Trouble Codes: (See DIAGNOSTIC TROUBLE CODES in Troubleshooting section.)

Data Log: Three data log pages consist of graphs showing GPS information for up to previous 60 minutes. Graphs can be used to show user any variation that has occurred in last 60 minutes.

Freq (MHz): This cell shows frequency of differential correction signal that receiver is set to receive.

Corrections Age (SEC): This cell shows age of differential correction signal to GPS (normally less than 10 seconds).

Sats Above Elev Mask: This is total number of GPS satellites available to your receiver that are above 7° elevation mask.

Satellites Tracked: This is total number of GPS satellites tracked by your receiver.

Satellites in Solution: This cell shows number of satellites actively used to compute position.

PDOP: PDOP (Position Dilution of Precision) is an indicator of GPS satellite geometry as viewed by receiver. A lower PDOP indicates better satellite geometry for calculating both a horizontal and vertical position.

Roll Angle: Is both graphical and numerical representation of amount of roll TCM is measuring, relative to calibrated zero degree reference. A positive roll angle means vehicle is rolled to right.

Yaw Rate: This gives a graphic representation and a numeric figure for amount of rotation TCM is measuring. Positive yaw rate means vehicle is turning to right.

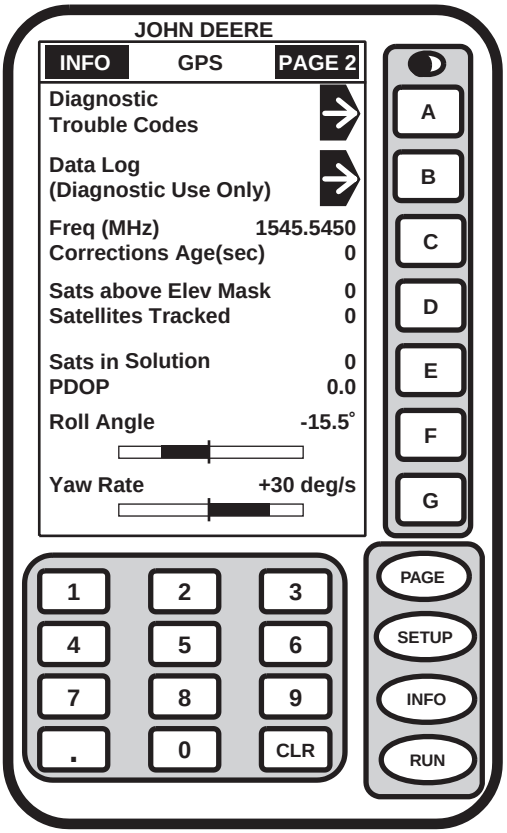
OUO6050,000120B –19–17OCT05–1/1

Data Log

Screen: INFO - GPS - PAGE 2

Press: INFO >> STARFIRE RECEIVER >> PAGE

Press letter button next to DATA LOG to access three data log pages. These pages consist of graphs showing GPS information for up to previous 60 minutes. Graphs can be used to show user any variation that has occurred in last 60 minutes.



PC8137 –19–31MAR04

INFO - GPS - PAGE 2

Continued on next page

OUO6050,000120C –19–17OCT05–1/4

INFO - DATA LOG - PAGE 1

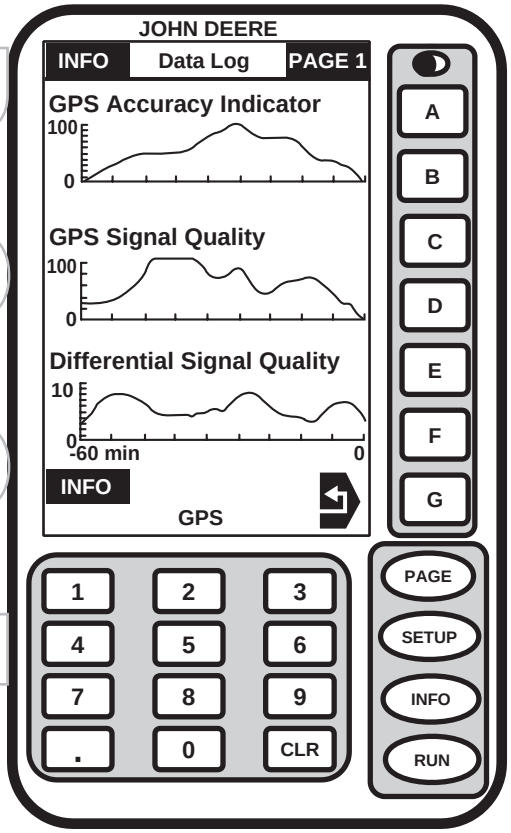
Screen: INFO - DATA LOG - PAGE 1

Press: INFO >> STARFIRE RECEIVER >> PAGE >> DATA LOG

GPS Accuracy Indicator: GPS Accuracy Indicator is a relative indication of overall differential GPS performance.

GPS Signal Quality: GPS signal quality shows quality of signals being received from GPS satellites. Unlike GPS Accuracy Indicator, Signal Quality doesn't include WAAS, SF1, SF2, or amount of time signal is received.

Differential Signal Quality: Differential signal quality is strength of StarFire network signal (SF2 or SF1). Normal range is from 5 to 15, but maximum reading on indicator is 10. Numerical value is displayed to right of indicator. Any value above 5 is normal.



PC8323 –19–02SEP04

OUO6050,000120C –19–17OCT05–2/4

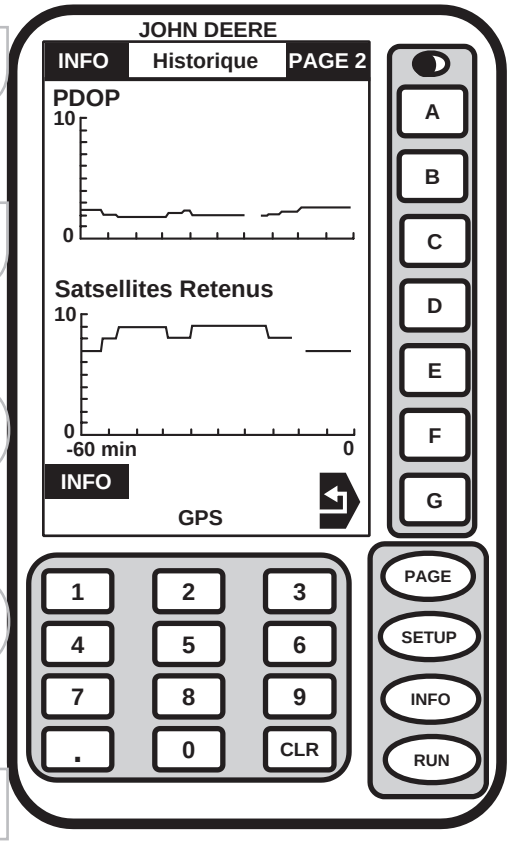
INFO - DATA LOG - PAGE 2

Screen: INFO - DATA LOG - PAGE 2

Press: INFO >> STARFIRE RECEIVER >> PAGE >> DATA LOG >> PAGE

PDOP: (Position Dilution Of Precision) is a combination of vertical and horizontal error (or three dimensional). Lower PDOP is better. A value below 2 is considered optimal.

Satellites in Solution: Number of satellites that receiver is using in current position solution. Maximum is 10. Satellites are not used in solution until they get above 7° elevation mask for WAAS, SF1, or SF2 (10° for RTK), and satellites are used until they drop below 7° elevation mask for WAAS, SF1, SF2, or RTK.



PC8324 –19–23AUG04

Continued on next page

OUO6050,000120C –19–17OCT05–3/4

INFO - DATA LOG - PAGE 3

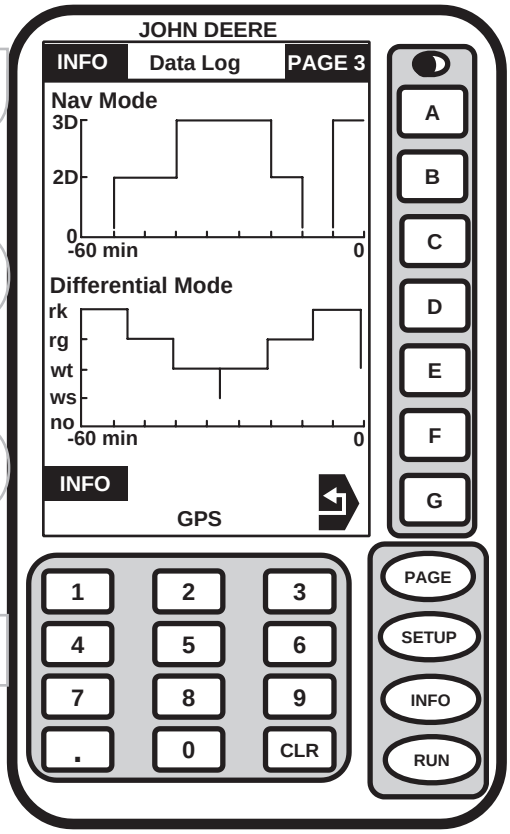
Screen: INFO - DATA LOG - PAGE 3

Press: INFO >> STARFIRE RECEIVER >> PAGE >> DATA LOG >> PAGE >> PAGE

Position Mode: Position mode is represented as three different types; No Nav, 2D and 3D. This helps determine if GPS position has been dropped in last 60 minutes.

Differential Mode: This shows level of differential signal that you have been receiving over past 60 minutes. Level of signal that you purchased on your receiver will determine highest point on bar graph that you will see.

- RK - RTK
- RG - current SF2
- WT - original SF2
- WS - WAAS
- NO - none



PC8325 –19–23AUG04

OUO6050,000120C –19–17OCT05–4/4

INFO - GPS - PAGE 3

Screen: INFO- GPS - PAGE 3

Press: INFO >> STARFIRE RECEIVER >> PAGE >> PAGE

This page shows detailed information about receiver. This information will help troubleshoot receiver if a problem occurs.

Activations: Activations displays all activation codes that have been entered into receiver. SF1, SF2, and/or RTK. Contact Customer Care Center 888 GRN STAR or visit www.StellarSupport.com for additional activations.

SF2 License: If receiver currently has active SF2 license, YES will be displayed. If not, NO will be displayed.

SF2 End Date: Date SF2 license will expire.

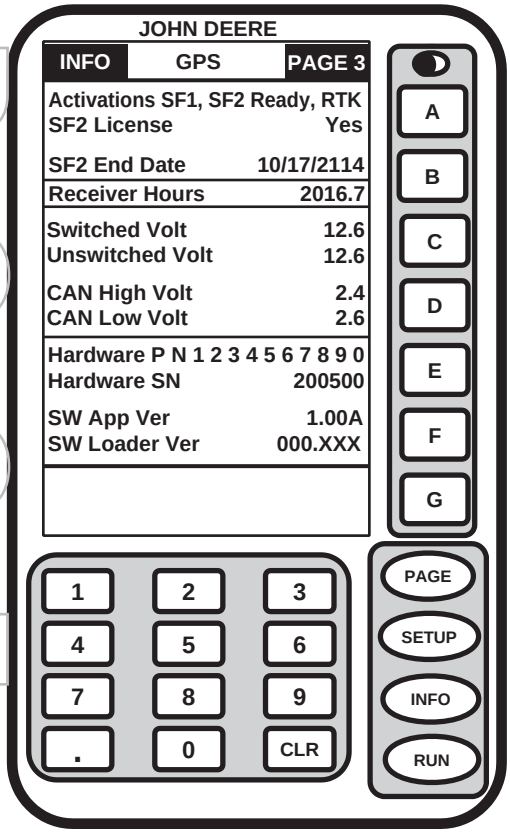
Receiver Hours: This cell displays number of hours on receiver.

Serial Number: This cell shows receiver serial number. This is required to obtain a StarFire signal license.

Hardware Version: This cell shows part number of receiver.

Software Version: This cell displays version of software being used by receiver.

NOTE: To acquire latest version of software call 1-888GRNSTAR, or via Internet at www.stellarsupport.com or contact your John Deere dealer.



INFO - GPS - PAGE 3

PC8331 –19–22SEP04

OUO6050,000120D –19–12AUG05–1/1

Satellite Tracking

Screen: INFO- GPS - PAGE 4

Press: INFO >> STARFIRE RECEIVER >> PAGE >> PAGE >> PAGE

This page shows satellites being tracked by GPS receiver and associated information.

SAT ID: (Satellite Identification Number): Identification number for GPS satellite

ELV: (Position Elevation): Elevation in degrees above horizon for GPS satellite position

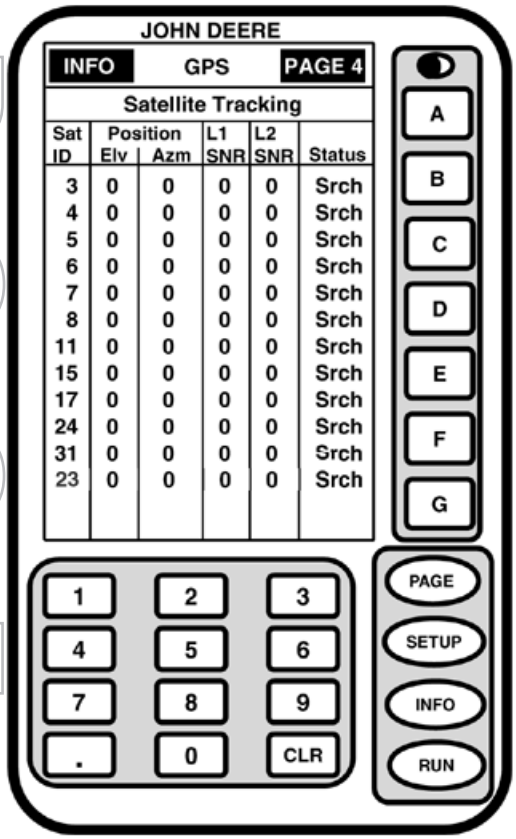
AZM: (Position Azimuth): Azimuth in degrees from true North for GPS satellite

L1 SNR: (L1 Signal to Noise Ratio): Signal strength for L1 GPS signal (signal to noise ratio)

L2 SNR: (L2 Signal to Noise Ratio): Signal strength for L2 GPS signal (signal to noise ratio)

Status: (GPS Signal Status): Status of GPS signal

- **Search:** searching for satellite signal
- **Track:** tracking satellite signal and using it for positioning
- **OK:** tracking satellite signal and using it for positioning
- **OK SF1:** tracking satellite signal and using it for positioning with STARFIRE signal frequency
- **OK SF2:** tracking satellite signal and using it for positioning with STARFIRE dual frequency



PC8547 –19–10MAY05

OUO6050,000120E –19–12AUG05–1/1

StarFire Receiver

IMPORTANT: If a SF2 correction signal is being used, accuracy of system may continue to increase after SF2 is verified on screen. When receiver powers up, it is in SF1 differential mode. It may take a few minutes for receiver to switch to SF2 mode. There may be a slight shift in position between two modes. If machine was receiving dual frequency when it was shut down, 10 minute delay will not occur unless it has been shut down for longer that time specified for HOURS ON AFTER SHUTDOWN.

OUO6050,000120F –19–12AUG05–1/1

SETUP - GPS - PAGE 1

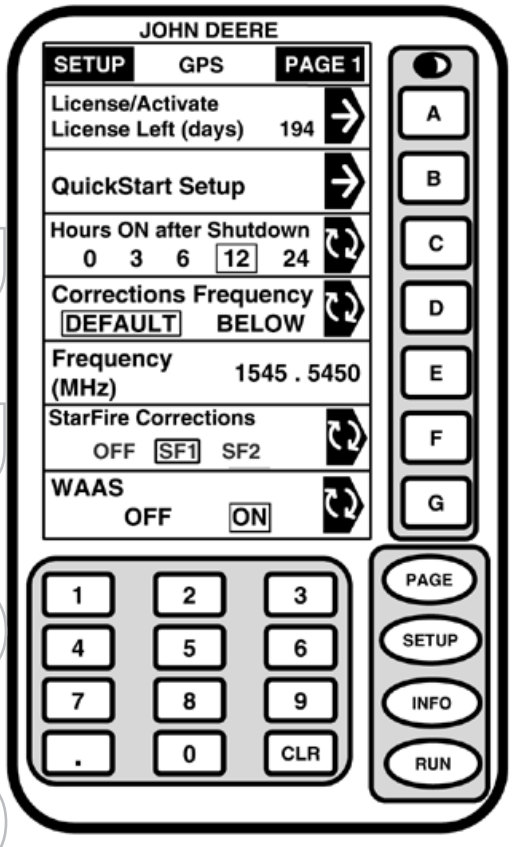
Screen: SETUP - GPS - PAGE 1

Press: SETUP >> STARFIRE RECEIVER

The following items can be setup in this Screen:

- License/Activate and License Left
- QuickStart SETUP - AUTOMATIC/OFF
- Hours on after shutdown
- Corrections Frequency-DEFAULT/BELOW
- StarFire Corrections-OFF, SF1, SF2

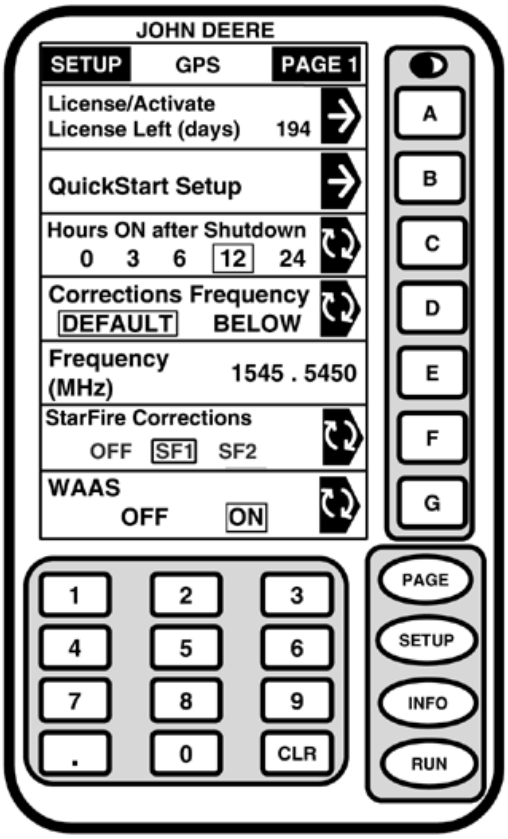
Press corresponding button to access option being changed.



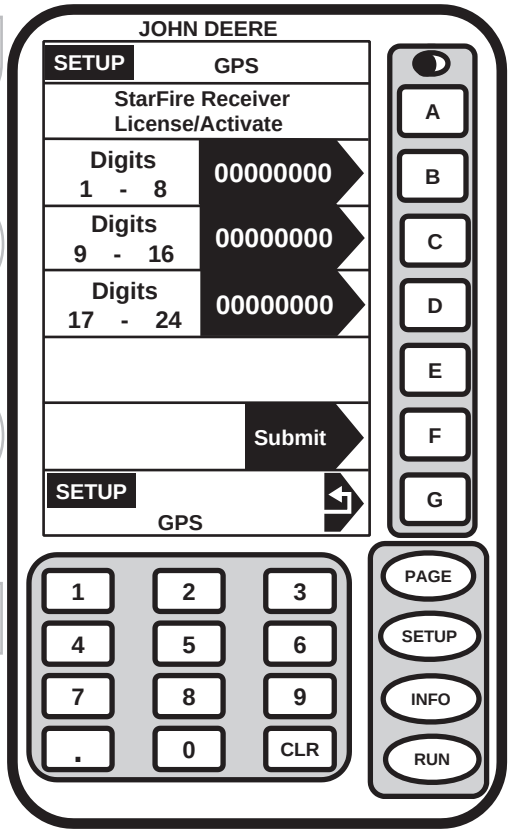
PC8548 –19–10MAY05

Continued on next page

OUO6050,0001210 –19–12AUG05–1/5



PC8548 –19–10MAY05



PC7942 –19–22OCT03

SETUP - GPS

License/Activate-Licence Left

NOTE: To receive updated license contact www.stellarsupport.com on the Internet, call + 49 (0) 62 18 29 44 70, or contact your John Deere dealer.

Renew license if using StarFire differential correction signal or activate receiver for use with RTK.

License left screen indicates number of days remaining before receiver license needs to be renewed.

Screen: SETUP - GPS

Press: SETUP >> STARFIRE RECEIVER >> LICENSE/ACTIVATE-LICENCE LEFT (DAYS)

This screen allows operator to manually enter 24-digit position receiver subscription license.

1. Press letter button next to DIGITS 1-8 and enter first eight digits using numeric keypad. Press letter button next to DIGITS 1-8 again to enter and save entered value.
2. Press letter button next to DIGITS 9-16 and enter first eight digits using numeric keypad. Press letter button next to DIGITS 9-16 again to enter and save entered value.
3. Press letter button next to DIGITS 17-24 and enter first eight digits using numeric keypad. Press letter button next to DIGITS 17-24 again to enter and save entered value.
4. Press letter button next to SUBMIT to accept all of numbers and send.

Continued on next page

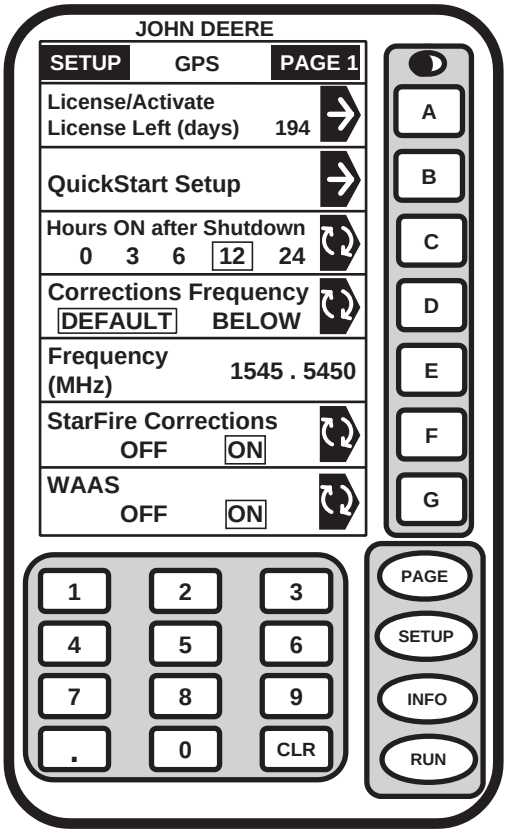
License Expired Warning

NOTE: Two 48 hour grace periods are available when current license expires. This is provided to allow sufficient time for customer to renew a license. Grace period signal will be SF 2 differential correction signal.

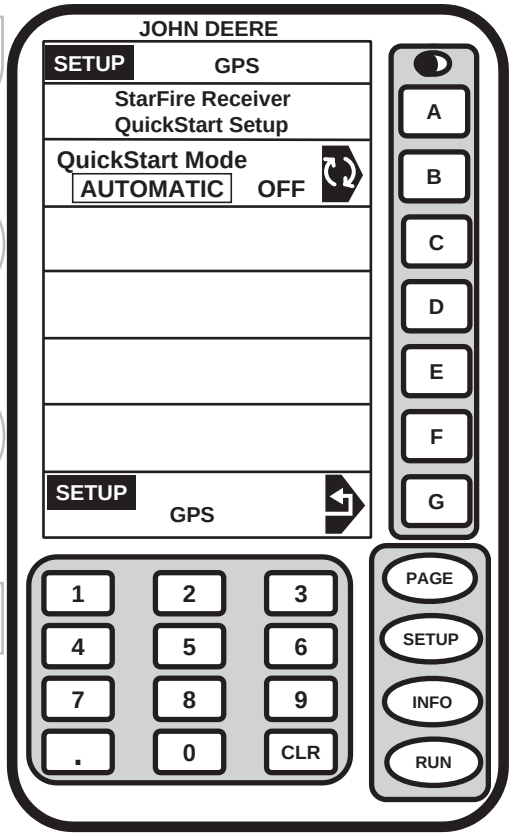
If license expires while operating or since last operated, a warning screen will appear.

Warning screen can be cleared by pressing letter button next to CONTINUE or a grace period can be activated by pressing letter button next to USE 1 if needed.

Continued on next page



SETUP - GPS - PAGE 1



Select QuickStart Mode

QuickStart

Screen: SETUP - GPS

Press: SETUP >> STARFIRE RECEIVER >> QUICKSTART SETUP

This screen allows operator to activate automatic mode by pressing letter button next to QUICKSTART MODE to toggle between AUTOMATIC and OFF.

If QuickStart is activated (automatic mode) and user has SF2 when receiver is powered down, a position is saved for future QuickStart. If power is restored to receiver within time period defined under HOURS ON AFTER SHUTDOWN, a QuickStart won't be needed since receiver power was never disrupted. However, if duration has been past hours on after shutdown, a QuickStart will be initiated. Saved position will be used to bypass startup transient (warm up period) that is usually required. However, stipulation is that receiver cannot move while this QuickStart is taking place. It may take up 6 minutes for QuickStart to complete. User will be notified on screen when it's done.

Continued on next page

Hours ON After Shutdown

This defines how long receiver remains powered after key is turned off in vehicle. If power is restored within number of hours defined under hours on after shutdown, receiver will re-establish full SF2 accuracy within a few seconds (assuming it had SF2 when key was turned off).

The operator can select amount time in hours system will stay on. Press letter button next to HOURS ON AFTER SHUTDOWN to toggle between settings. Default setting is 3 hours.

Corrections Frequency

IMPORTANT: DO NOT change default channel unless instructed to do so by your John Deere Dealer or by John Deere Ag Management Solutions.

Press letter button next to CORRECTIONS FREQUENCY to toggle/select either DEFAULT or BELOW frequency.

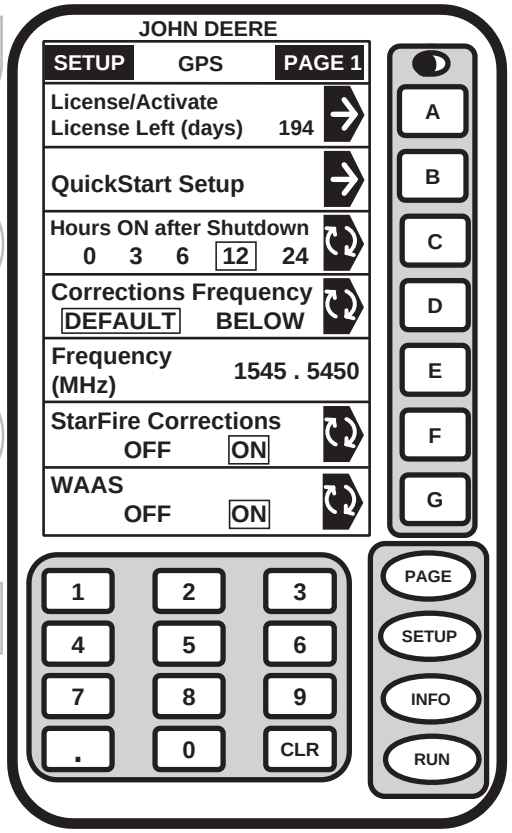
StarFire Corrections

NOTE: This information will only appear when receiver has a license.

Press letter button next to STARFIRE CORRECTIONS to toggle/select OFF or ON.

WAAS

Press letter button next to WAAS to toggle/select OFF or ON.



PC7940 –19–22OCT03

SETUP - GPS - PAGE 1

OUO6050,0001210 –19–12AUG05–5/5

SETUP - GPS - PAGE 2

Screen: SETUP - GPS - PAGE 2

Press: SETUP >> STARFIRE RECEIVER >> PAGE

The following items can be setup in this Screen:

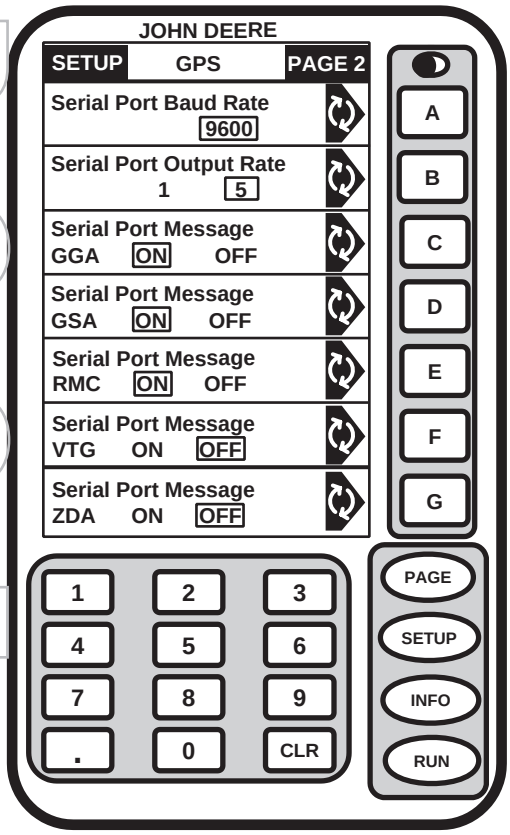
- Serial Port Baud Rate
- Serial Port Output Rate
- GGA Port Message
- GSA Port Message
- RMC Port Message
- VTG Port Message
- ZDA Port Message

Serial Port Baud Rate

NOTE: Output rates are: 4800, 9600, 19200 and 38400.

The STARFIRE receiver is capable of sending NMEA messages on a serial port. This allows receiver to be used for applications other than GreenStar system.

Press letter button next to SERIAL PORT BAUD RATE to toggle/select serial baud rate.



PC7406 –19–05NOV02

Continued on next page

OUO6050,0001211 –19–10OCT05–1/2

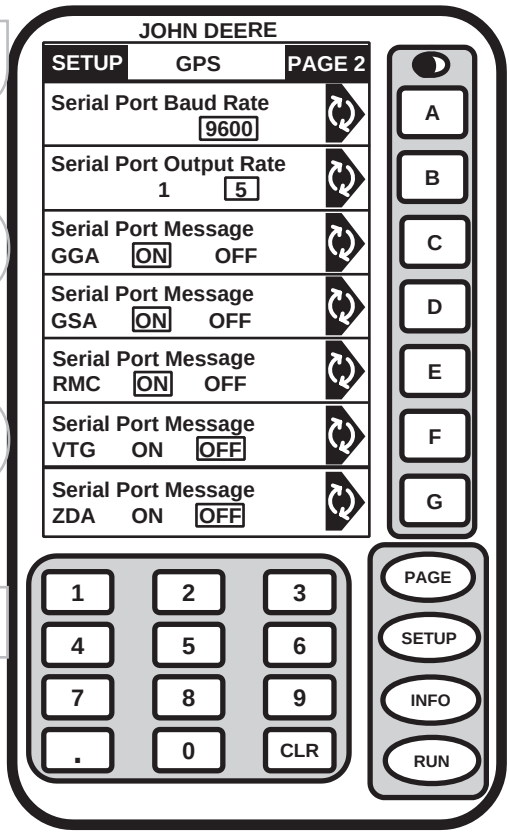
Serial Port Output Rate

NOTE: Serial port settings do not affect GreenStar applications.

Press letter button next to SERIAL PORT OUTPUT RATE to toggle/select from 1 to 5 Hz.

Serial Port Messages

Press letter button next to button to desired SERIAL PORT MESSAGE to toggle/select between ON and OFF.



PC7406 –19–05NOV02

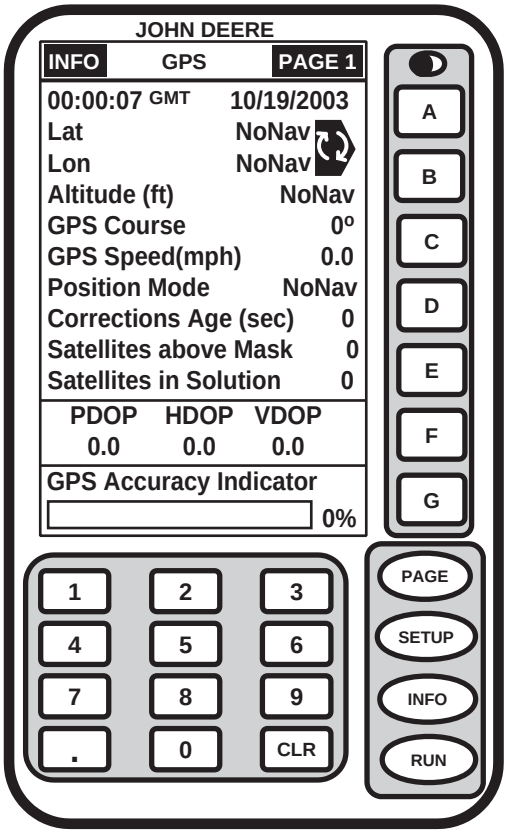
OUO6050,0001211 –19–10OCT05–2/2

INFO - GPS - PAGE 1

Screen: INFO - GPS - PAGE 1

Press: INFO >> STARFIRE RECEIVER

This screen shows information and status of incoming GPS and differential correction signals. No information on this screen can be changed. It is for viewing only.



PC7943 –19–22OCT03

Date and Time

This cell shows date and time for Greenwich Mean time.

Lat

This cell displays vehicle location latitude coordinates with respect to Equator (north or south).

Lon

This cell shows vehicle location longitude coordinates with respect to Prime Meridian (east or west).

NOTE: Toggle button allows operator to change the way latitude and longitude are displayed between degrees, minutes, seconds and decimal degrees.

Altitude

This cell shows height of receiver in meters (feet) above sea level.

GPS Course

NOTE: Course and speed normally show small speeds and various courses even when machine is not moving.

This cell displays direction of travel, in degrees, relative to true north (zero degrees) as measured by receiver. Angle is measured in clockwise direction.

GPS Speed

This cell shows ground speed of machine in kilometers per hour (mile per hour) as measured by receiver.

Continued on next page

Position Mode

This cell shows status of GPS signal: 2-D (two dimensional with latitude and longitude of vehicle) or 3-D (three dimensional with altitude, latitude, and longitude of vehicle).

The position mode cell also shows status of differential signal: SF 1 (StarFire 1 differential), SF 2 (StarFire 2 differential).

Corrections Age (SEC)

This cell shows age of differential correction signal to GPS (normally less than 10 seconds).

Sats Above Mask

This is the total number of GPS satellites available to your StarFire receiver that are above 7° elevation mask.

Satellites in Solution

This cell shows number of satellites actively used to compute position.

PDOP, HDOP and VDOP

This cell shows precision of GPS position signal. Precision of signal is affected by geometry of satellites being used.

- PDOP-position dilution of precision
- HDOP-horizontal dilution precision
- VDOP-vertical dilution of precision

GPS Accuracy Indicator

Version 7.00 and greater StarFire receiver software includes GPS Accuracy Indicator (GPS AI). GPS AI gives an indication of GPS position accuracy achieved by StarFire receiver, and is displayed as a percentage (0-100%). GPS AI is displayed on RUN screen of Parallel Tracking (Figure 1), AutoTrac, and Field Doc and INFO – GPS – Page 1 (Figure 2).

Continued on next page

When StarFire receiver is initially powered, GPS AI will display 0%. As receiver acquires satellites and calculates a position, GPS AI will increase as accuracy improves. Acceptable guidance performance for Parallel Tracking and AutoTrac is achieved when GPS AI displays 80% or greater. This may take up to 20 minutes. GPS accuracy is affected by many factors. If 80% accuracy or greater is not achieved within 25 minutes, consider following possibilities:

- Unobstructed view of sky – trees, buildings, or other structures may block StarFire receiver from receiving signals from all available satellites
- L1/L2 signal to noise ratio (SNR) – radio interference from 2-way radios or other sources may cause low SNR
- Satellite position in sky – poor GPS satellite geometry can reduce accuracy
- Number of satellites above elevation mask – this is total number of GPS satellites available to your StarFire receiver that are above 7° elevation mask
- Number of satellites in solution – this is the total number of satellites that are being used by StarFire receiver to calculate a position

OUO6050,0001212 –19–17OCT05–3/3

INFO - GPS - PAGE 2
Correction Receiver

Screen: INFO - GPS - PAGE 2

Press: INFO >> STARFIRE RECEIVER >> PAGE

This screen shows detailed information about position receiver. This information will help troubleshoot position receiver if a problem occurs.

Lock Status

This cell shows status of L-Band differential correction signal acquisition (search, locked).

Signal Level

This cell shows signal strength of L-Band differential correction signal in dB. A good signal is 6 dB or higher.

Differential Type

This cell displays type of corrections signal being received.

Channel

This cell shows frequency which receiver is using for L-Band differential corrections.

Good Packets

Packets are information data strings received from differential satellite. Good packets contain differential correction information.

Reframe Count

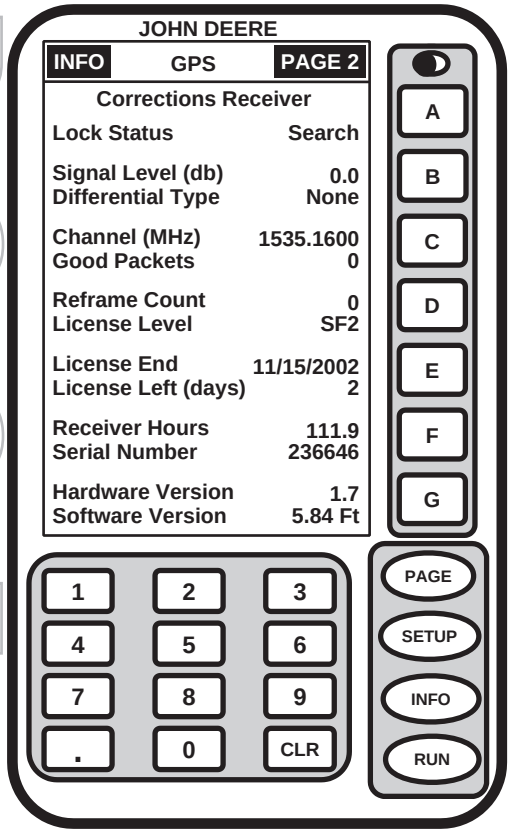
This cell shows number of times receiver has acquired differential corrections signal.

License Activation

This cell shows type of differential signal being received.

License End

This cell shows date license ends.



PC7421 –19–14NOV02

Continued on next page

OUO6050,0001213 –19–12AUG05–1/2

License Left

This cell shows number of days left until L-Band differential correction license expires.

Receiver Hours

This cell displays number of hours on receiver.

Serial Number

This cell shows position receiver serial number. This is required to obtain an L-Band signal license.

Hardware Version

This cell shows part number of position receiver.

Software Version

NOTE: To acquire latest version of software call 1-888GRNSTAR, or via Internet at www.stellarsupport.com or contact your John Deere dealer.

This cell displays version of software being used by position receiver.

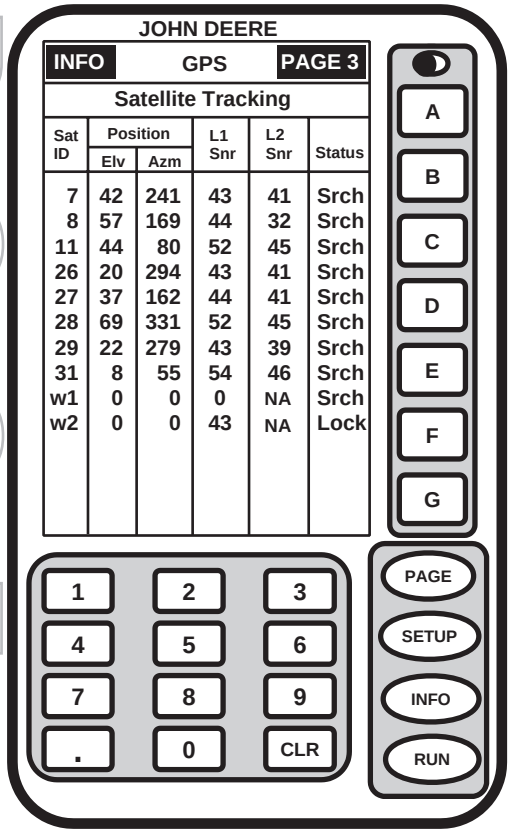
OUO6050,0001213 –19–12AUG05–2/2

INFO - GPS - PAGE 3
Satellite Tracking

Screen: INFO - GPS - PAGE 3

Press: INFO >> STARFIRE RECEIVER >> PAGE >> PAGE

This screen shows satellites being tracked by GPS receiver and associated information.



PC7420 –19–14NOV02

SAT ID

This cell shows identification number for GPS satellite.

ELEV

This cell displays elevation in degree above horizon for GPS satellite position.

AZM

This cell shows azimuth in degree from true North for GPS satellite.

L1 SNR

This cell shows signal strength for L1 GPS signal (signal to noise ratio).

L2 SNR

This cell shows signal strength for L2 GPS signal (signal to noise ratio).

Status

This cell shows status of GPS signal.

- Search-Searching for satellite signal.
- Track-tracking satellite signal and using it for positioning.
- OK-Tracking satellite signal and using it for positioning.
- OK SF1-Tracking satellite signal and using it for positioning with STARFIRE signal frequency.
- OK SF2-Tracking satellite signal and using it for positioning with STARFIRE dual frequency.

OUO6050,0001214 –19–10OCT05–1/1

Warning Screens

NOTE: Pressing E will suppress warning screen until power is cycled.

Warning screen ID 304 will appear if differential correction has been lost.

Warning screen ID 305 appears if signal is lost.

Press letter button next to DO NOT WARN AGAIN to turn warning off.

Press letter button next to OK to continue. Warning will repeat every 5—10 minutes.

Warning screen ID 302 is to alert user that receiver is not locked onto a differential signal and that it should be locked onto a different signal.

Warning screen ID 301 will appear if receiver is not receiving corrections messages from STARFIRE network (idle packets only). Position receiver will not function properly if it is not receiving correction messages from STARFIRE network. This condition will be corrected as soon as possible by STARFIRE network personnel.

Press letter button next to OK to continue.

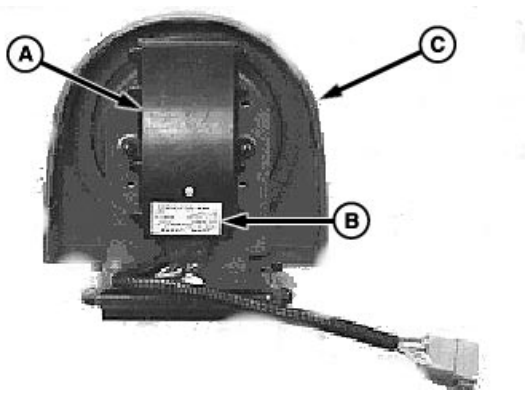
IMPORTANT: This warning screen indicates a problem with STARFIRE satellite network. No action needs to be taken by operator.

OUO6050,0001215 –19–10OCT05–1/1

TCM—on Original StarFire Receiver

Location

A—Terrain Compensation Module (TCM)
B—Product Identification Numbers
C—Receiver



PC7562 –UN–28MAR03

OUO6050,0001216 –19–12AUG05–1/1

TCM and Position Receiver

The position receiver is located on cab of machine. Position receiver receives global positioning and differential correction signal through a single receiver and integrates signal for use with system.

The Terrain Compensation Module is a navigational aid used with StarFire position receiver to enhance vehicle position and course parameters that GPS provides. TCM corrects for vehicle dynamics such as roll on side-slopes, rough terrain or varying soil conditions. TCM is mounted to StarFire receiver and connects between receiver and rest of components.

OUO6050,0001217 –19–12AUG05–1/1

Setup

IMPORTANT: TCM must be setup properly for maximum performance.

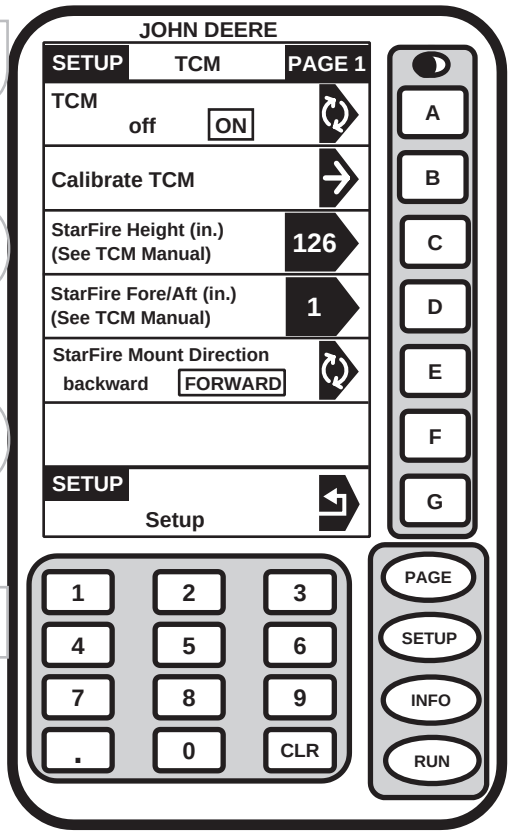
Screen: SETUP - TCM - PAGE 1

Press: SETUP >> TCM

NOTE: Depending on number of programs loaded on KeyCard, TCM may not appear on SETUP - PAGE 1 screen. Press PAGE button to access TCM.

This screen allows operator to view and change specific information for TCM (Terrain Compensation Module):

- Turn TCM ON/OFF
- Calibrate TCM for zero degree roll angle
- Manually insert height of receiver (from ground)
- Manually insert fore/aft (distance from pivot point of vehicle to receiver)
- Change mounting direction of receiver (backward/forward)



PC7548 –19–27MAR03

OUO6050,0001218 –19–12AUG05–1/1

Turning ON/OFF

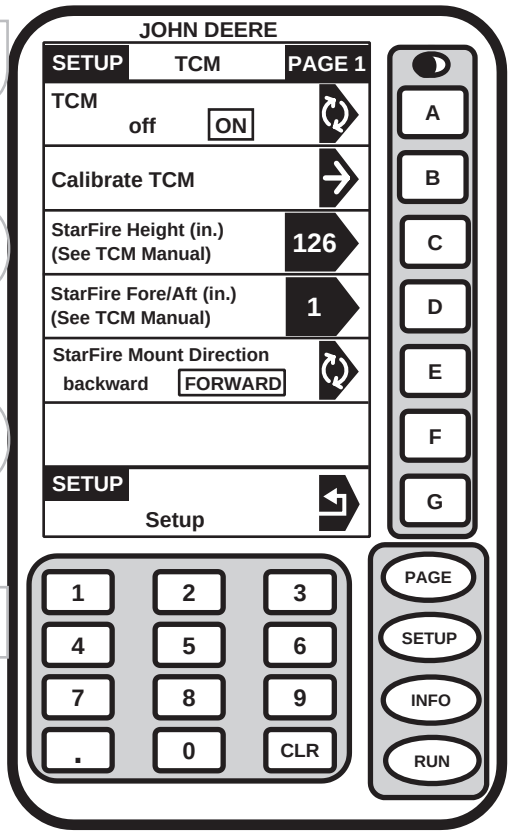
IMPORTANT: TCM must be on for AutoTrac to operate. If TCM is turned OFF, AutoTrac will not operate.

NOTE: There is no indication on RUN screens if TCM is on or off.

TCM will default to ON when cycling power.

Press A button to toggle between ON and OFF, selection will appear boxed and in capital letters.

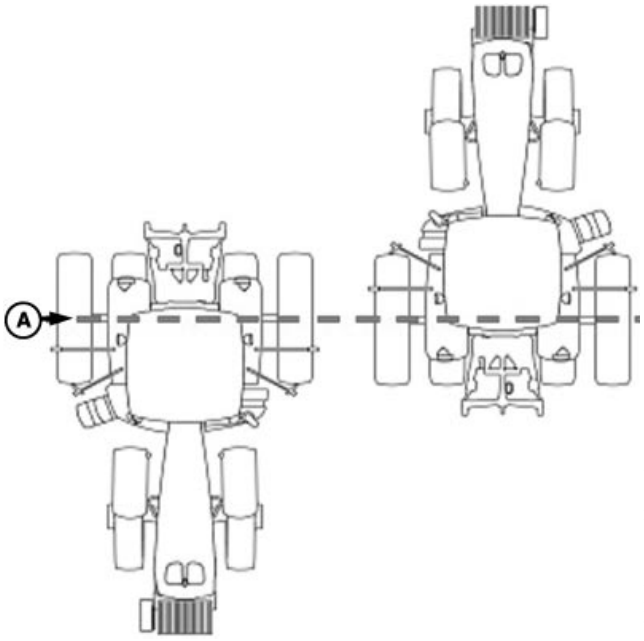
When TCM is turned OFF, GPS messages will not be corrected for vehicle dynamics or side slopes.



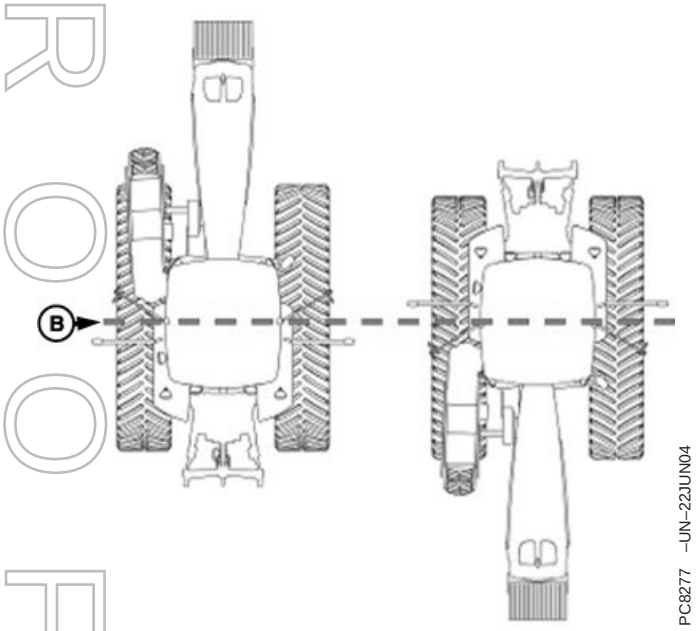
PC7548 –19–27MAR03

OUO6050,0001219 –19–12AUG05–1/1

Calibrating



Floating Front Axle Vehicles



Fixed-Axis Wheels Or Tracks Vehicles

A—Rear Axle

B—Vehicle Pivot Point

Positioning Machine during Calibration

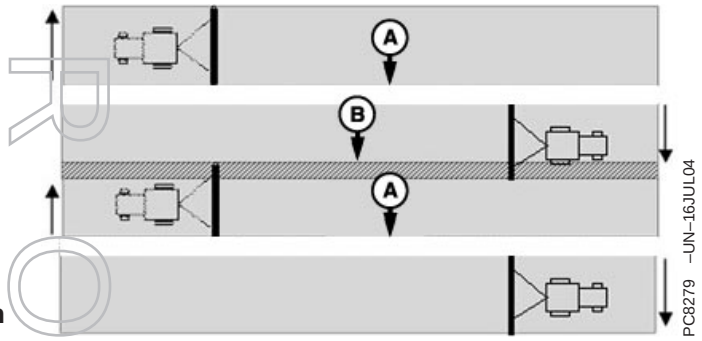
IMPORTANT: When calibrating, it is important that TCM is at same angle when facing either direction. If roll angle is a positive 2° when facing one direction, vehicle needs to be a negative 2° when facing opposite direction. To position TCM at same angle it is important when turning vehicle around and facing other direction that tires are placed in correct location. Once vehicle is parked on a hard flat surface, note location of tires on ground. When turning around use following instructions:

- **Floating Front Axle Vehicles (MFWD, ILS, TLS)—put rear axle/wheels in same location when performing 2 point calibration. See above diagram for Floating Front Axle Vehicles.**
- **Fixed-Axis Wheels Or Tracks Vehicles (track Tractors, 4700 and 4900 Series Sprayers, 9000, And 9020 Series Wheel Tractors)—Place all in same location when facing either direction. See above diagram for Fixed-Axis Wheels Or Tracks Vehicles.**

Continued on next page

Calibration Surface

IMPORTANT: Vehicle must be on a hard, flat level surface for calibration. If TCM is not calibrated on a level surface or TCM mounting angle is not level in relation to vehicle angle (StarFire mounting bracket or vehicle cab being slightly offset, uneven tire pressures from one side to other, etc.) operator may see an offset during operation. This offset could look like a consistent skip (A) or overlap (B) in pass-to-pass operation. To eliminate offset, re-calibrate on a level surface, drive down a pass, turn around and drive down same pass in opposite direction. If vehicle does not follow same pass, measure offset distance and enter in an implement offset in SETUP - TRACKING - PAGE 2. (See SETUP - TRACKING - PAGE 2 in Setup section.) After initial calibration of TCM, it is not necessary to calibrate again unless TCM angle in relation to vehicle has changed. For example, tire pressure has been lowered on one side of vehicle causing vehicle angle in relation to ground to change.

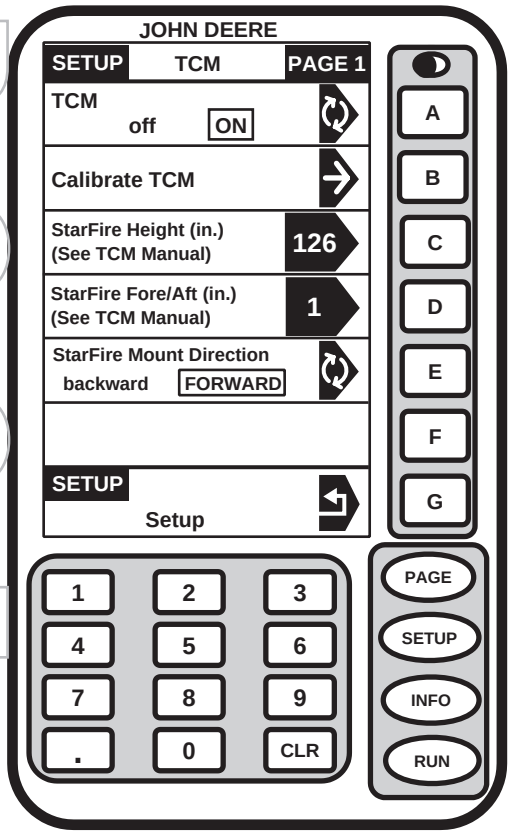


A—Skip
B—Overlap

Continued on next page

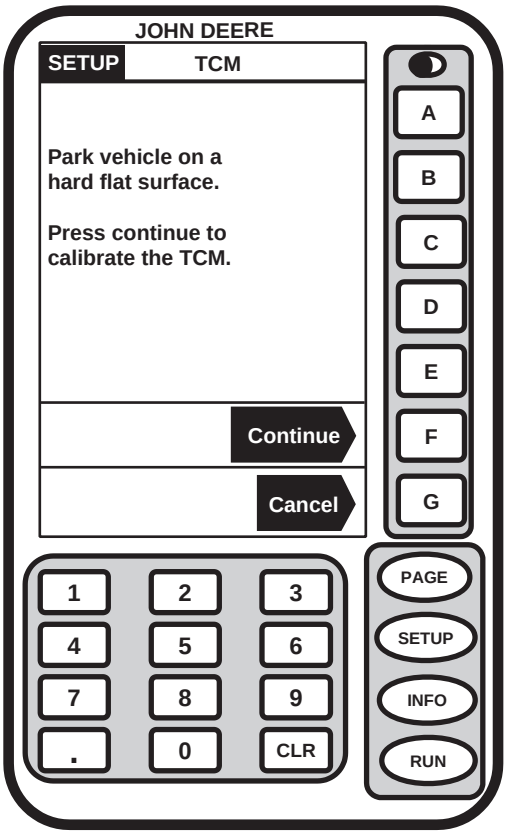
OUO6050,000121A –19–12AUG05–2/5

1. Press letter button next to CALIBRATE TCM.

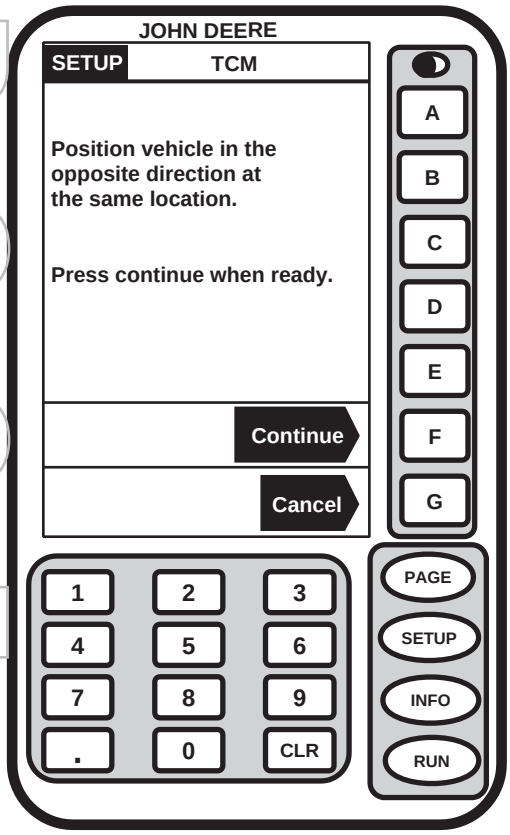


PC7548 –19–27MAR03

Continued on next page



PC7998 –19–11NOV03



PC8000 –19–11NOV03

2. Park vehicle is on a hard, level surface and come to a complete stop (cab is not rocking). Press letter button next to CONTINUE.

NOTE: While calibrating, TCM will provide a warning if it detects vehicle roll angle is greater than 10° relative to internal axis of TCM. If vehicle is on a level surface and yet warning is displayed, check mounting orientation of TCM and verify it is aligned within 10° of vehicle axis.

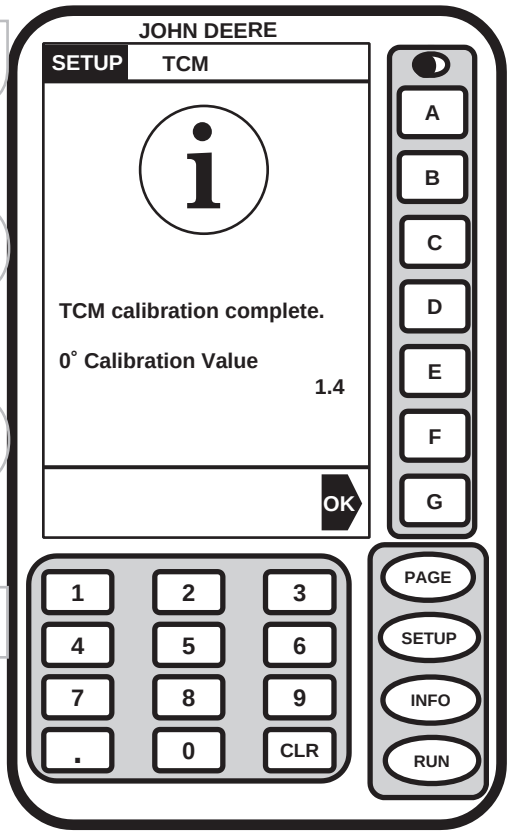
3. Turn vehicle 180° to face opposite direction. Ensuring that tires are in same location.

4. Ensure vehicle has come to a complete stop (cab is not rocking). Press letter button next to CONTINUE.

Continued on next page

5. Press letter button next to OK .

6. Once finished, a calibration value will be displayed. 0 degree calibration value is the difference between factory calibration value and actual calibration value which was just determined.



PC8001 –19–11NOV03

OUO6050,000121A –19–12AUG05–5/5

Height

IMPORTANT: Under or over compensation for vehicle roll angles will occur if height is incorrectly entered during setup (i.e. on a 10° slope with a receiver height error of 12 inches will result in a position offset of 2 inches on ground).

The factory default setting is 126. On some AutoTrac-equipped vehicles, height value will be automatically detected and entered during power up. Because this dimension is critical for proper operation of TCM and can vary due to vehicle configuration and tire sizes, operator should still measure actual distance to be entered each time TCM is installed on a different vehicle.

Height (A) is measured from ground to top of StarFire Dome.

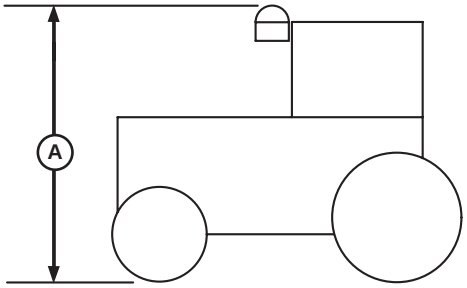
NOTE: Use chart below for example StarFire Height values.

Press letter button next to STARFIRE HEIGHT and enter receiver height using numeric keypad.

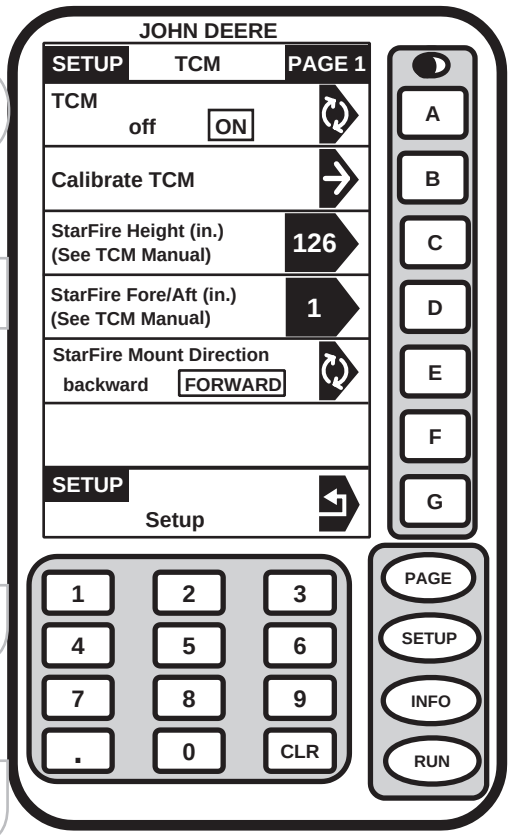
Press letter button next to STARFIRE HEIGHT to save entered height.

NOTE: Chart figures are approximate heights.

John Deere Vehicle	StarFire Height cm (in.)
6000 Series Tractors	280 cm (111 in.)
7000 Series Tractors	305 cm (120 in.)
8000 Series Tractors	320 cm (126 in.)
8000T Series Tractors	320 cm (126 in.)
9000 Series Tractors	361 cm (142 in.)
9000T Series Tractors	356 cm (140 in.)
4700 Series Sprayers	389 cm (153 in.)
4900 Series Sprayers	396 cm (156 in.)
Combine	396 cm (156 in.)



PC7673 –UN–22MAY03



PC7548 –19–27MAR03

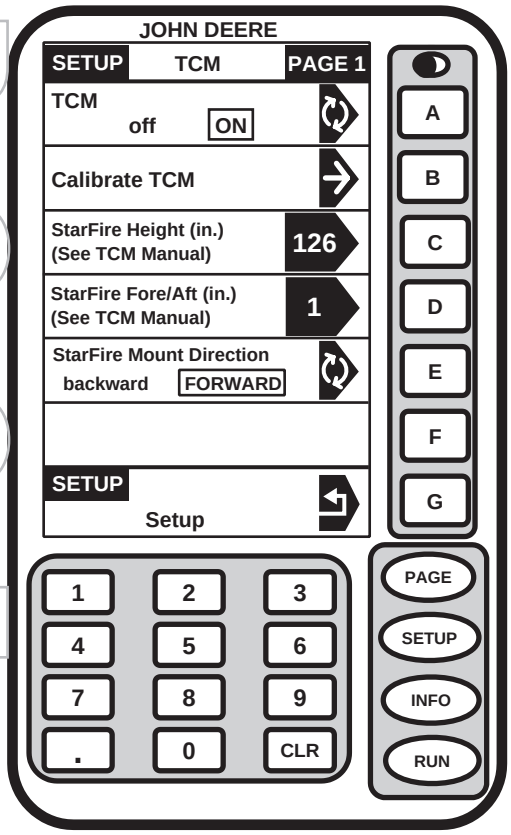
A—Height

Fore/Aft

NOTE: On some AutoTrac-equipped vehicles, fore/aft value will be automatically detected and entered during power up. If fore/aft value is shown **without** *black text box, it has been automatically detected and cannot be changed.*

If value is shown **with** *black text box, it must be entered manually. Perform following procedure to select and manually enter value. Use chart below to select Fore/Aft values if necessary.*

If using TCM for Parallel Tracking on a vehicle not listed in chart below, then enter 1 for fore/aft setting.



PC7548 –19–27MAR03

Press letter button next to STARFIRE FORE/AFT and enter Fore/Aft (in.) value using numeric keypad.

Press letter button next to STARFIRE FORE/AFT to save entered value.

Recommended StarFire Fore/Aft values For John Deere Vehicles	
John Deere Vehicle	**StarFire Fore/Aft cm (in.)**
6000 Series Tractors	75 cm (29 in.)
7000 Series Tractors	75 cm (29 in.)
8000 Series Tractors	75 cm (29 in.)
8000T Series Tractors	3 cm (1 in.)
9000 Series Tractors	-51 cm (-20 in.)
9000T Series Tractors	3 cm (1 in.)
4700 Series Sprayers	203 cm (80 in.)
4900 Series Sprayers	257 cm (101 in.)
Combine	140 cm (55 in.)

OUO6050,000121C –19–16OCT05–1/1

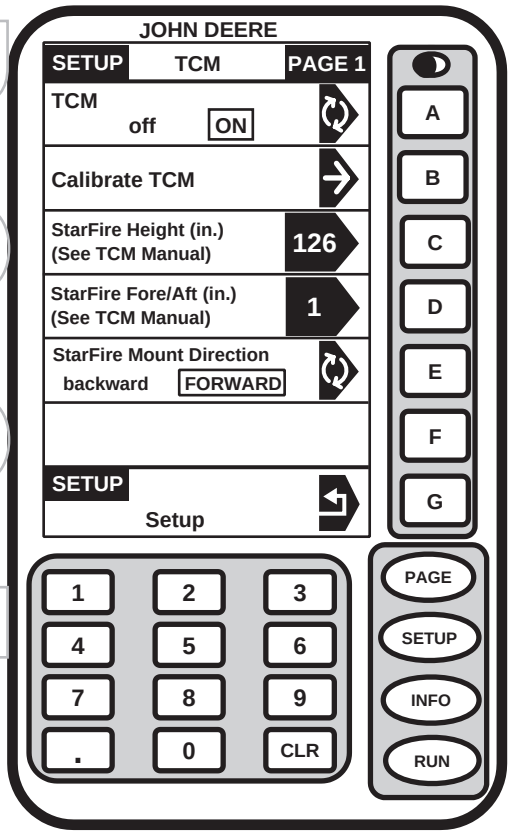
Mount Direction

NOTE: Mount direction is direction receiver is facing.

This setting defines mounting orientation of receiver. TCM uses this setting to determine correct direction of vehicle roll. A receiver that extends forward from attaching bracket in direction of vehicle travel is in **FORWARD** *mount direction.*

Desired selection will appear boxed and in capital letters.

Press letter button next to STARFIRE MOUNT DIRECTION and select desired mount direction, backward or forward.



PC7548 –19–27MAR03

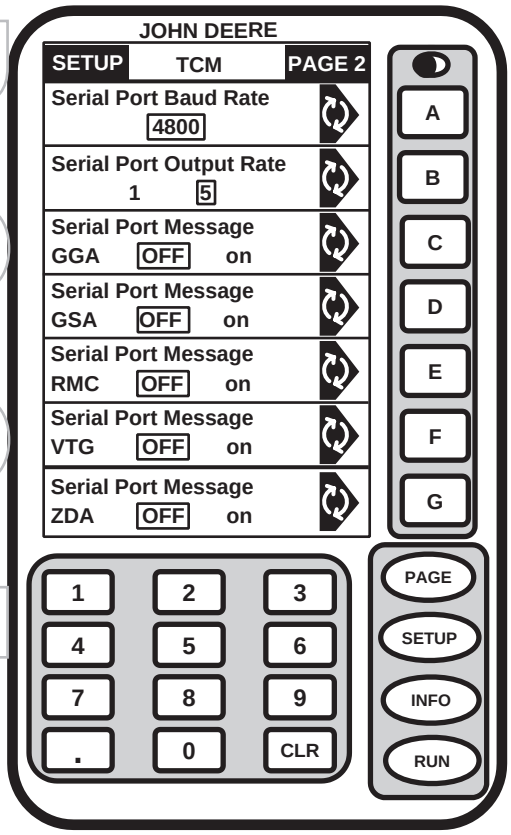
OUO6050,000121D –19–10OCT05–1/1

SETUP - TCM - PAGE 2

Press PAGE button on SETUP - TCM - PAGE 1 screen and SETUP - TCM - PAGE 2 screen will appear.

NOTE: These setting are only for NMEA serial port message for communication with **non-GreenStar systems**.

Press letter button next to desired cell button, toggle to desired selection.



PC7549 –19–27MAR03

OUO6050,000121E –19–12AUG05–1/1

Serial Port Baud Rate/Serial Port Messages

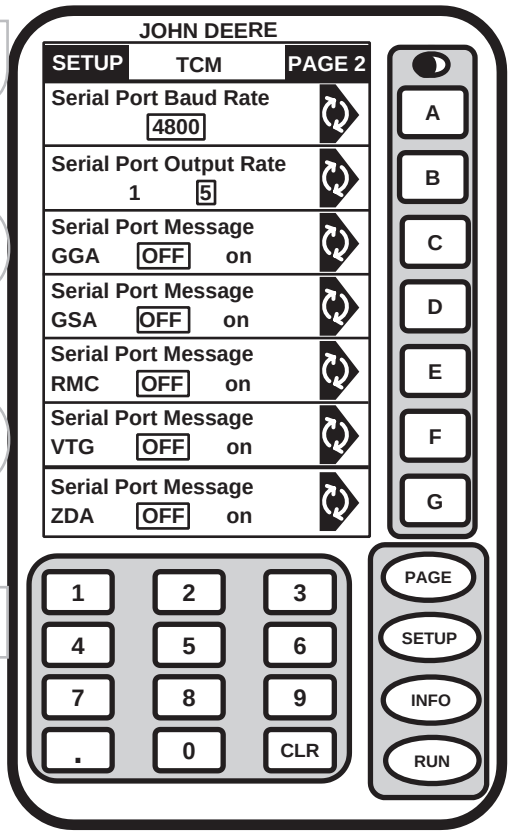
NOTE: Serial port baud output rates are: 4800, 9600, 19200 and 38400.

TCM is capable of sending NMEA messages on a serial port. This allows receiver and TCM to be used for applications other than GreenStar systems. Non-GreenStar system used will provide information as to settings required.

Press A button to change serial baud rate.

Press B and output rate will toggle from 1 to 5 Hz.

Press letter button next to desired SERIAL PORT MESSAGE to toggle between ON/OFF.



PC7549 –19–27MAR03

OUO6050,000121F –19–10OCT05–1/1

INFO - TCM - PAGE 1

Screen: INFO - TCM - PAGE 1

Press: INFO >> TCM

NOTE: INFO - TCM - PAGE 1 screens allows operator to only view information and status of TCM.

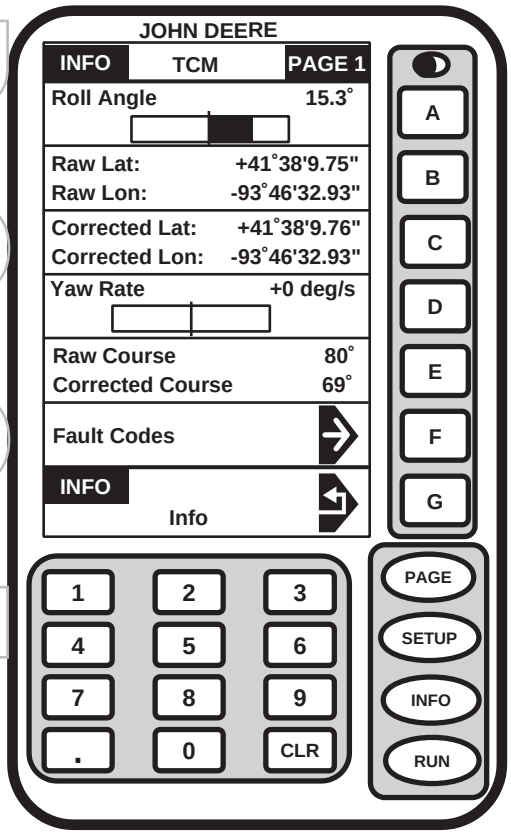
Roll Angle: Is both graphical and numerical representation of amount of roll TCM is measuring, relative to calibrated zero degree reference. A positive roll angle means vehicle is rolled to right.

Raw Lat and Raw Lon: This is latitude and longitude TCM is receiving from receiver.

Corrected Lat and Corrected Lon: This is latitude and longitude that TCM is sending to system, corrected for measured roll angle and receiver height setting.

Yaw Rate: This gives a graphic representation and a numeric figure for amount of rotation TCM is measuring. Positive yaw rate means vehicle is turning to right.

Raw Course and Corrected Course: Raw course is heading received from receiver. Corrected course is value sent to system, which has been corrected for vehicle dynamics of roll and yaw.



PC7553 –19–27MAR03

OUO6050,0001220 –19–12AUG05–1/1

INFO - TCM - PAGE 2

Screen: INFO - TCM - PAGE 2

Press: INFO >> TCM >> PAGE

Switched and Unswitched Voltage: Supply voltages powering TCM.

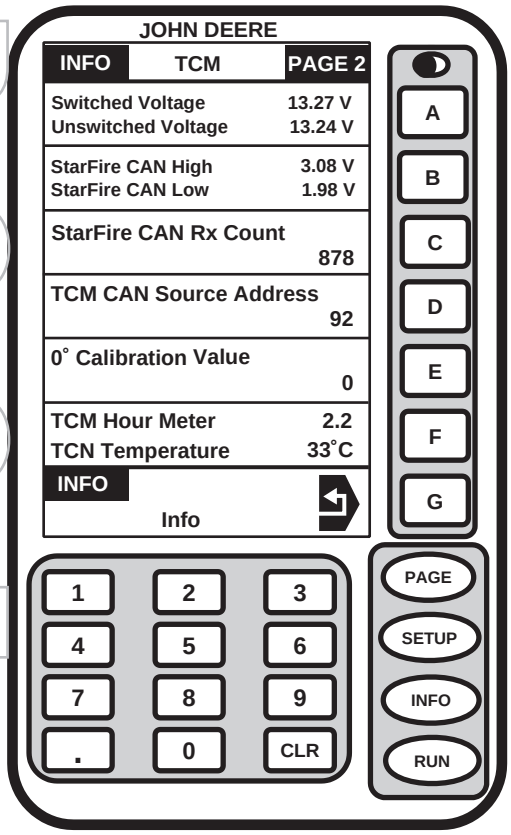
StarFire CAN High and Low: Voltages on CAN bus between TCM and receiver.

StarFire CAN Rx Count: Verifies proper communication from receiver.

TCM CAN Source Address: For factory use only.

0 Degree Calibration Value: Difference in calibration value from factory to last calibration on vehicle.

TCM Hour Meter and TCM Temperature: TCM Hour Meter is the number of hours on TCM. TCM Temperature is internal temperature inside TCM.



PC7555 –19–27MAR03

OUO6050,0001221 –19–12AUG05–1/1

INFO - TCM - PAGE 3

Screen: INFO - TCM - PAGE 3

Press: INFO >> TCM >> PAGE >> PAGE

Hardware Part #: Shows part number of TCM.

Hardware Serial #: Shows serial number of TCM.

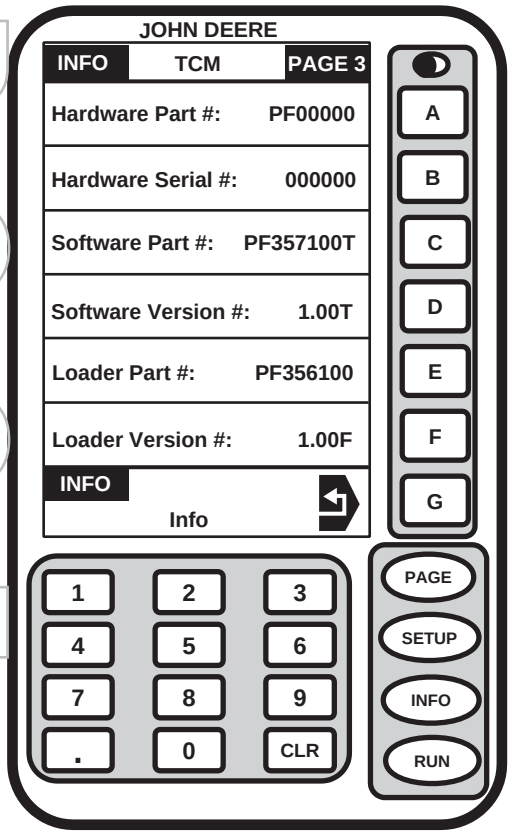
Software Part #: Shows software part number of TCM.

Software Version #: Shows version number of software loaded to TCM.

NOTE: To acquire latest version of software, call 1-888GRNSTAR, via internet www.stellarsupport.com or contact your John Deere dealer.

Loader Part #: Shows loader part number of TCM.

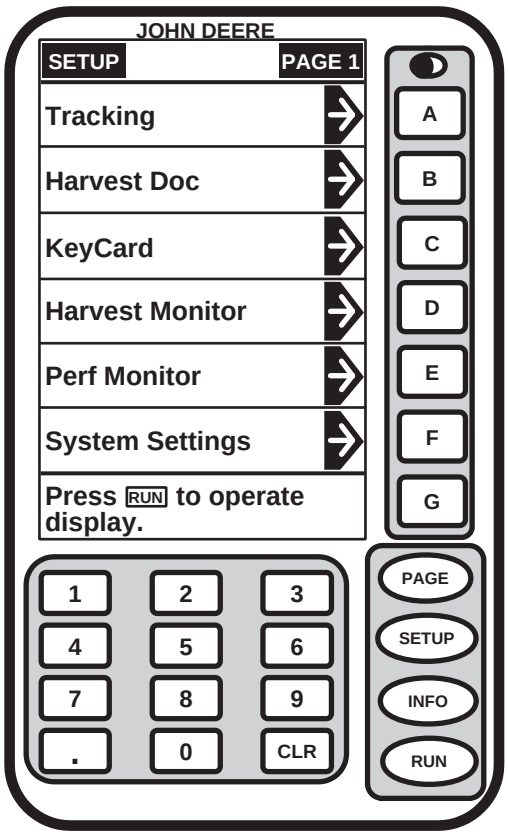
Loader Version #: Shows loader version number of TCM.



PC7556 –19–27MAR03

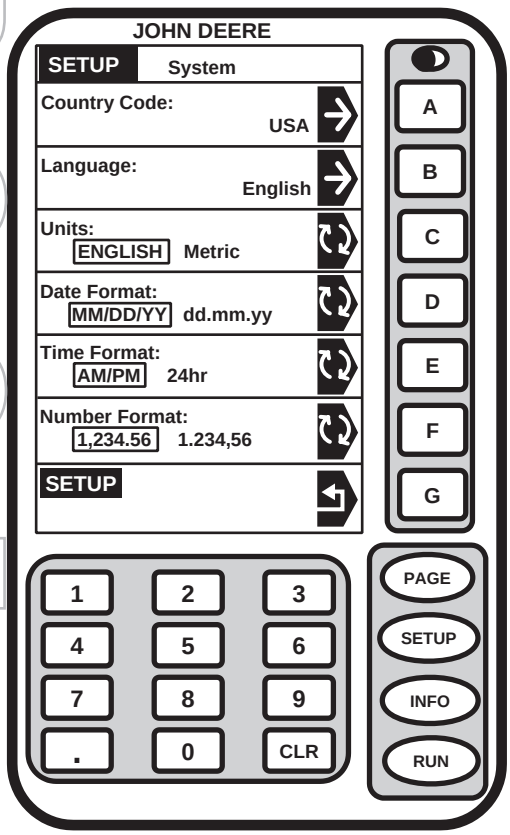
OUO6050,0001222 –19–12AUG05–1/1

Country Code



PC7725 –19–01JUL03

Screen: SETUP - SYSTEM



H70321 –19–16NOV01

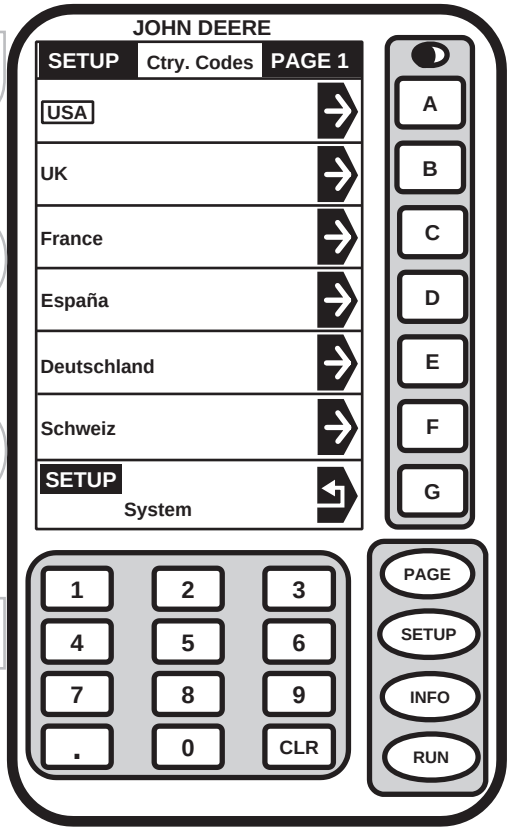
Press: SETUP >> SYSTEM SETTINGS

Continued on next page

Screen: SETUP - CTRY CODES - PAGE 1

Press: SETUP >> SYSTEM SETTINGS >> COUNTRY CODE

This screen shows the following countries that are currently available, with their default settings:



H70323 –19–15NOV01

Country	Language	Units	Date Format	Time Format	Number Format
USA	English	English	MM/DD/YY	AM/PM	1,234.56
UK	English	Metric	DD.MM.YY	AM/PM	1,234.56
France	French	Metric	JJ.MM.AA	24HR	1.234,56
Espana	Spanish	Metric	DD.MM.AA	24HR	1.234.56
Deutschland	German	Metric	TT.MM.JJ	24STD	1.234,56
Schweiz	German	Metric	TT.MM.JJ	24STD	1.234,56
Osterrich	German	Metric	TT.MM.JJ	24STD	1.234,56

If desired country does not appear press PAGE button to see additional countries.

Press letter button next to desired country.

Depending on which country is selected SETUP - SYSTEM screen will display default settings for each of the cells.

OUO6050,0001223 –19–12AUG05–2/2

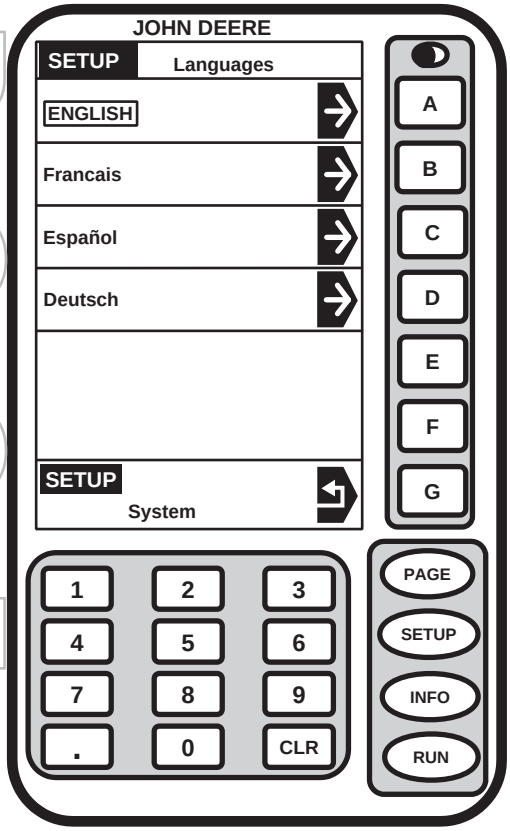
Language

NOTE: To select different language they must be first loaded on system (see Setup and Load a Language in this section).

Screen: SETUP - LANGUAGE

Press: SETUP >> SYSTEM SETTINGS >> LANGUAGE

Press letter button next to desired language.



H70322 –19–15NOV01

OUO6050,0001224 –19–12AUG05–1/1

Setup and Load Language

NOTE: Language can only be loaded from Harvest Doc, Field Doc, Auto Trac and Parallel Tracking.

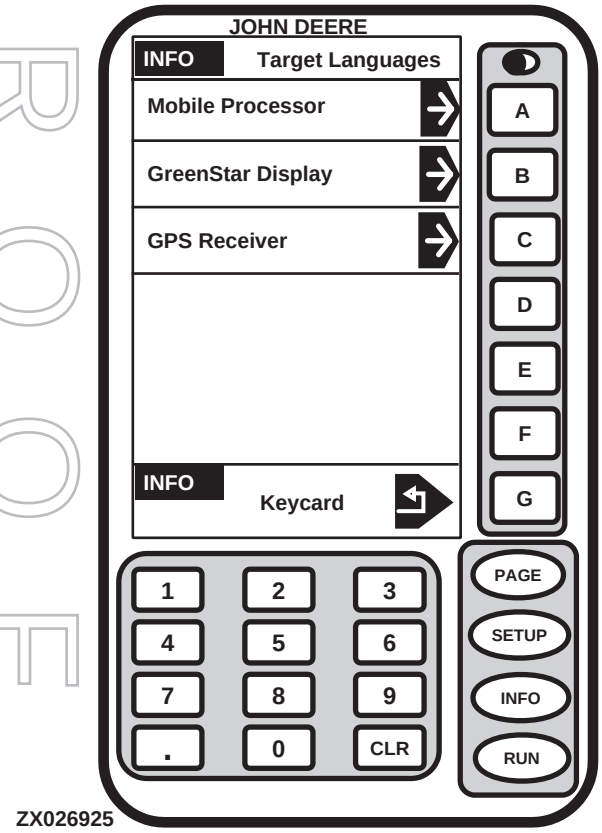
For this example Field Doc screens are used, selection procedures are the same for any system in use.

1. **Screen:** INFO - TARGET LANGUAGES

   Press: INFO >> KEYCARD >> TARGET LANGUAGES

   This screen allows operator to program a language to desired component (i.e. mobile processor). Press letter button next to desired component that you would like to program a language to. INFO - SELECT LANGUAGE screen will appear.

IMPORTANT: Each component (mobile processor, display and receiver) must be individually loaded with desired language.



ZX026925 –19–20DEC01

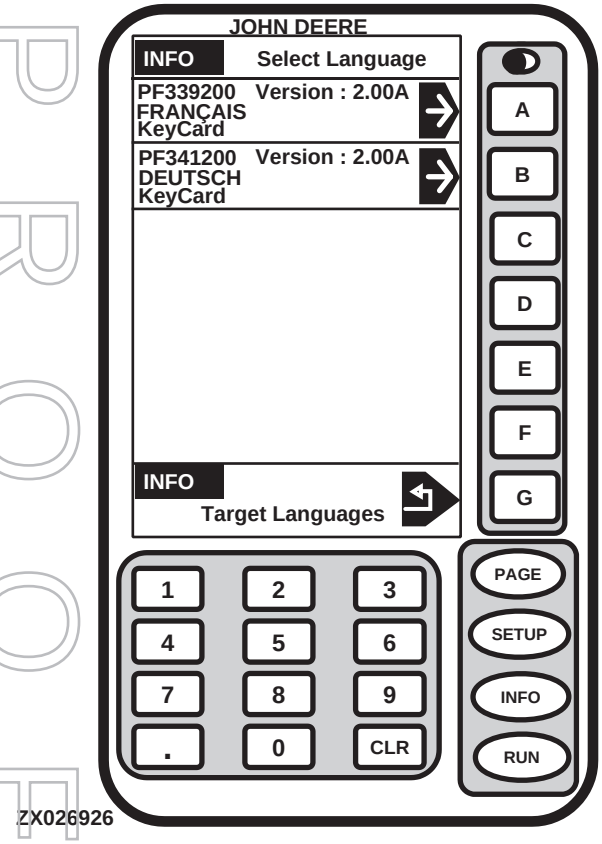
OUO6050,0001225 –19–12AUG05–1/4

2. Select language(s) you want to load (i.e. French).

NOTE: Warning screen will be displayed while programming a new language. DO NOT REMOVE PC CARD, DO NOT REMOVE POWER!

3. The display will show LANGUAGE SUCCESSFULLY LOADED. Press G button to load more than one language.

4. Repeat steps 1—6 to load languages onto additional components.



ZX026926 –19–20DEC01

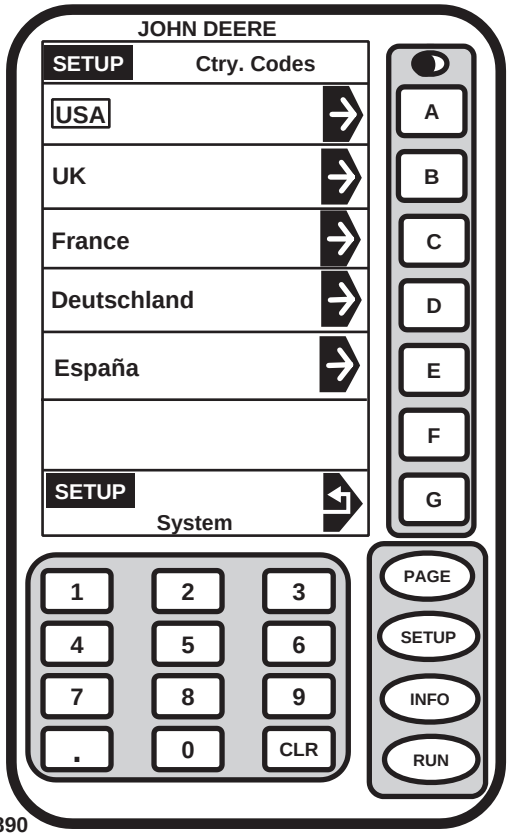
Continued on next page

OUO6050,0001225 –19–12AUG05–2/4

5. **Screen:** SETUP - COUNTRY CODE

   Press: SETUP >> SYSTEM SETTINGS >> COUNTRY CODE:

   Press letter button next to desired country.



ZX026890 –19–20DEC01

OUO6050,0001225 –19–12AUG05–3/4

NOTE: Language choice can affect date, time and number formats and units.

6. **Screen:** SETUP - LANGUAGES

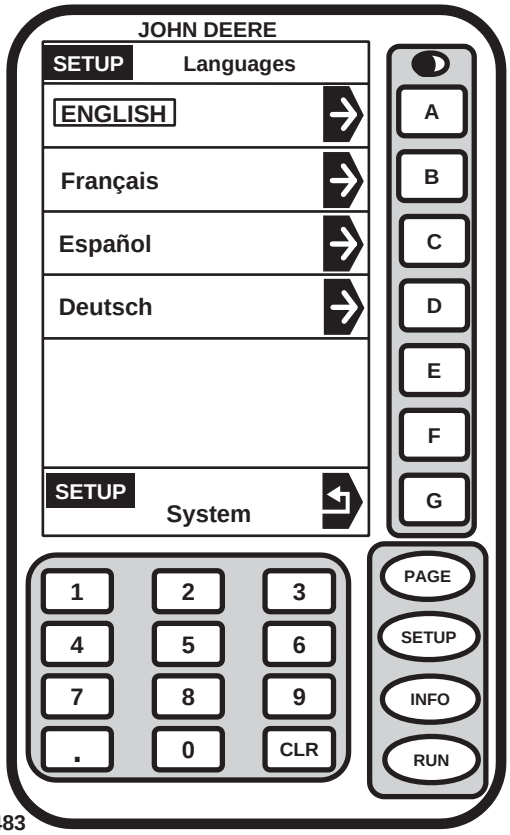
   Press: SETUP >> SYSTEM SETTINGS >> LANGUAGE:

   Press letter button next to desired language .

   If you choose a language that has not been loaded on component(s), a warning message ID233 will be displayed:

   THE FOLLOWING DEVICE(s) DO NOT SUPPORT THE SELECTED LANGUAGE. THEY WILL CONTINUE TO USE THE PREVIOUSLY SELECTED LANGUAGE

   Press CANCEL THIS MESSAGE button to load desired language to relevant component(s) as previously described.



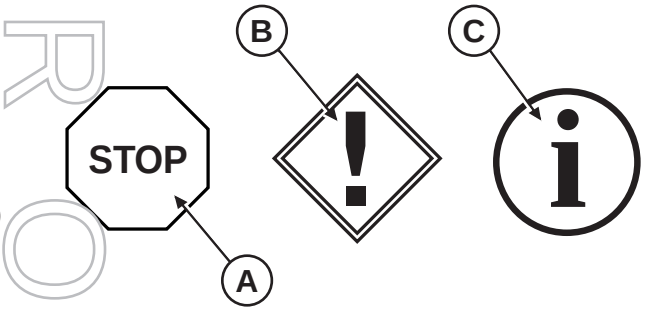
ZX027483 –19–20DEC01

OUO6050,0001225 –19–12AUG05–4/4

Warning Screens

Warning screens and alarms provide operator alerts to monitor system operational problems. Each screen displays a Diagnostic Trouble Code (DTC) on upper right corner (D), keyword strings (E) and text strings (F). (See DIAGNOSTIC TROUBLE CODE LISTS to get specific operational problem and recommended corrective action.)

Each diagnostic trouble code has a priority. Priority of diagnostic trouble code is given by relevant icon (A), (B) or (C) displayed:



ZX026095

ZX026095 –UN–19JUN01

- Icon (A) belongs to FULL PAGE CAUTION screens. Cautions are displayed at bottom of RUN screens or as a FULL screen if display is NOT on a RUN screen. Audible alarm will sound at highest level.

NOTE: When caution screen appears, corrective action must be taken before continuing operation.

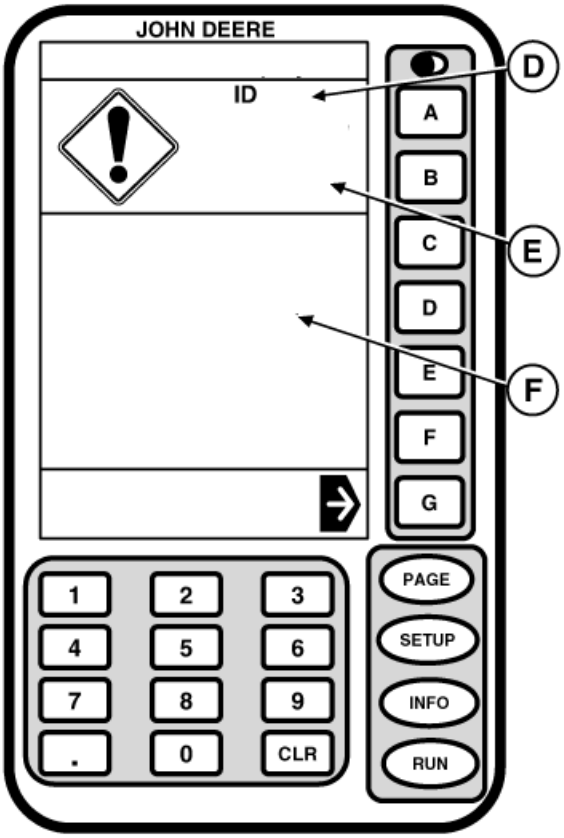
- Icon (B) belongs to FULL PAGE WARNING screens. A full page warning will override any other display function in progress.

NOTE: The RUN, SETUP, and INFO buttons will NOT be active during this display.

If a CAUTION or ADVISORY alarm is in progress when a FULL PAGE WARNING occurs, that alarm will be interrupted and FULL PAGE WARNING alarm will sound.

NOTE: When warning screen appears, corrective action should be taken before continuing operation.

- Icon (C) belongs to FULL PAGE INFO screens.



PC8757 –UN–08SEP05

A—Full page caution icon
B—Full page warning icon
C—Full page INFO icon
D—Diagnostic Trouble Code (DTC)
E—Keyword strings
F—Text strings

OUO6050,0001226 –19–12AUG05–1/1

Parallel Tracking Diagnostic Trouble Code List

Trouble Code	Key Word Strings	Text Strings	Description/Reason	Comments
100	PC Card Error	PC Data Card Error. An error has been detected. Error code is 02-02-00. Please check PC Card.	PC Data Card or KeyCard has a problem	Cycle power. If trouble code 100 appears again then contact your dealer
155	PC Card Warning	KeyCard has been removed. Please re-insert KeyCard.	KeyCard cannot be accessed by Mobile Processor	Check KeyCard insertion
200	CAN Bus Problem	The following Device(s) are no longer communicating with display. Check indicated device(s) and CAN bus wiring.	Communication problem between display and one or several other devices.	Contact your dealer
201	CAN Bus Problem	Two Devices are requesting same RUN screen section. Perform RUN PAGE LAYOUT to correct conflict.	Display conflict.	Perform RUN PAGE LAYOUT
210	CAN Bus Problem	Too many devices are attempting to communicate with display. Remove 1 or more devices.	Attempted to logon more than 8 devices to CAN bus.	Disconnect unnecessary device
211	CAN Bus Problem	CAN bus communications overload. Reset display or turn power off and then back on.	Display keys pushed too rapidly.	Cycle power
213	Internal error	A failure has been detected in display's internal memory.	Internal problem with display.	Cycle power. If trouble code 213 appears again then replace display.
220	Parallel Tracking Problem	Parallel tracking is not receiving data from GPS receiver. Check: 1. Position Receiver Connection 2. Wiring Harness	Loss of communication with position receiver.	Follow screen recommendations
221	Parallel Tracking Problem	The GPS is not able to acquire a differential correction signal.	Loss of differential.	Cycle power. If trouble code 221 appears again then contact your dealer
224	Parallel Tracking Problem	No Parallel Tracking key on KeyCard or no KeyCard present. Install KeyCard with Parallel Tracking key in Mobile Processor.	No KeyCard installed.	Follow screen recommendations
225	Parallel Tracking Problem	The GPS receiver must be set to report at 5Hz. rate. Confirm: 1. StarFire Receiver 2. License Level StarFire2	Tracking inaccurate	Follow screen recommendations
226	Parallel Tracking Problem	The GPS receiver has no GPS signal.	Loss of GPS.	Cycle power. If trouble code 226 appears again then contact your dealer
230	Display Address Change	You are about to change address of display. Selection of wrong address will cause loss of communication with implements.	Device address change.	Make sure to set Display to PRIMARY display address

Continued on next page

Trouble Code	Key Word Strings	Text Strings	Description/Reason	Comments
232	CAN Bus Problem	No Primary GreenStar Display detected. All systems require a primary display.	Wrong Display address used (i.e. AUX1).	Set Display to PRIMARY display address
233	Language Selection Problem	The following device(s) do not support selected language. They will continue to use previously selected language.	The system shows which component(s) do not have language loaded that is selected.	Load all necessary languages to each component of system, then select desired system language
259	KeyCard Warning	Product re-programming Error. A PRP file specified in a BIN file is missing on card.	Program error while programming from Parallel Tracking system to Yield Mapping System using SETUP/KeyCard/YIELD MAPPING sequence.	Use INFO/KeyCard/PROG. TARGET sequence to reprogrammed system to Yield Mapping
301	Warning	StarFire Network Problem. Please stand by.	Receiver is not receiving correction messages from StarFire network.	Contact your dealer
302	Warning	Receiver Not Receiving on Alternate Frequency.	The receiver is not locked onto a differential signal	Switch to default frequency
303	Warning	GPS Corrections License has Expired.	License should be renewed	Renew license or use grace periods, if available
304	Warning	Corrected GPS Position is not Available.	Differential correction has been lost	Wait until differential correction has been recovered
305	Warning	GPS Position is not Available.	Signal is lost	Wait until signal has been recovered
306	Warning	Update StarFire GPS Software. Please stand by.	New StarFire software loading process	Wait until programming has completed

OUO6050,0001227 –19–13OCT05–2/2

Display Diagnostic Trouble Code List

Trouble Code	Problem	Description/Reason	Comments
20	Implement disconnected.	A previously logged on implement has been disconnected from CAN bus.	Check all component connectors for proper engagement.
21	Display conflict.	An implement has attempted to write to a RUN page display section it has not previously been allocated.	Make a RUN Page Layout
30	Too many devices on CAN bus.	Attempted to logon more than 8 implements to CAN bus.	Disconnect unnecessary implements.
31	Display overload.	Display keys pushed too rapidly.	Cycle power.
33	Memory failure.	Internal problem with display.	Cycle power. If trouble code 33 appears again then replace display.
40	No GPS Communication	Loss of communication with position receiver.	Check connection with position receiver. Contact your dealer.
41	No GPS Differential	Loss of differential signal.	Contact you dealer.
44	No KeyCard Installed	No KeyCard installed in mobile processor	Insert a KeyCard in mobile processor.
45	1 Hz GPS Operation	1 Hz GPS Operation	
46	No GPS Signal	Position receiver is not receiving a GPS signal.	Signal has been lost or position receiver is not functioning. Make sure position receiver is not blocked.
47	Display is not functioning	Device address has been changed.	See you dealer.
48		Device Address changed	Set device address to auto.
49		No primary display address on CAN Bus.	Set display address to primary.
50	No SSU Communication	Loss of CCD Communication to steering controller	See you dealer.
51		Operator alertness check.	
52		More than one display with a primary address on bus	Set parallel tracking display to auxiliary.
53		An AUX address detected CCD active. CCD should only be active on primary display.	See your dealer.
54		Auto-detect layer disagrees with user selected CAN layer.	Set display CAN Bus layer to auto.
60	Flash Erase failed.	An erase of Curve track memory failed	See your dealer.
61	Flash write failed	A write to Curve track memory failed	See your dealer.
110	CAN bus problem.	Communication problem with CAN bus.	Check CAN bus wiring harness and terminators. Contact your dealer.
111	CCD bus problem.	CCD bus hardware/wiring errors.	Check CCD wiring between digital tach and display. Contact your dealer
112	Display conflict RUN Page Layout.	Two or more devices are requesting same screen allocation.	Make a RUN Page Layout

Continued on next page

Trouble Code	Problem	Description/Reason	Comments
115	CAN bus address conflict	Two or more devices are requesting same CAN address.	See your dealer.
126	AutoTrac disabled.	Using a version of mobile processor application code that is not using secure CAN.	See your dealer.

OUO6050,0001228 –19–07SEP05–2/2

Display

Symptom	Problem	Solution
Display is blank.	No power.	Check harness connections at display.
	Out of contrast or insufficient backlighting.	Adjust contrast.
		Change backlighting level.
Display audible alarm does not sound.	Possible failed alarm.	See your John Deere dealer.
Display is locked up on a certain page.	Communication problem.	Turn key switch OFF and ON.
Dual display will not operate properly.	Incorrect display address.	Make sure Parallel Tracking display is set to auxiliary 1 and main display is set to primary.
		If using a single display make sure address is set to primary.
Parallel Tracking system is slow or sluggish.	Incorrect update rate.	Make sure receiver is set to 5 Hz.
Display does not work properly.	Incorrect display software.	See your John Deere dealer for display upgrade kit PF90091.

OUO6050,0001229 –19–12AUG05–1/1

Mobile Processor

Symptom	Problem	Solution
KeyCard will not fit in slot.	KeyCard is backward.	Align arrow on KeyCard with arrow on mobile processor.
System locks up during re-programming.	Incorrect message from display.	Turn key switch off. Disconnect wiring harness from mobile processor. Turn key switch on and reconnect mobile processor wiring harness.
		re-programming should continue.

OUO6050,000122A –19–12AUG05–1/1

Position Receiver

Symptom	Problem	Solution
No differential correction.	Differential license has expired.	Contact GreenStar software support.
		To acquire latest version of software call 1-888GRNSTAR, or via Internet at www.stellarsupport.com or contact your John Deere dealer.
	Interference with two-way radio.	Relocate two-way radio antenna at least 2 meters (6.5 ft.) from position receiver.

OUO6050,000122B –19–12AUG05–1/1

AutoTrac Universal

Symptom	Problem	Solution
Tractor turns right or left unexpectedly when the resume switch is pressed and the vehicle is already lined up on the line.	Encoder out of range when wheels are pointed forward	With front wheels pointed forward encoder should be +/- 500. Drive forward with wheels pointed straight ahead until encoder is in limit.
ATU disengages	Anti-rotation device too tight – causing misalignment of ATU with the steering shaft.	Re-position ATU so it slides easily on steering shaft then adjust anti-rotation device
	Steering Wheel speed too high on a vehicle with high steering resistance.	Lower Steering wheel speed
	Looseness or rotation in the Steering console	Insert shims to take out tolerance in Steering console
	Steering Wheel turns hard after ATU installed.	Lubricate Steering Shaft where it goes through console
	Disengagement force set too low for a vehicle with high steering resistance.	Set disengagement force setting from normal to high.
ATU unstable when entering track	Acquire sensitivity too high	Decrease acquire sensitivity
ATU takes too long to enter next track	Acquire sensitivity too low	Increase acquire sensitivity

Continued on next page

Symptom	Problem	Solution
ATU constantly weaves in the row (Erratic steering)	StarFire Height or Fore-Aft not properly set	Enter correct StarFire Height and Fore-Aft dimension
	StarFire Receiver not in front of or even with Fixed Axle (Even with or Behind for Articulated)	Position StarFire in front of or even with Fixed Axle (Even with or Behind for Articulated)
	On-line sensitivity too high	Decrease On-Line Sensitivity
	StarFire mount direction in SETUP different from actual mount direction	Correctly match TCM SETUP mount direction to actual mount direction
	Too much play in steering mechanism	Check steering cylinder bushing; tie rod ends, etc. for proper tolerance.
	ATU did not establish direction correctly	Drive forward at a speed greater than 1 mph and turn steering wheel greater than 45 degrees
	Looseness or rotation in the Steering console	Insert shims to take out tolerance in Steering console
	Loose Soil	Add Ballast
ATU drives too far off line when in row	On-line sensitivity too low	Increase on-line sensitivity
AutoTrac Universal won't engage. AutoTrac will not resume.	Stop Code encountered	See list of stop codes to find issue
AutoTrac Universal does not appear on INFO or SETUP screens	System not recognizing AutoTrac Universal on CAN bus line	Ensure AutoTrac Universal is connected to GreenStar Harness and receiving power
		Check for blown fuses in ATU wiring harness
Direction can not be determined	Old TCM Software	Update TCM Software to newest software (Version 1.08 or greater)
	No differential Correction	Establish differential correction
	No GPS	Establish signal

OUO6050,0001492 –19–18OCT05–2/2

AutoTrac Universal Stop Codes

Stop Code	Description	Solution
None	Nothing has been checked yet	
Steering Wheel	Steering wheel has moved to disengage AutoTrac	Press resume switch to re-engage AutoTrac
Too Slow	Vehicle speed too slow to use AutoTrac	Increase speed over .5 km/h (.3 mph)
Too Fast	Vehicle Speed too high to use AutoTrac	Reduce Speed below platform limit Tractor - 30 km/h (18.6 mph) Sprayer - 37 km/h (23 mph) Combine - 22 km/h (13.7 mph) Reverse speed on all machines – 10 km/h (6 mph)
Unknown Direction	Unknown direction	Drive forward greater than 1.6 km/h (1 mph) and turn steering wheel greater than 45°
Track Changed	Track number changed	Align vehicle on desired track and press resume
Lost Dual GPS	SF1, SF2, or RTK signal was lost	Establish signal
SSU Error	A SSU fault severe enough to disable AutoTrac	Cycle power on the ATU unit and the GSD
OK	Last state upgrade was successful	
No GSD	Bad GSD messages.	Cycle power on GSD to try and establish communication
PT Turned Off	Tracking not turned on.	Turn tracking on in set up AutoTrac
No KeyCard	AutoTrac Keycard or AutoTrac Key missing.	Insert AutoTrac KeyCard
Heading Error	Heading error is out of range.	Align tractor within heading limit (80° of track)
Lateral Error	Lateral error is out of range.	Align tractor within lateral limit (40% of track spacing)
No Operator	Operator presence switch is open.	Operator in seat or press resume for activity monitor to reset time
No TCM	Either no TCM present or TCM is turned off.	Turn TCM on, or install TCM
Voltage Unstable	Voltage Too Low	Check harnessing
Reverse Timeout	Reverse Timeout (greater than 45 seconds)	Cycle direction forward before resuming in reverse
0 Speed Timeout	0 Speed Timeout	Increase speed greater then 0.5 km/h (0.3mph)
Curvature	Curve Track radius tighter than AutoTrac will allow	Manually drive through tight radius curves

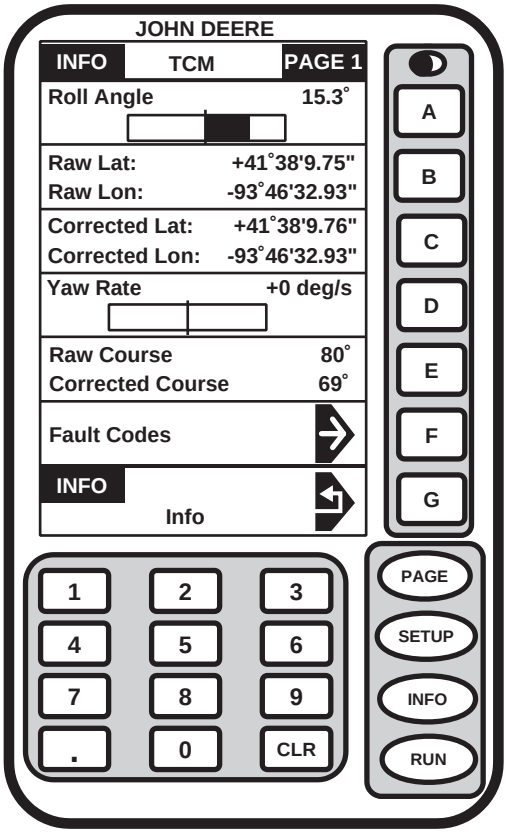
OUO6050,0001478 –19–16OCT05–1/1

Troubleshooting—TCM on Original StarFire Receiver

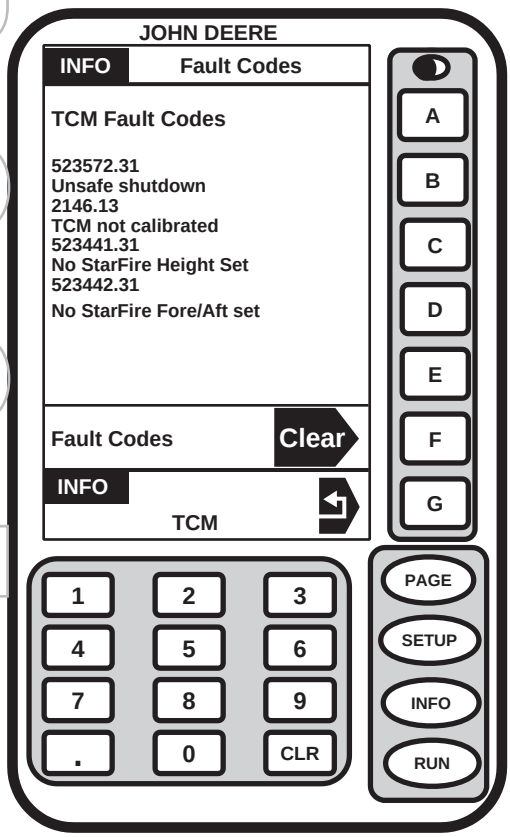
Symptom	Problem	Solution
Guidance system is inaccurate or unstable.	The problem may be with TCM or with other guidance components.	Go to SETUP - TCM screen to turn TCM on and off to determine if problem is related to TCM. If problem is related to TCM, see below for other troubleshooting suggestions.
Navigation position is always offset left or right.	TCM is not calibrated for vehicle zero degree roll angle.	Go to SETUP - TCM screen to calibrate.
	Receiver is not mounted on centerline of vehicle.	Check Offsets feature. (See SETUP - TRACKING - PAGE 2 in Setup section.)
	Implement is not centered behind tractor.	Check Offsets feature. (See SETUP - TRACKING - PAGE 2 in Setup section.)
The measured roll angle is in wrong direction.	StarFire Mount Direction is not set correctly.	Go to SETUP - TCM screen and verify StarFire Mount Direction is correct. On most vehicles, receiver is mounted in FORWARD position.
Navigation position is inaccurate through bumps or quickly changing terrain.	StarFire Height is not set correctly.	Go to SETUP - TCM screen and verify StarFire Height setting is correct.
	StarFire Fore/Aft is not set correctly.	Go to SETUP - TCM screen and verify Fore/Aft setting is correct for that vehicle. Refer to Operators Manual section on Fore/Aft setting.

OUO6050,000122C –19–12AUG05–1/1

Fault Codes—TCM on Original StarFire Receiver



PC7553 –19–27MAR03



PC7554 –19–27MAR03

Screen: INFO - FAULT CODES

Press: INFO >> TCM >> FAULT CODES

This screen displays fault codes generated by TCM since last time they were cleared.

Fault Codes are used for troubleshooting purposes. (See Troubleshooting section in this manual for complete listing of fault codes.)

Press F button to clear codes.

OUO6050,000122D –19–12AUG05–1/1

Fault Codes

IMPORTANT: To determine if fault code conditions are still active, manually clear all fault codes and see if any fault codes appear.

Stored fault codes indicate that a problem has been detected. Stored fault codes will remain in memory until they are cleared by operator. It is possible that fault condition is no longer active.

Continued on next page

Fault Code	Description	Problem	Solution
523319.18	Low switched voltage	TCM detected low voltage on key switched power supply.	Check battery voltage, check grounds, check harness. Contact dealer if problem persists.
523792.18	Low unswitched voltage	TCM has detected low voltage on unswitched battery power supply.	Check battery voltage, check grounds, check harness. Contact dealer if problem persists.
523792.1	No unswitched voltage	TCM has detected no voltage on unswitched battery power supply. TCM is unable to save setup changes when key is turned off.	Check battery voltage, check grounds, check fuses. Contact your John Deere dealer.
2028.12	No StarFire communication	The TCM has lost communication with receiver	Check TCM harness to ensure proper connection between receiver and TCM. Check CAN voltages. Contact your John Deere dealer.
523773.3	StarFire CAN voltage out of range	StarFire CAN High signal voltage is out of range high.	Check TCM harness to ensure proper connection between receiver and TCM. Check CAN STARFIRE voltages. Contact your John Deere dealer.
523773.4	StarFire CAN voltage out of range	StarFire CAN High signal voltage is out of range low.	Check TCM harness to ensure proper connection between Receiver and TCM. Check CAN voltages. Contact your John Deere dealer.
523774.3	StarFire CAN voltage out of range	StarFire CAN Low signal voltage is out of range high.	Check TCM harness to ensure proper connection between receiver and TCM. Check CAN voltages. Contact dealer.
523774.4	StarFire CAN voltage out of range	StarFire CAN Low signal voltage is out of range low.	Check TCM harness to ensure proper connection between receiver and TCM. Check CAN voltage. Contact your John Deere dealer.
956.16	Roll Sensor out of range	Internal Roll Sensor is out of normal operating range. TCM cannot correct position for roll angles.	Contact your John Deere dealer.
2146.14	Temp Sensor out of range	Internal Temperature Sensor is out of normal operating range.	Contact your John Deere dealer.
523309.7	Yaw Sensor not responding	Internal Yaw Sensor is not responding. TCM cannot compensate for terrain changes.	Contact your John Deere dealer.
523309.16	Yaw Sensor out of range	Internal Yaw Sensor is out of normal operating range. TCM cannot compensate for terrain changes.	Contact your John Deere dealer.
523310.2	Memory Error	An internal memory error has occurred.	Contact your John Deere dealer.

Continued on next page

523442.31	No Fore/Aft setting	Fore/Aft setting has not been entered for this vehicle. Go to SETUP - TCM screen.	See FORE/AFT in TCM or StarFire iTC section..
523441.31	No StarFire Height setting	The StarFire Height setting has not been entered for this vehicle. Go to SETUP - TCM screen.	See HEIGHT in TCM or StarFire iTC section..
2146.13	TCM not calibrated	TCM has not been calibrated for this vehicle. Please go to SETUP - TCM screen to calibrate.	See CALIBRATE in TCM or StarFire iTC section..
523572.31	Unsafe Shutdown-parameters not stored	TCM was unable to save setup changes when key was turned off. Must have unswitched battery voltage after key off to save changes.	Check battery voltage at TCM with key off, check harness. Contact John Deere dealer.

OUO6050,000122E –19–12AUG05–3/3

Warning Screens

Warning Screens

Warning screens and alarms alert operator to monitor system operational problems.

NOTE: When a warning screen appears, corrective action should be taken before continuing operation.

Warning and alarms will NOT prevent machine from starting, operating or recording data.

Each warning screen displays a specific operational problem and recommended corrective action.

Full Page Warning Screens

NOTE: The RUN, SETUP, and INFO keys will not be active during this display.

Full page warning will override any other display function in progress.

Audible alarm will sound at highest level. If a CAUTION or ADVISORY alarm is in progress when a full page warning occurs, that alarm will be interrupted and full page warning alarm will sound.

Full Page Caution Screens

Cautions are displayed at bottom of RUN screens or as a full screen if not a RUN screen.

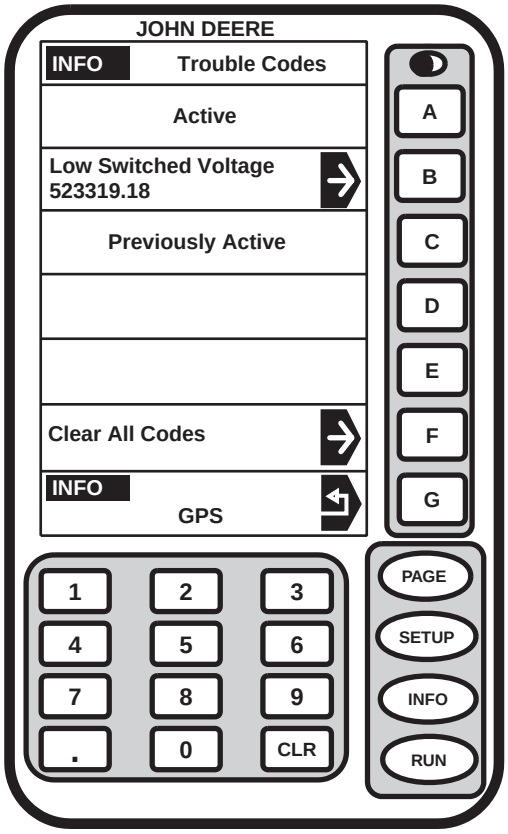
Symptom	Problem	Solution
KeyCard error warning screen.	Mobile processor does not recognize KeyCard in slot.	Verify that KeyCard is securely in slot (black eject button should be popped up).
Communication problem warning screen.	Data network communication problem.	Cycle power, if problem persists see your John Deere dealer.
Program not found warning screen.	Programs are not found on KeyCard.	Verify that programs are in correct directory on KeyCard.
No communication screen.	Position receiver communication problem.	Check all connections indicated on screen.

Continued on next page

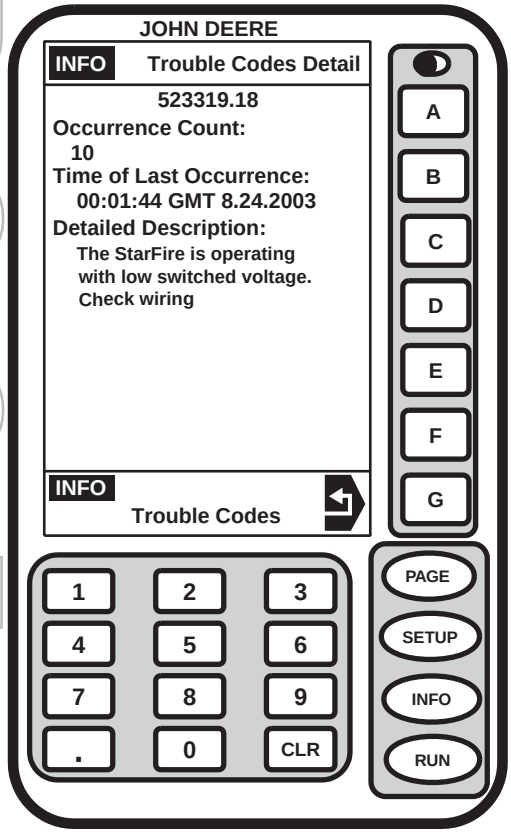
Symptom	Problem	Solution
		Cycle power, if problem persists see your John Deere dealer.
Battery voltage low.	Battery voltage too low at mobile processor.	Check battery voltage. Check machine fuses. Replace as needed. If problem persists, see your John Deere dealer.
Battery voltage low at mobile processor.	Battery voltage too low.	Check battery voltage. Check machine fuses. Replace as needed. Check system ground. If problem persists, see your John Deere dealer.

OUO6050,000122F –19–12AUG05–2/2

Fault Codes—StarFire iTC



INFO - TROUBLE CODES



INFO - TROUBLE CODE DETAIL

Screen: INFO - TROUBLE CODE DETAIL

Press: INFO >> STARFIRE RECEIVER >> PAGE >> DIAGNOSTIC TROUBLE CODES

NOTE: INFO - TROUBLE CODES screen displays fault codes generated by TCM and receiver since last time they were cleared.

Fault Codes are used for troubleshooting purposes, see Troubleshooting section in this manual for complete listing of fault codes.

Press F button to clear codes.

IMPORTANT: To determine if fault code conditions are still active, manually clear all fault codes and see if any fault codes appear.

Stored fault codes indicate that a problem has been detected. Stored fault codes will remain in memory until they are cleared by operator. It is possible that fault condition is no longer active.

Continued on next page

Fault Code	Description	Problem	Solution
523319.18	Low switched voltage	low voltage on key switched power supply.	Check battery voltage, check grounds, check harness. Contact dealer if problem persists.
523792.18	Low unswitched voltage	TCM has detected low voltage on unswitched battery power supply.	Check battery voltage, check grounds, check harness. Contact dealer if problem persists.
523792.1	No unswitched voltage	TCM has detected no voltage on unswitched battery power supply. TCM is unable to save setup changes when key is turned off.	Check battery voltage, check grounds, check fuses. Contact your John Deere dealer.
2028.12	No STARFIRE communication	TCM has lost communication with STARFIRE receiver	Check TCM harness to ensure proper connection between STARFIRE Receiver and TCM. Check CAN voltages. Contact your John Deere dealer.
523773.3	StarFire CAN voltage out of range	StarFire CAN High signal voltage is out of range high.	Check TCM harness to ensure proper connection between STARFIRE Receiver and TCM. Check CAN STARFIRE voltages. Contact your John Deere dealer.
523773.4	StarFire CAN voltage out of range	StarFire CAN High signal voltage is out of range low.	Check TCM harness to ensure proper connection between Receiver and TCM. Check CAN voltages. Contact your John Deere dealer.
523774.3	StarFire CAN voltage out of range	StarFire CAN Low signal voltage is out of range high.	Check TCM harness to ensure proper connection between STARFIRE Receiver and TCM. Check CAN voltages. Contact dealer.
523774.4	StarFire CAN voltage out of range	StarFire CAN Low signal voltage is out of range low.	Check TCM harness to ensure proper connection between STARFIRE Receiver and TCM. Check CAN voltage. Contact your John Deere dealer.
956.16	Roll Sensor out of range	Internal Roll Sensor is out of normal operating range. TCM cannot correct position for roll angles.	Contact your John Deere dealer.
2146.14	Temp Sensor out of range	Internal Temperature Sensor is out of normal operating range.	Contact your John Deere dealer.
523309.7	Yaw Sensor not responding	Internal Yaw Sensor is not responding. TCM cannot compensate for terrain changes.	Contact your John Deere dealer.
523309.16	Yaw Sensor out of range	Internal Yaw Sensor is out of normal operating range. TCM cannot compensate for terrain changes.	Contact your John Deere dealer.

Continued on next page

523310.2	Memory Error	An internal memory error has occurred.	Contact your John Deere dealer.
523442.31	No StarFire Fore/Aft setting	StarFire Fore/Aft setting has not been entered for this vehicle. Please go to SETUP TCM.	See FORE/AFT in TCM or StarFire iTC section..
523441.31	No StarFire Height setting	StarFire Height setting has not been entered for this vehicle. Go to SETUP TCM.	See HEIGHT in TCM or StarFire iTC section..
2146.13	TCM not calibrated	TCM has not been calibrated for this vehicle. Please go to SETUP TCM to calibrate.	See Calibrating in TCM or StarFire iTC section..
523572.31	Unsafe Shutdown-parameters not stored	TCM was unable to save SETUP changes when key was turned off. Must have unswitched battery voltage after key off to save changes.	Check battery voltage at TCM with key off, check harness. Contact John Deere dealer.

OUO6050,0001230 –19–12AUG05–3/3

Diagnostic Trouble Codes—StarFire iTC

SPN.FMI	SPN Name FMI Description	Tractor Warning Light Level 1 Text
523442.3	antenna location (X axis) (523442) Not Available or Condition Exists (31)	Info No StarFire Fore/Aft Set
523441.3	antenna location (Z axis) (523441) Not Available or Condition Exists (31)	Info No StarFire Height Dimension
523773.3	CAN High line (523773) Voltage Above Normal, or Shorted to High Source (3)	No Lamp CAN HI voltage too high
523773.4	CAN High line (523773) Voltage Below Normal, or Shorted to Low Source (4)	No Lamp
523774.3	CAN Low line (523774) Voltage Above Normal, or Shorted to High Source (3)	No Lamp CAN LO voltage too high
523774.4	CAN Low line (523774) Voltage Below Normal, or Shorted to Low Source (4)	No Lamp CAN HI voltage too low
2854.31	Communications Carrier (2854) Not Available or Condition Exists (31)	No Lamp RTK Rover loss of radio link
232.2	DGPS Differential Correction (232) Data Erratic, Intermittent or Incorrect (2)	Info Corrected GPS position is not available
232.14	DGPS Differential Correction (232) Special Instructions (14)	NA RTK Extend will be lost in # minutes
523572.3	ECU power shutdown error (523572) Not Available or Condition Exists (31)	Info Unsafe Shutdown - parameters not stored
523792.2	ECU Power Supply Voltage #1 (523792) Data Valid but Below Normal Operating Range - Moderately Severe Level (18)	Info Low Unswitched Voltage
523319.2	ECU Power Supply Voltage #1, Switched (523319) Data Valid but Below Normal Operating Range - Moderately Severe Level (18)	Info Low Switched Voltage
168.18	Electrical Potential (Voltage) (168) Data Valid but Below Normal Operating Range - Moderately Severe Level (18)	NA RTK Base Station Low Voltage
841.31	Global Positioning System (GPS) (841) Not Available or Condition Exists (31)	Service Alert Signal interference (from jammer)
522339.3	GPS differential corrections license (522339) Not Available or Condition Exists (31)	Info GPS corrections license has expired
522552.1	Navigation Bus 1 (522552) Root Cause not Known (11)	Service Alert StarFire Network Problem
701558.2	Navigational system position data (701558) Data Erratic, Intermittent or Incorrect (2)	Info GPS position is not available
523310.2	Non-volatile memory read/write (523310) Data Erratic, Intermittent or Incorrect (2)	Info Non-volatile Memory Read/Write Failure
524210.2	Number of Satellites Visible (524210) Data Valid but Above Normal Operating Range - Moderately Severe Level (16)	No Lamp RTK Base Station not using visible satellites
522338.1	Receiver secondary differential correction source (522338) Out of Calibration (13)	Service Alert Receiver not receiving on alternate frequency

Continued on next page

SPN.FMI	SPN Name FMI Description	Tractor Warning Light Level 1 Text
956.16	Rollover Sensor (956) Data Valid but Above Normal Operating Range - Moderately Severe Level (16)	Service Alert Roll Accelerometer out of range
524257.1	RTK base station location (524257) Special Instructions (14)	No Lamp RTK Base Station Position Survey in progress
524257.2	RTK base station location (524257) Data Valid but Above Normal Operating Range - Moderately Severe Level (16)	Service Alert RTK Base Station relocation
524209.2	RTK Rover relative distance (524209) Data Valid but Above Normal Operating Range - Moderately Severe Level (16)	No Lamp RTK Rover too far from Base Station
2146.13	Source Address 146 (2146) Out of Calibration (13)	Info TCM not calibrated
2146.14	Source Address 146 (2146) Special Instructions (14)	Service Alert Temp sensor out of range
523309.7	Yaw Gyro (523309) Mechanical System not Responding or Out of Adjustment (7)	Service Alert Yaw Gyro not responding
523309.2	Yaw Gyro (523309) Data Valid but Above Normal Operating Range - Moderately Severe Level (16)	Service Alert Yaw Gyro out of range

OUO6050,0001231 –19–12AUG05–2/2

TCM—StarFire iTC

Symptom	Problem	Solution
Guidance system is inaccurate or unstable.	Problem may be with TCM or with other guidance components.	Go to SETUP TCM to turn TCM ON and OFF to determine if problem is related to TCM. If problem is related to TCM, see below for other troubleshooting suggestions.
Navigation position is always offset left or right.	TCM is not calibrated for vehicle zero degree roll angle.	Go to SETUP TCM screen to calibrate.
	Receiver is not mounted on centerline of vehicle.	Check Receiver Offset feature. (See SETUP - TRACKING - PAGE 2 in Setup section.).
	Implement is not centered behind tractor.	Check Implement Offset feature. (See SETUP - TRACKING - PAGE 2 in Setup section.).
Measured roll angle is in wrong direction.	StarFire Mount Direction is not set correctly.	Go to SETUP TCM and verify StarFire Mount Direction is correct. On most vehicles, receiver is mounted in FORWARD position.
Navigation position is inaccurate through bumps or quickly changing terrain.	StarFire Height is not set correctly.	Go to SETUP TCM and verify StarFire Height setting is correct.
	StarFire Fore/Aft is not set correctly.	Go to SETUP TCM and verify StarFire Fore/Aft setting is correct for that vehicle. Refer to Operators Manual section on Fore/Aft setting.

OUO6050,0001232 –19–12AUG05–1/1

Warning Screens—StarFire iTC

NOTE: Pressing E will suppress warning screen until power is cycled.

Warning screen ID 304 will appear if differential correction has been lost.

Warning screen ID 305 appears if signal is lost.

Press letter button next to DO NOT WARN AGAIN to turn warning off.

Press letter button next to OK to continue. Warning will repeat every 5—10 minutes.

Warning screen ID 302 is to alert user that receiver is not locked onto a differential signal and that it should be locked onto a different signal.

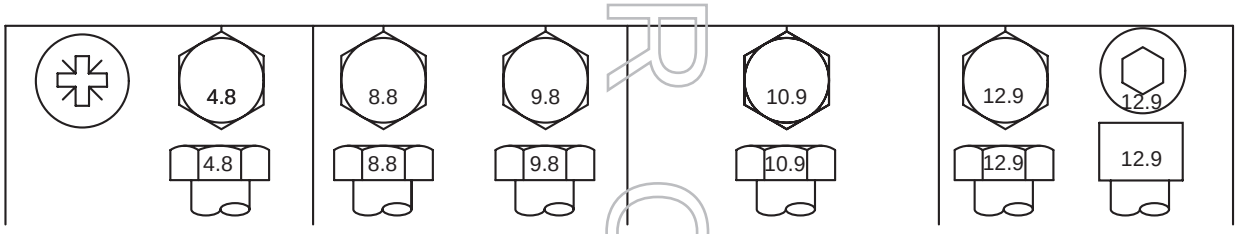
Warning screen ID 301 will appear if receiver is not receiving corrections messages from STARFIRE network (idle packets only). Position receiver will not function properly if it is not receiving correction messages from STARFIRE network. This condition will be corrected as soon as possible by STARFIRE network personnel.

Press letter button next to OK to continue.

IMPORTANT: This warning screen indicates a problem with STARFIRE satellite network. No action needs to be taken by operator.

OUO6050,0001233 –19–10OCT05–1/1

Metric Bolt and Screw Torque Values



TS1670 –UN–01MAY03

Bolt or	Class 4.8				Class 8.8 or 9.8				Class 10.9				Class 12.9			
Screw	Lubricated[a]		Dry[b]		Lubricated[a]		Dry[b]		Lubricated[a]		Dry[b]		Lubricated[a]		Dry[b]	
Size	N•m	lb-in	N•m	lb-in	N•m	lb-in	N•m	lb-in	N•m	lb-in	N•m	lb-in	N•m	lb-in	N•m	lb-in
M6	4.7	42	6	53	8.9	79	11.3	100	13	115	16.5	146	15.5	137	19.5	172
									N•m	lb-ft	N•m	lb-ft	N•m	lb-ft	N•m	lb-ft
M8	11.5	102	14.5	128	22	194	27.5	243	32	23.5	40	29.5	37	27.5	47	35
			N•m	lb-ft	N•m	lb-ft	N•m	lb-ft								
M10	23	204	29	21	43	32	55	40	63	46	80	59	75	55	95	70
	N•m	lb-ft														
M12	40	29.5	50	37	75	55	95	70	110	80	140	105	130	95	165	120
M14	63	46	80	59	120	88	150	110	175	130	220	165	205	150	260	190
M16	100	74	125	92	190	140	240	175	275	200	350	255	320	235	400	300
M18	135	100	170	125	265	195	330	245	375	275	475	350	440	325	560	410
M20	190	140	245	180	375	275	475	350	530	390	675	500	625	460	790	580
M22	265	195	330	245	510	375	650	480	725	535	920	680	850	625	1080	800
M24	330	245	425	315	650	480	820	600	920	680	1150	850	1080	800	1350	1000
M27	490	360	625	460	950	700	1200	885	1350	1000	1700	1250	1580	1160	2000	1475
M30	660	490	850	625	1290	950	1630	1200	1850	1350	2300	1700	2140	1580	2700	2000
M33	900	665	1150	850	1750	1300	2200	1625	2500	1850	3150	2325	2900	2150	3700	2730
M36	1150	850	1450	1075	2250	1650	2850	2100	3200	2350	4050	3000	3750	2770	4750	3500

Torque values listed are for general use only, based on the strength of the bolt or screw. DO NOT use these values if a different torque value or tightening procedure is given for a specific application. For stainless steel fasteners or for nuts on U-bolts, see the tightening instructions for the specific application. Tighten plastic insert or crimped steel type lock nuts by turning the nut to the dry torque shown in the chart, unless different instructions are given for the specific application.

Shear bolts are designed to fail under predetermined loads. Always replace shear bolts with identical property class. Replace fasteners with the same or higher property class. If higher property class fasteners are used, tighten these to the strength of the original. Make sure fastener threads are clean and that you properly start thread engagement. When possible, lubricate plain or zinc plated fasteners other than lock nuts, wheel bolts or wheel nuts, unless different instructions are given for the specific application.

[a] "Lubricated" means coated with a lubricant such as engine oil, fasteners with phosphate and oil coatings, or M20 and larger fasteners with JDM F13C zinc flake coating.

[b] "Dry" means plain or zinc plated without any lubrication, or M6 to M18 fasteners with JDM F13B zinc flake coating.

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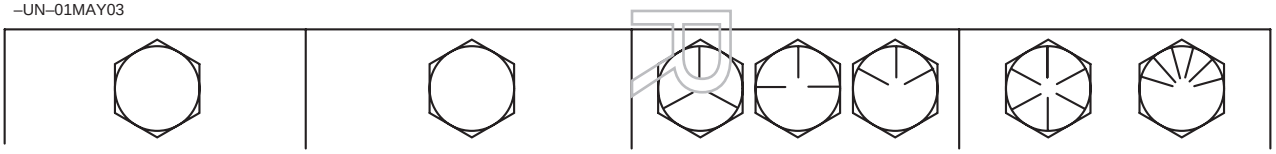
Unified Inch Bolt and Screw Torque Values

TS1671 –UN–01MAY03



Bolt or	SAE Grade 1				SAE Grade 2[a]				SAE Grade 5, 5.1 or 5.2				SAE Grade 8 or 8.2			
Screw	Lubricated[b]		Dry[c]		Lubricated[b]		Dry[c]		Lubricated[b]		Dry[c]		Lubricated[b]		Dry[c]	
Size	N•m	lb-in	N•m	lb-in	N•m	lb-in	N•m	lb-in	N•m	lb-in	N•m	lb-in	N•m	lb-in	N•m	lb-in
1/4	3.7	33	4.7	42	6	53	7.5	66	9.5	84	12	106	13.5	120	17	150
													N•m	lb-ft	N•m	lb-ft
5/16	7.7	68	9.8	86	12	106	15.5	137	19.5	172	25	221	28	20.5	35	26
									N•m	lb-ft	N•m	lb-ft				
3/8	13.5	120	17.5	155	22	194	27	240	35	26	44	32.5	49	36	63	46
			N•m	lb-ft	N•m	lb-ft	N•m	lb-ft								
7/16	22	194	28	20.5	35	26	44	32.5	56	41	70	52	80	59	100	74
	N•m	lb-ft														
1/2	34	25	42	31	53	39	67	49	85	63	110	80	120	88	155	115
9/16	48	35.5	60	45	76	56	95	70	125	92	155	115	175	130	220	165
5/8	67	49	85	63	105	77	135	100	170	125	215	160	240	175	305	225
3/4	120	88	150	110	190	140	240	175	300	220	380	280	425	315	540	400
7/8	190	140	240	175	190	140	240	175	490	360	615	455	690	510	870	640
1	285	210	360	265	285	210	360	265	730	540	920	680	1030	760	1300	960
1-1/8	400	300	510	375	400	300	510	375	910	670	1150	850	1450	1075	1850	1350
1-1/4	570	420	725	535	570	420	725	535	1280	945	1630	1200	2050	1500	2600	1920
1-3/8	750	550	950	700	750	550	950	700	1700	1250	2140	1580	2700	2000	3400	2500
1-1/2	990	730	1250	930	990	730	1250	930	2250	1650	2850	2100	3600	2650	4550	3350

Torque values listed are for general use only, based on the strength of the bolt or screw. DO NOT use these values if a different torque value or tightening procedure is given for a specific application. For plastic insert or crimped steel type lock nuts, for stainless steel fasteners, or for nuts on U-bolts, see the tightening instructions for the specific application. Shear bolts are designed to fail under predetermined loads. Always replace shear bolts with identical grade.

Replace fasteners with the same or higher grade. If higher grade fasteners are used, tighten these to the strength of the original. Make sure fastener threads are clean and that you properly start thread engagement. When possible, lubricate plain or zinc plated fasteners other than lock nuts, wheel bolts or wheel nuts, unless different instructions are given for the specific application.

[a]Grade 2 applies for hex cap screws (not hex bolts) up to 6. in (152 mm) long. Grade 1 applies for hex cap screws over 6 in. (152 mm) long, and for all other types of bolts and screws of any length.

[b]"Lubricated" means coated with a lubricant such as engine oil, fasteners with phosphate and oil coatings, or 7/8 in. and larger fasteners with JDM F13C zinc flake coating.

[c]"Dry" means plain or zinc plated without any lubrication, or 1/4 to 3/4 in. fasteners with JDM F13B zinc flake coating.

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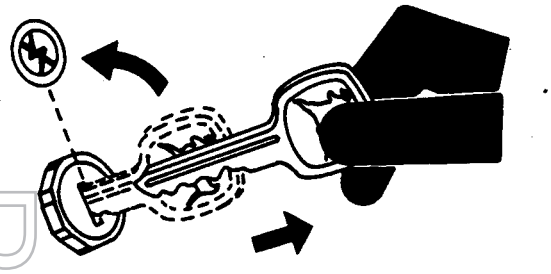
Keep Proof of Ownership

1. Maintain in a secure location an up-to-date inventory of all product and component serial numbers.
2. Regularly verify that identification plates have not been removed. Report any evidence of tampering to law enforcement agencies and order duplicate plates.
3. Other steps you can take:
   - Mark your machine with your own numbering system
   - Take color photographs from several angles of each machine

DX,SECURE1 –19–18NOV03–1/1

Keep Machines Secure

1. Install vandal-proof devices.
2. When machine is in storage:
   - Lower equipment to the ground
   - Set wheels to widest position to make loading more difficult
   - Remove any keys and batteries
3. When parking indoors, put large equipment in front of exits and lock your storage buildings.
4. When parking outdoors, store in a well-lighted and fenced area.
5. Make note of suspicious activity and report any thefts immediately to law enforcement agencies.
6. Notify your John Deere dealer of any losses.



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John Deere Service Literature Available

Technical Information

Technical information can be purchased from John Deere. Some of this information is available in electronic media, such as CD-ROM disks, and in printed form. There are many ways to order. Contact your John Deere dealer. Call **1-800-522-7448** to order using a credit card. Search online from http://www.JohnDeere.com. Please have available the model number, serial number, and name of the product.

Available information includes:

- PARTS CATALOGS list service parts available for your machine with exploded view illustrations to help you identify the correct parts. It is also useful in assembling and disassembling.
- OPERATOR'S MANUALS providing safety, operating, maintenance, and service information. These manuals and safety signs on your machine may also be available in other languages.
- OPERATOR'S VIDEO TAPES showing highlights of safety, operating, maintenance, and service information. These tapes may be available in multiple languages and formats.
- TECHNICAL MANUALS outlining service information for your machine. Included are specifications, illustrated assembly and disassembly procedures, hydraulic oil flow diagrams, and wiring diagrams. Some products have separate manuals for repair and diagnostic information. Some components, such as engines, are available in separate component technical manuals
- FUNDAMENTAL MANUALS detailing basic information regardless of manufacturer:
  - Agricultural Primer series covers technology in farming and ranching, featuring subjects like computers, the Internet, and precision farming.
  - Farm Business Management series examines "real-world" problems and offers practical solutions in the areas of marketing, financing, equipment selection, and compliance.
  - Fundamentals of Services manuals show you how to repair and maintain off-road equipment.

TS189 –UN–17JAN89

TS191 –UN–02DEC88

TS224 –UN–17JAN89

TS1663 –UN–10OCT97

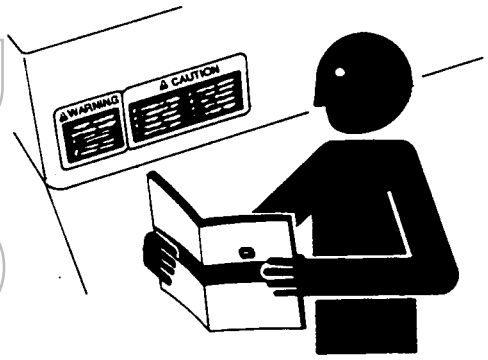
Continued on next page

– Fundamentals of Machine Operation manuals explain machine capacities and adjustments, how to improve machine performance, and how to eliminate unnecessary field operations.

DX,SERVLIT –19–31JUL03–2/2

John Deere Service Keeps You On Job

John Deere Is At Your Service



TS201 –UN–23AUG88

CUSTOMER SATISFACTION is important to John Deere.

Our dealers strive to provide you with prompt, efficient parts and service:

–Maintenance and service parts to support your equipment.

–Trained service technicians and the necessary diagnostic and repair tools to service your equipment.

CUSTOMER SATISFACTION PROBLEM RESOLUTION PROCESS

Your John Deere dealer is dedicated to supporting your equipment and resolving any problem you may experience.

1. When contacting your dealer, be prepared with the following information:

–Machine model and product identification number

–Date of purchase

–Nature of problem

2. Discuss problem with dealer service manager.

3. If unable to resolve, explain problem to dealership manager and request assistance.

4. If you have a persistent problem your dealership is unable to resolve, ask your dealer to contact John Deere for assistance.

5. If a problem is not resolved to your satisfaction, contact the Ag Customer Assistance Center at 1-866-99DEERE (866-993-3373) or e-mail us at agriculture@johndeere.com.

DX,IBC,2 –19–02APR02–1/1