



4050 Directional Drill

Software Versions A–D

Model No. 23898—Serial No. 316000001 and Up

Model No. 23899—Serial No. 316000001 and Up

Read this information carefully to learn how to operate and maintain your product properly and to avoid injury and product damage. You are responsible for operating the product properly and safely.

Visit www.Toro.com for product safety and operation training materials, accessory information, help finding a dealer, or to register your product.

Joysticks

4-Button Joysticks

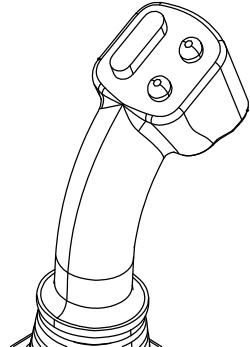


Figure 1

g290345

8 or 9-Button Joysticks

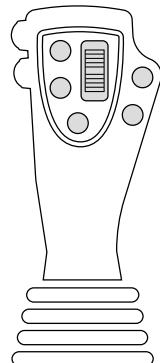
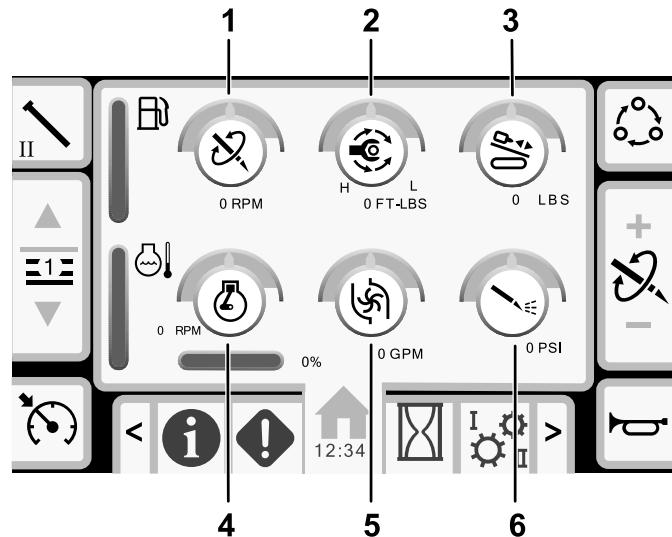


Figure 2

g290344

Main Information Screen

This is the first screen that appears after the initial splash screen. To navigate between screens, use the left and right arrows.



g287717

Figure 3

1. Drill speed (rpm)	4. Engine speed (rpm)
2. Rotary torque	5. Drilling-fluid flow rate
3. Thrust force	6. Drilling-fluid / Air-hammer pressure



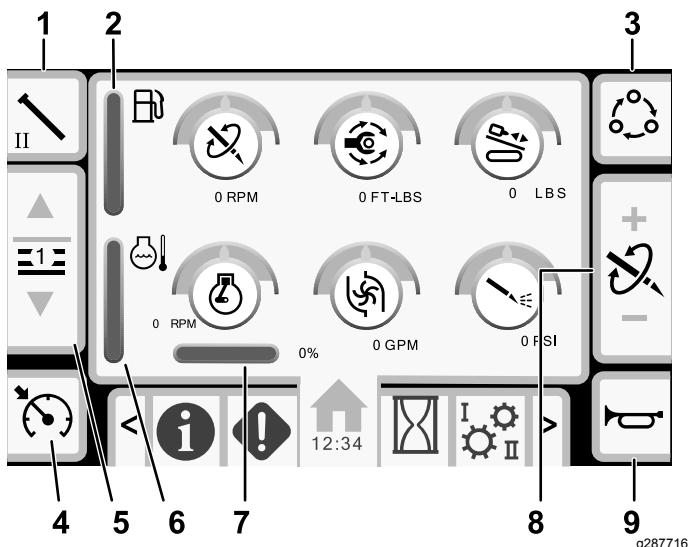


Figure 4

1. Pipe functions
2. Fuel gauge
3. Limit setting options
4. Cruise option
5. Select pipe row
6. Engine temperature gauge
7. Engine droop
8. Thrust force, drill speed (rpm), or rotary torque adjustment
9. Horn

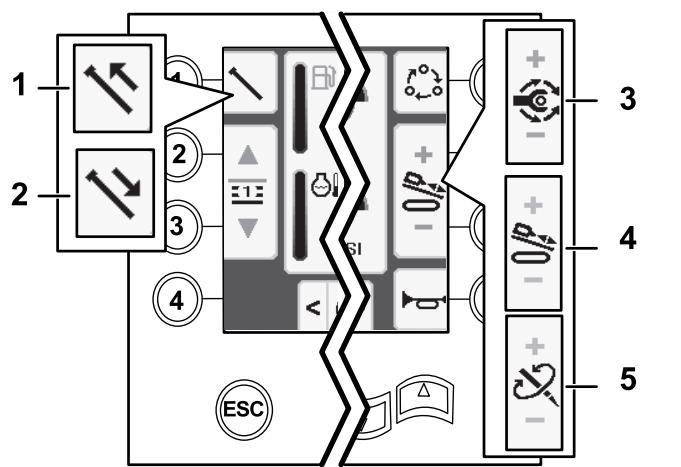


Figure 5

1. Pull pipe
2. Push pipe
3. Rotary torque
4. Thrust force
5. Drill speed (rpm)

Go to the [Mud or Air Hammer Selection Screen \(page 15\)](#) to switch between mud pressure and air hammer functions.

Push button 1 to switch between the pipe functions pull pipe, push pipe, and neutral.

Push button 4 to go to the cruise screen.

Push button 5 to switch between thrust force, drill speed (rpm), and rotary torque limits.

Use buttons 6 and 7 to set the limits for maximum drill speed (rpm), rotary torque, and thrust force.

- Thrust force: Change the thrust force limit by pushing 6 or 7.
- Drill speed (rpm): Change the drill speed rpm limit by pushing 6 or 7.
- Rotary torque: Change the rotary torque limit force by pushing 6 or 7.

Cruise Mode and Screen

Software version Rev D and up.



Cruise mode is identified by this icon:

Cruise mode provides hands-free operation for rotary and thrust, set by the operator.

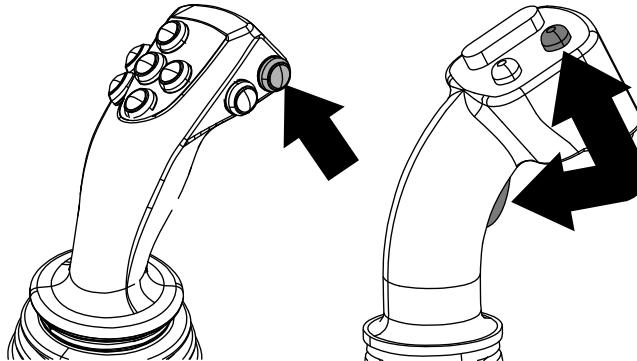
Note: Use Cruise mode for pull back only. Using cruise mode in thrust could cause damage.

You can only use cruise mode with clockwise functions.

Accessing the Cruise Screen

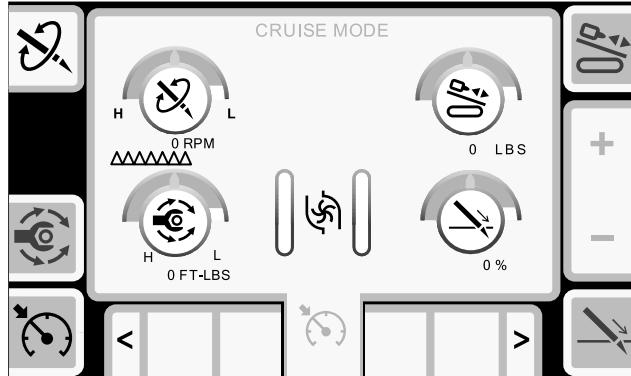
Push the cruise button on the joystick (Figure 6) or push button 4 on the home screen to access the cruise screen.

Note: For the 4-button joystick, push the trigger and top button together.



g290320

Figure 6



g290322

Figure 7
Cruise Mode Screen

Activating Cruise

1. If necessary, set the machine limits; refer to the [Main Information Screen \(page 1\)](#).
2. Hold the joystick(s) in the active position for the amount of thrust and rotation speed you want and push the cruise button on the joystick (Figure 6).

Once set, use the cruise screen to adjust the settings (Figure 7).

1. Push buttons 1, 3, 5, or 8 to select the setting to adjust.

Note: The icon will turn green and a green circle will highlight the option you select (Figure 8).

2. Push button 6 or 7 to increase or decrease the value of the selected setting.

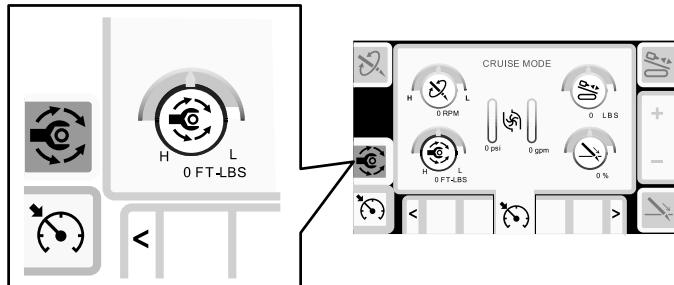


Figure 8

The following table describes the function values affected when another function is given priority.

The priority is the function with the highest value, not the value selected in the screen.

All values are dependent on the available engine horse power.

Button	Priority	Icon	Description
1	Pipe rotation speed (Rotary RPM)		The set rotary RPM is maintained unless the set rotary torque is exceeded, then the rotary rpm is reduced.
3	Rotary Torque		The set rotary torque value is maintained unless the maximum set rotary RPM is exceeded, then the torque value is reduced.
5	Thrust force (Carriage Thrust)		The set carriage thrust is maintained unless the carriage rate (speed) is exceeded, then the thrust force is reduced.
8	Thrust rate (Carriage Rate/Speed)		The set carriage rate (speed) is maintained unless the maximum set carriage thrust is exceeded, then the speed is reduced.

Push the ESC button to return to the [Main Information Screen \(page 1\)](#).

Deactivating Cruise

Push the joystick in any direction or push the cruise button to deactivate the cruise mode.

Note: The settings reset when the machine is turned off.

Resuming Cruise

Push the cruise button on the joystick to resume the functions with the same settings.

Note: The settings reset when the machine is turned off.

SmartTouch™ Home Screen

SmartTouch mode allows the operator to load and unload pipes from the rod box with less joystick operation to reduce operator fatigue.

Use the [Carriage Settings Screen \(page 14\)](#) to turn SmartTouch mode on and off.

Note: The Push/Pull Icons have a green background when SmartTouch mode is on and a ribbon appears at the bottom of the screen showing a sequence of the steps.

Important: Never switch between Push/Pull modes during the chosen operation. Use neutral (manual) mode to switch between Push/Pull; refer to [Carriage Settings Screen \(page 14\)](#) to turn SmartTouch mode off.

The SmartTouch screens appears along the bottom of the home screen as shown below.

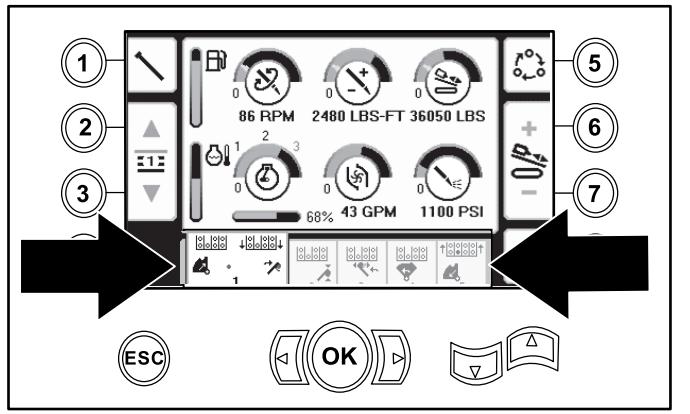


Figure 9

Pulling Pipe in SmartTouch Mode

Start the SmartTouch mode with the cam assembly in the home position (row 4 of the pipe box).

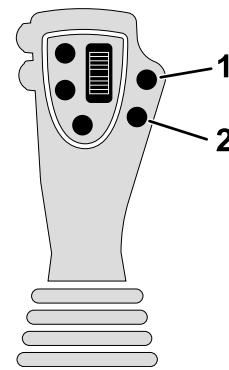


Figure 10

g236957

1. Go to the previous step
2. Go to the next step

Important: Push and hold the lower section of the cam rocker switch on the left joystick until the action is complete in each step ([Figure 11](#)).

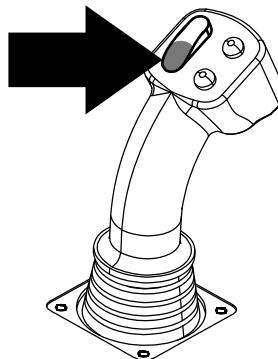


Figure 11

g210060

Push and hold the upper section of the cam rocker switch on the left joystick until all actions are complete to go to the previous step in the sequence ([Figure 12](#)).

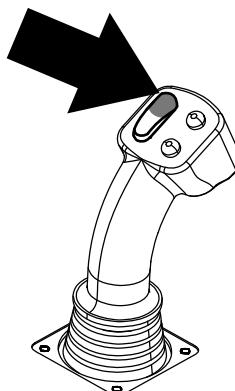


Figure 12

g210061

1. Push button 1 to select the pull pipe option (Figure 13).
2. Push buttons 2 and 3 to select the row where you want to place the pipe (Figure 13).

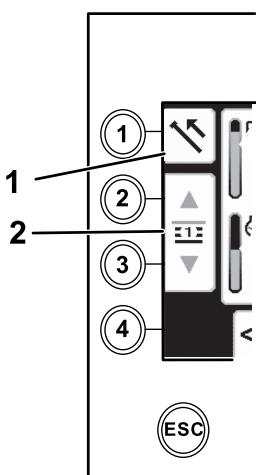


Figure 13

g232381

1. Pull pipe
2. Select pipe row
3. Hold the lower right button on the 8-button joystick (Figure 10) or the lower section of the rocker switch (Figure 15) on the 4-button joystick until the following 3 things happen (Figure 16):
 - A. The cam assembly rotates toward the operator station.
 - B. The elevator lowers.
 - C. The loader arms rotate to the drill pipe.



Figure 14

g231712

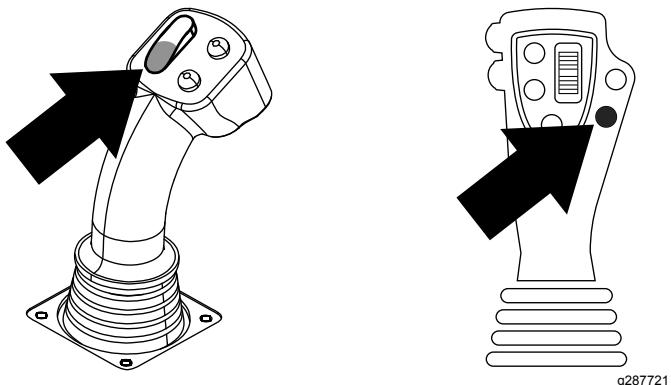


Figure 15

g287721

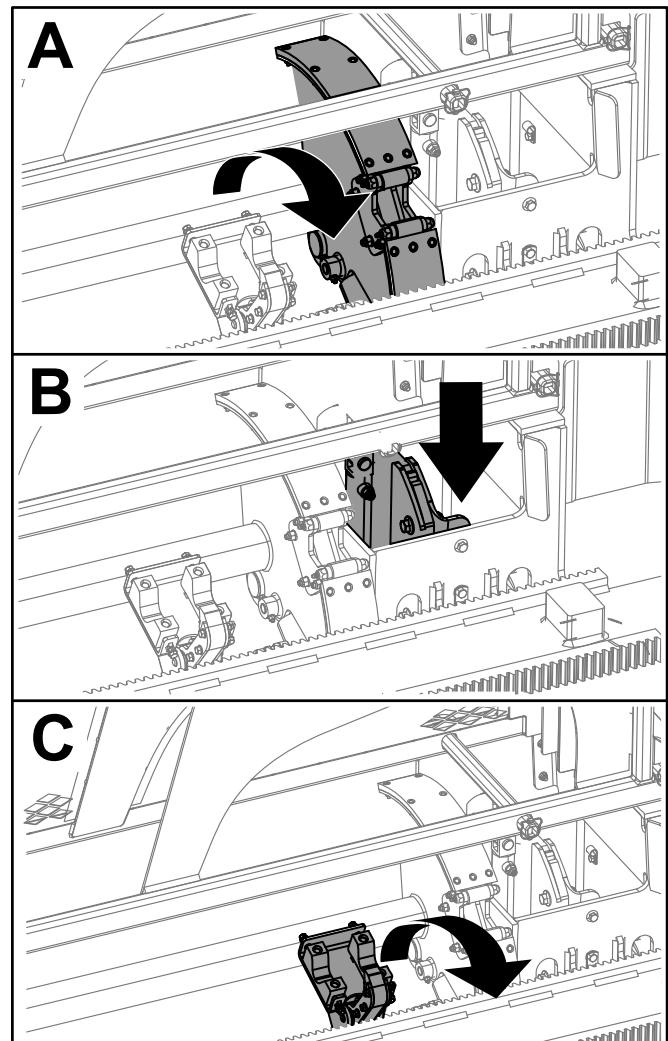


Figure 16

g232376

4. Release the rocker switch/button to proceed to the next step in the sequence (Figure 17).

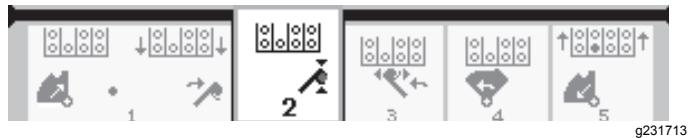


Figure 17

5. Break the pipe connection; refer to Removing Drill Pipes in the *Operator's Manual*.
 6. Hold the lower left button on the 8-button joystick or the upper button on the 4-button joystick to grip the pipe (Figure 18) and Figure 19) and release the button.

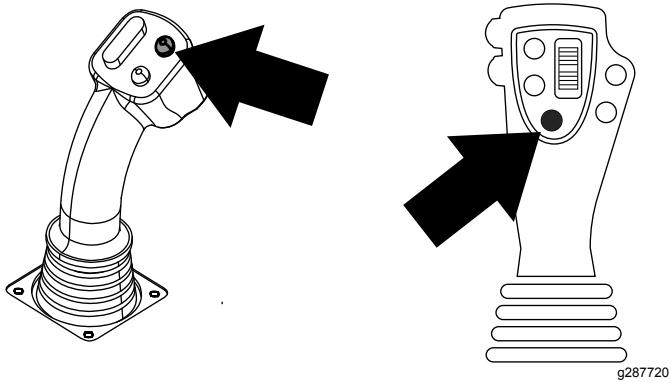


Figure 18

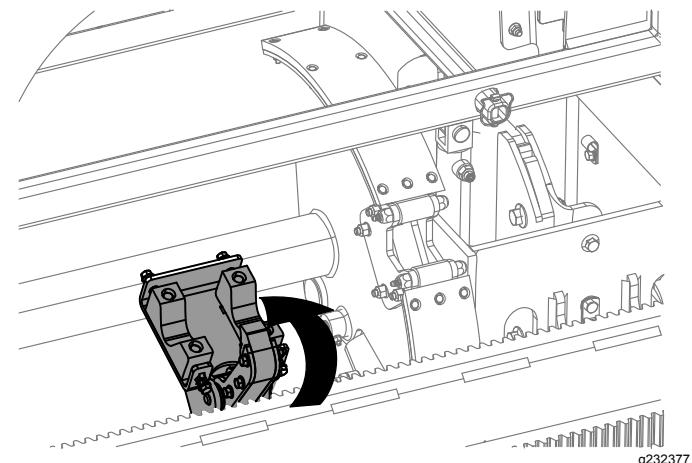


Figure 19

7. Hold the lower right on the 8-button joystick (Figure 10) or the lower section of the rocker switch (Figure 21) of the 4-button joystick until the arms rotate with the pipe back to the home position and the grippers open as the pipe enters the cam assembly pocket (Figure 22).

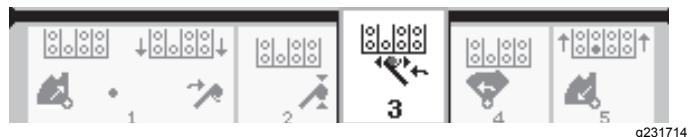


Figure 20

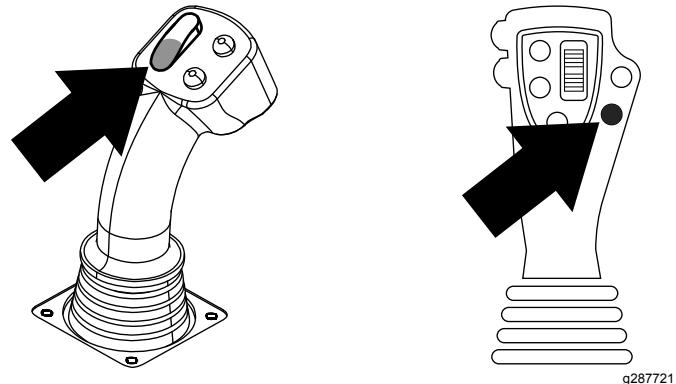


Figure 21

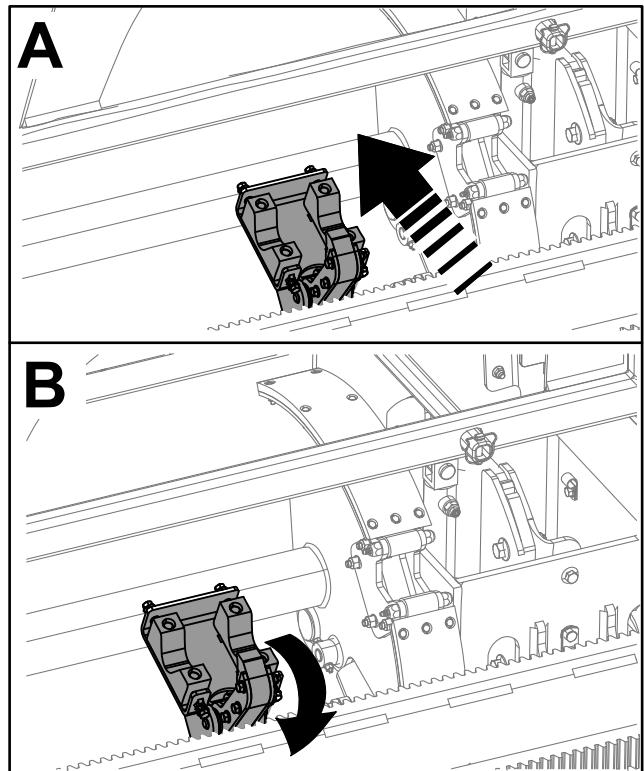


Figure 22

8. Release the button/rocker switch to proceed to the next step in the sequence (Figure 23).



Figure 23

9. Hold the lower right button (Figure 10) on the 8-button joystick or the lower section of the rocker switch (Figure 24) of the 4-button joystick until the cam assembly rotates to the selected row under the pipe box (Figure 25).

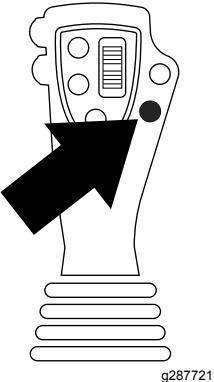
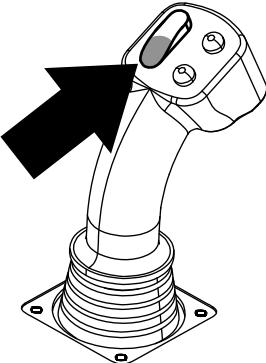


Figure 24

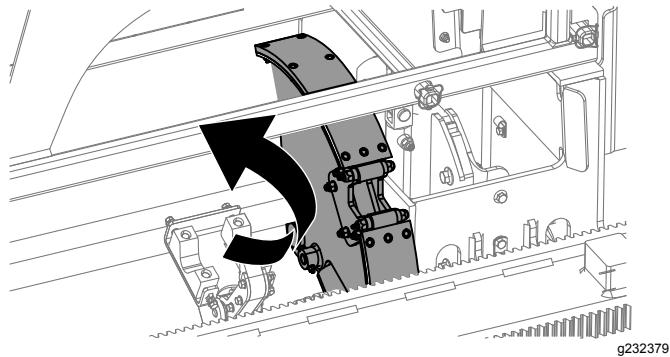


Figure 25

11. Hold the lower right button (Figure 10) on the 8-button joystick or the lower section of the rocker switch (Figure 27) of the 4-button joystick until the elevator puts the pipe back in the pipe box and the cam rotates to the home position (Figure 28).

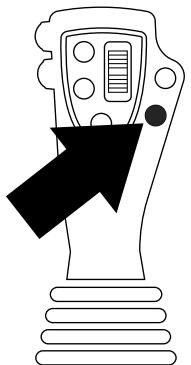
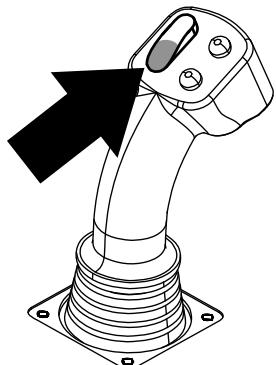


Figure 27

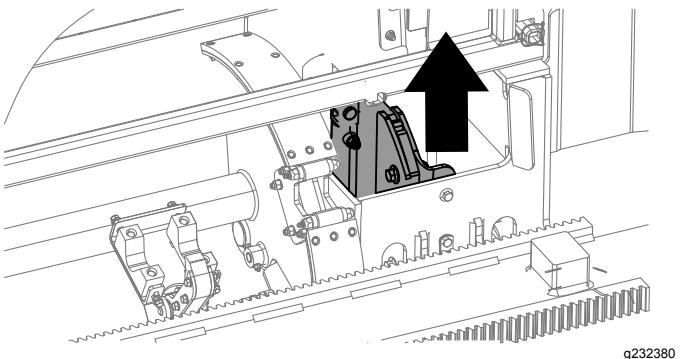


Figure 28

12. Release the rocker switch to start the pull-pipe process again.

10. Release the rocker switch to proceed to the next step in the sequence (Figure 26).



Figure 26

Pushing Pipe in SmartTouch Mode

Start the SmartTouch mode with the cam assembly in the home position (row 4 of the pipe box).

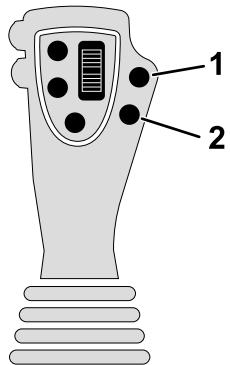


Figure 29

g236957

1. Go to the previous step 2. Go to the next step

Important: Ensure that you hold the lower section of the cam rocker switch, on the left joystick, completely down until the action is complete in each step (Figure 30).

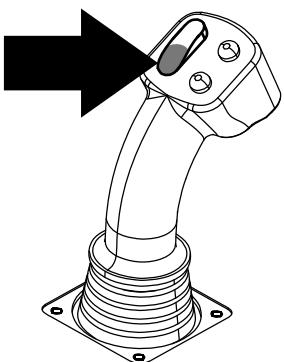


Figure 30

g210060

Hold the upper section of the cam rocker switch, on the left joystick, completely down until all actions are complete to go to the previous step in the sequence (Figure 31).

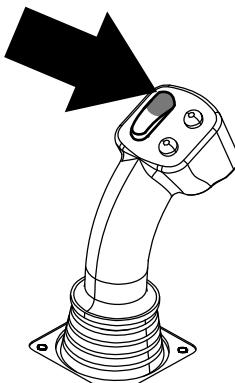


Figure 31

g210061

1. Push button 1 to select push pipe (Figure 32).
2. Push buttons 2 and 3 to select the row where you want to get the pipe (Figure 32).

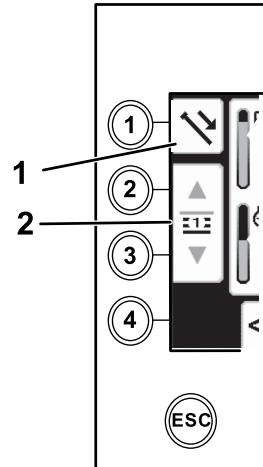


Figure 32

g232387

1. Push pipe 2. Select pipe row

3. Hold the lower right button on the 8-button joystick (Figure 10) or the lower section of the rocker switch (Figure 34) on the 4-button joystick until the cam assembly rotates to the selected row and the elevator lowers the pipe into the opening (Figure 35).

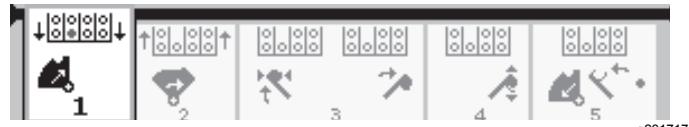


Figure 33

g231717

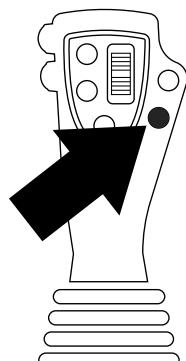
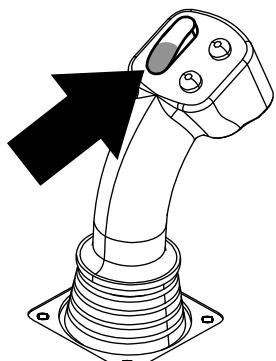


Figure 34

g287721

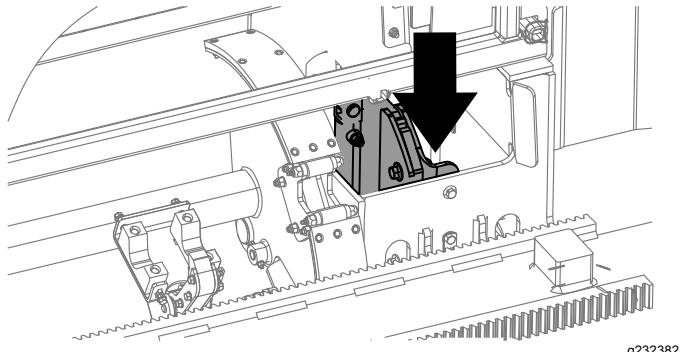


Figure 35

g232382

4. Release the rocker switch to proceed to the next step in the sequence (Figure 36).



Figure 36

g231718

5. Hold the lower right button on the 8-button joystick (Figure 10) or the lower section of the rocker switch (Figure 37) on the 4-button joystick until the cam assembly fully rotates forward to the rack and the elevators lift the remaining pipe into the pipe box (Figure 38).

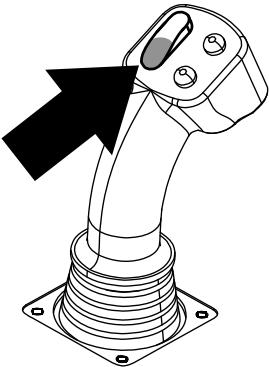
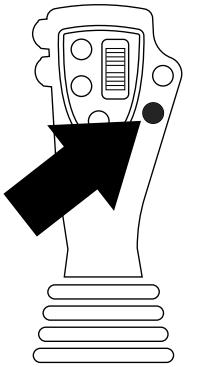
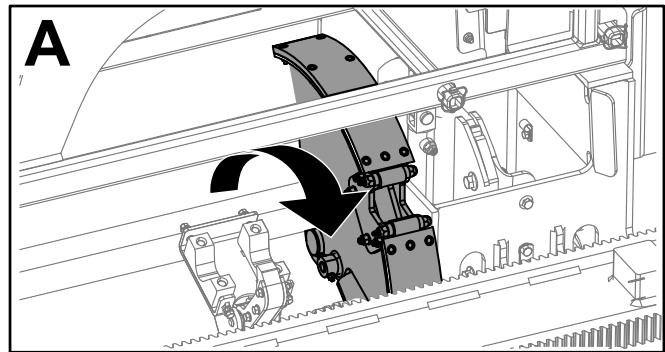


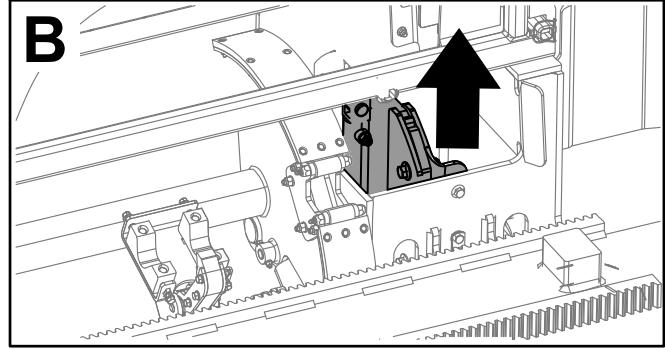
Figure 37



g287721



A



B

Figure 38

g232383

6. Release the button / rocker switch to proceed to the next step in the sequence (Figure 39).

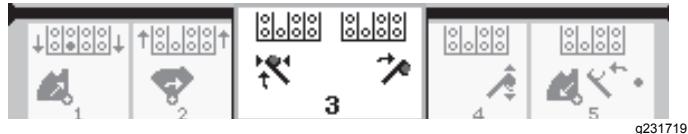


Figure 39

7. Hold the lower right button on the 8-button joystick (Figure 10) or the lower section of the rocker switch (Figure 40) on the 4-button joystick until the loader arms rotate toward the pipe box. As they rotate past the cam assembly the pipe grippers close on the pipe, bringing it to the drill string (Figure 41).

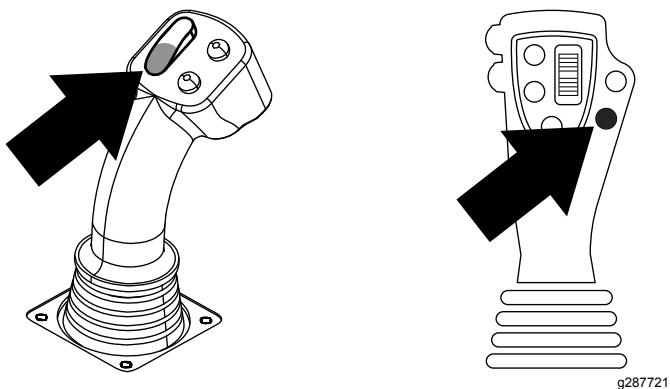


Figure 40

8. Release the rocker switch to proceed to the next step in the sequence (Figure 42).



Figure 42

9. Make the pipe connection; refer to Adding Drill Pipes in the *Operator's Manual*.

10. Hold the lower left button on the 8-button joystick or the lower button on the 4-button joystick to release the pipe (Figure 43 and Figure 44) and release the button.

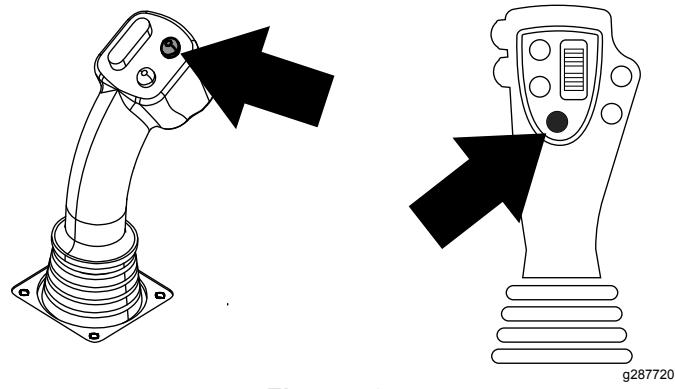


Figure 43

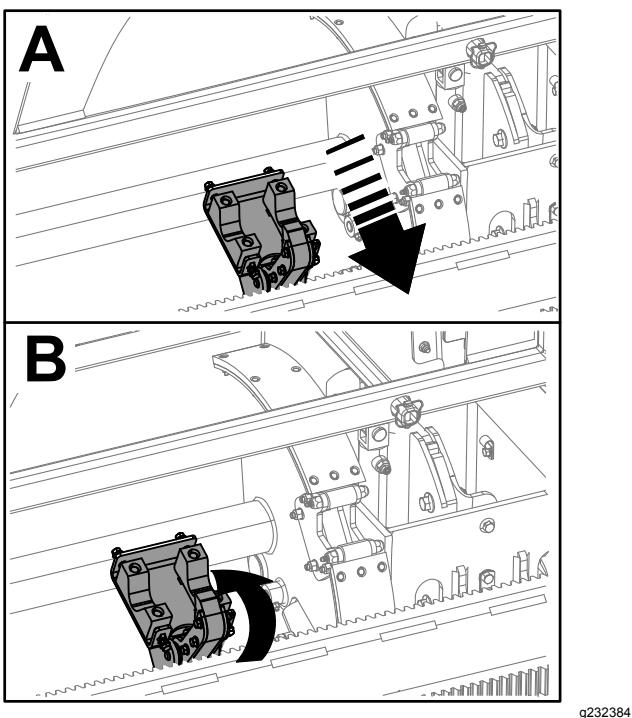


Figure 41

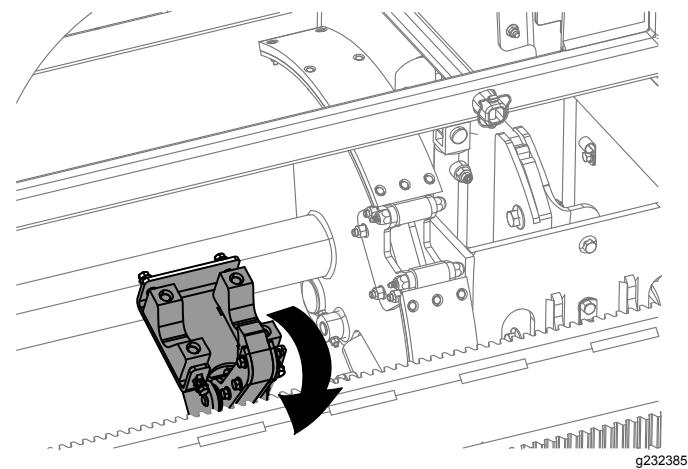


Figure 44

11. Hold the lower right on the 8-button joystick (Figure 10) or the lower section of the rocker switch (Figure 46) on the 4-button joystick until the loader arms rotate back and the cam assembly returns to the home position (row 4) (Figure 47).



Figure 45

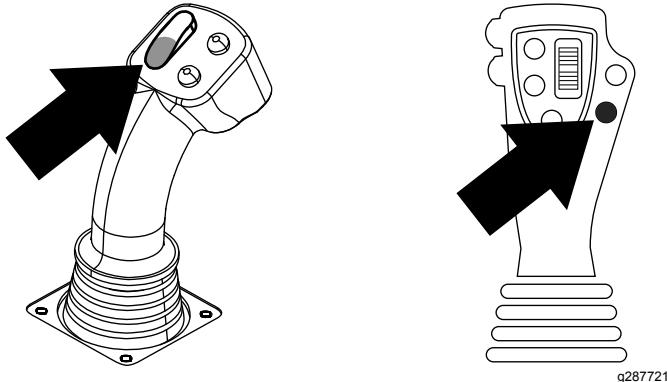


Figure 46

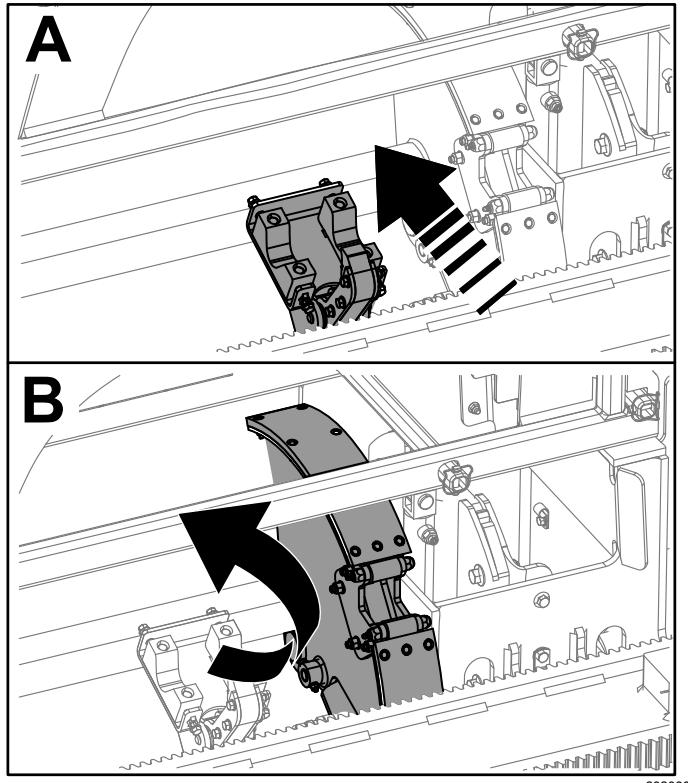


Figure 47

12. Release the button / rocker switch to start the push-pipe process again. The cam assembly goes to the row picked in step 2 of [Pushing Pipe in SmartTouch Mode](#) (page 9).

Hours Screen Options

Machine Hours Screen

To access this screen, push button 1 on the Hours screen.

This screen shows the operating hours of the machine. You cannot change Machine 1 but you can reset Machine 2.

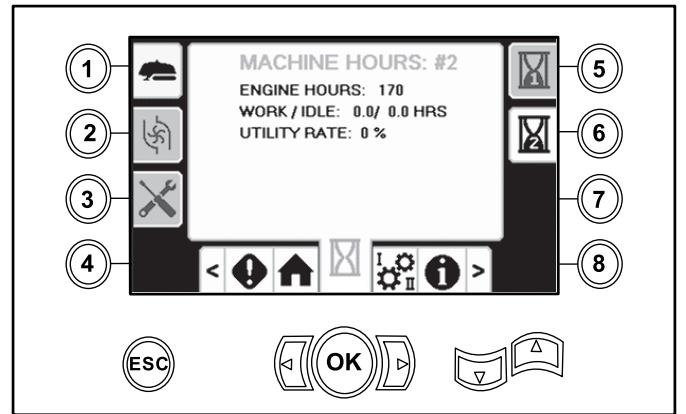


Figure 48

Mud Use Screen

To access this screen, push button 2 on the Hours screen.

This screen shows the mud volume used.

To switch between gallons and liters, refer to [Figure 58, Language and Units Options Screen](#) (page 15).

You cannot change the total mud, but you can reset the daily mud using button 8.

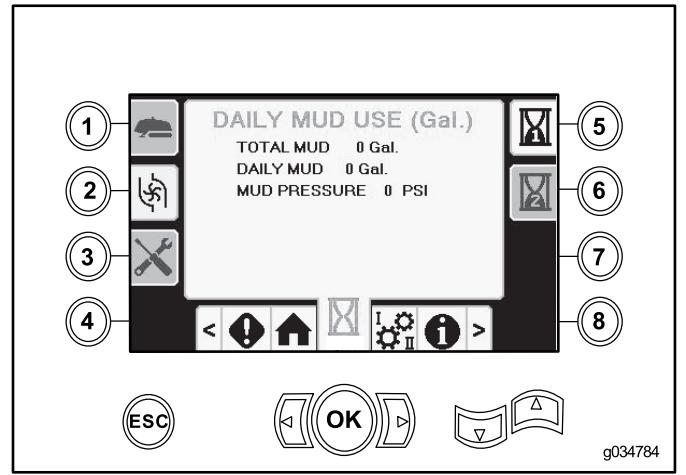


Figure 49

Lubrication and Maintenance Screens

To access this screen, push button 3 on the Hours screen.

These screens provide the user with the daily maintenance schedules in the increments listed below.

To reset the maintenance interval, navigate to the [Parameters Options Screen \(page 14\)](#), push the down arrow to scroll to the maintenance options screen, and enter pin number **12356**.

Push the following buttons to attain the subsequent maintenance schedule:

- Button 3—10-hour/Daily (Figure 50)
- Button 5—50-hour (Figure 51)
- Button 6—250-hour (Figure 52)
- Button 7—500-hour (Figure 53)
- Button 8—1,000-hour (Figure 54)

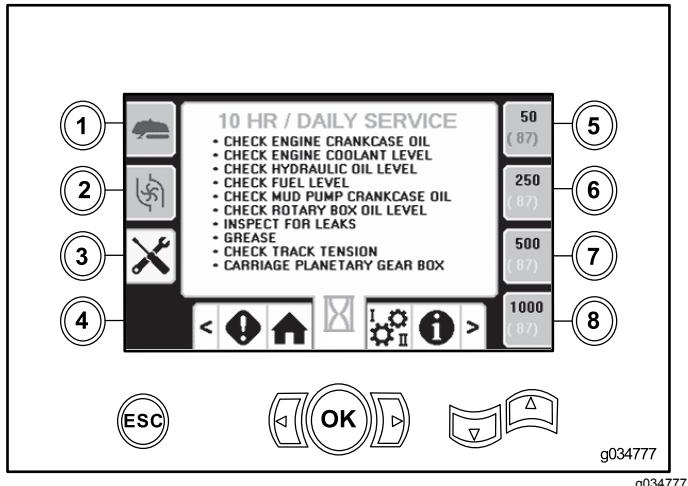


Figure 50

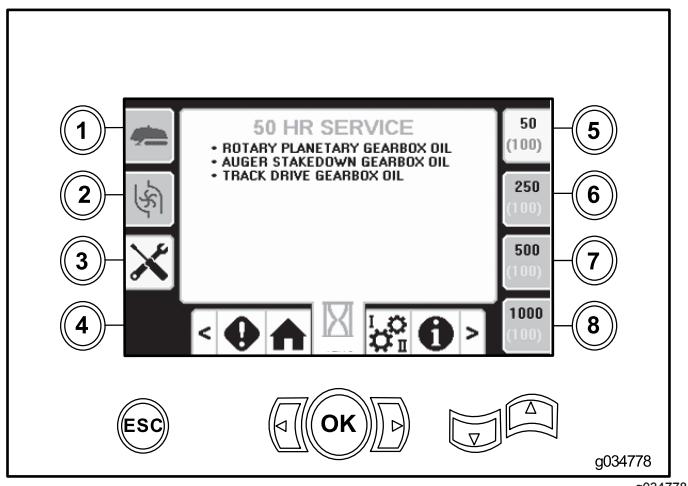


Figure 51

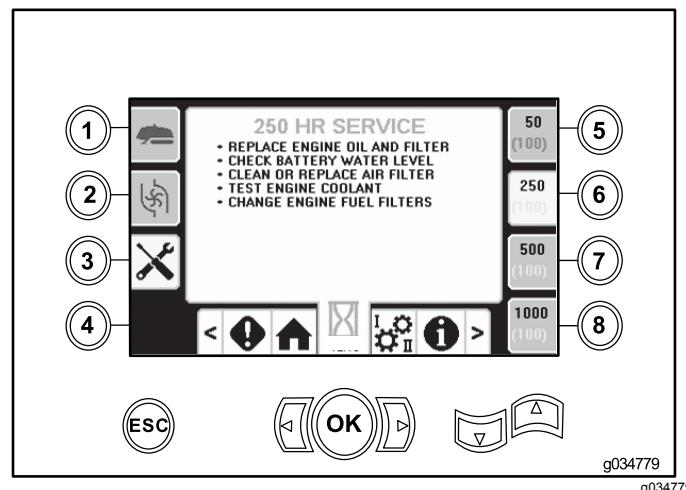


Figure 52

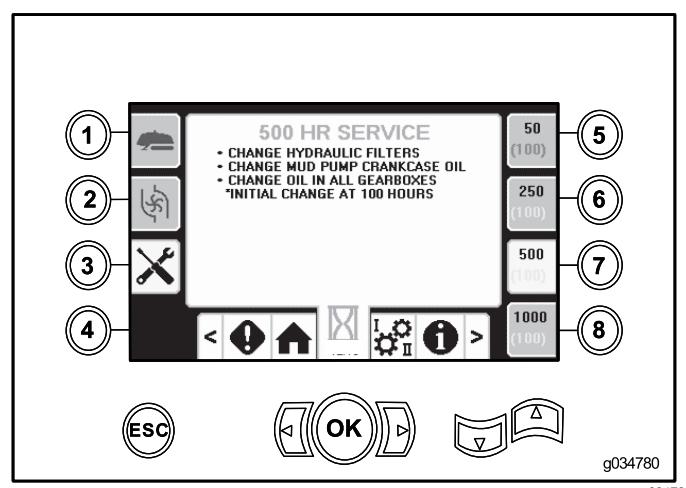


Figure 53

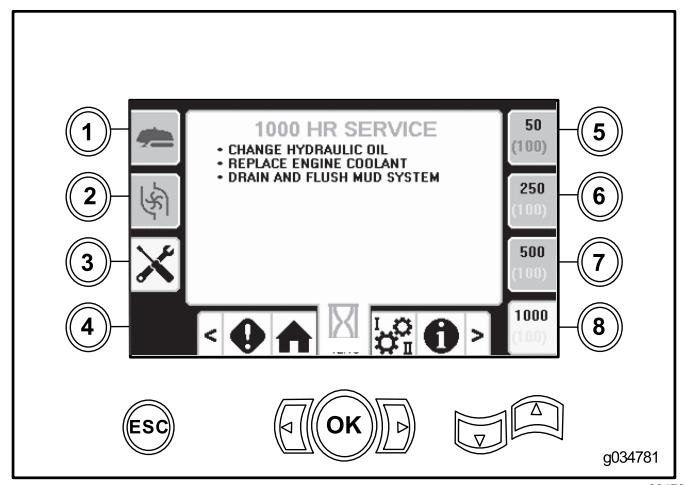


Figure 54

Settings Screen Options

Carriage Settings Screen

Push button 1 on the Settings screen.

Use this screen to change the carriage settings. Use the up and down arrows to rotate between push pipe, pull pipe, and neutral.

Push the OK button to turn SmartTouch™ on and off.

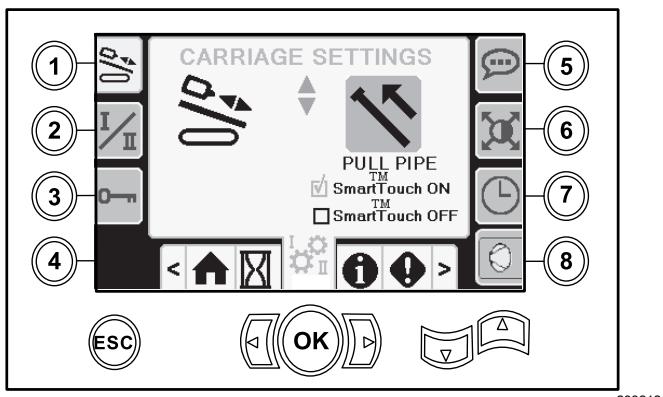


Figure 55

Joystick Type	Left/Right	Mode I	Mode II
8 or 9-Button Joystick Functions	Left Joystick	(no action)	Rotation
	Right Joystick	Thrust and rotation	Thrust

Parameters Options Screen

Push button 3 on the Settings screen.

The pin number to change the parameters is **73236531**.

Push the down arrow to scroll to the maintenance options screen to reset the maintenance interval. Enter pin number **12356**.

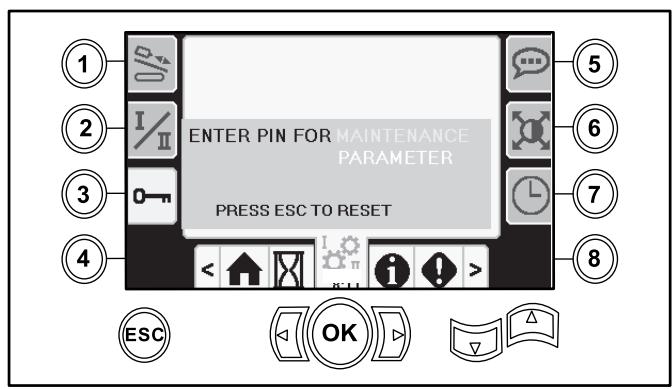


Figure 57

Control Mode Screen

Push button 2 on the Settings screen.

Use this screen to select between the 2 joystick control options. Push the up and down arrows to switch between Mode I and Mode II.

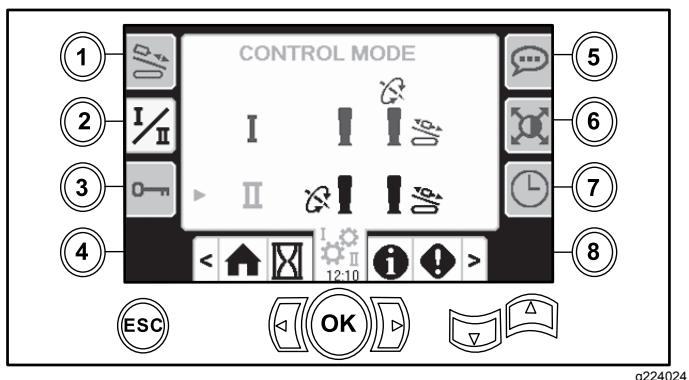


Figure 56

Joystick Type	Left/Right	Mode I	Mode II
4-Button Joystick Functions	Left Joystick	Wrench and pipe loader (gripper and elevator)	Rotation, wrench, and pipe gripper
	Right Joystick	Thrust and rotation	Thrust and pipe loader elevator

Language and Units Options Screen

Push button 5 on the Settings screen to access the language and units Screen. Push the up and down arrows to switch between English units and metric units.

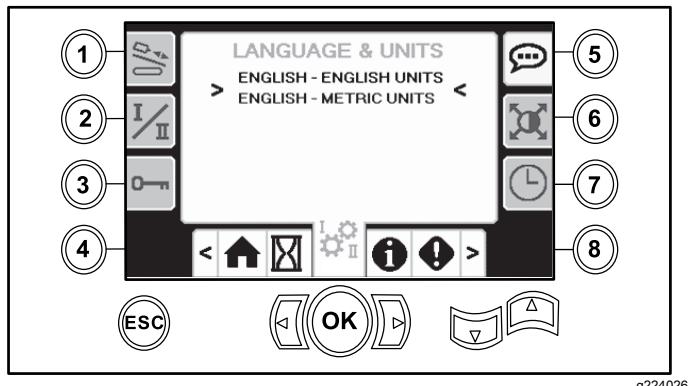


Figure 58

g224026

Clock Settings Screen

Push button 7 on the Settings screen to set the clock settings options.

Once you are on this screen, push button 7 to rotate between date, time, and 12/24.

Use the up and down arrows to adjust the parameters.

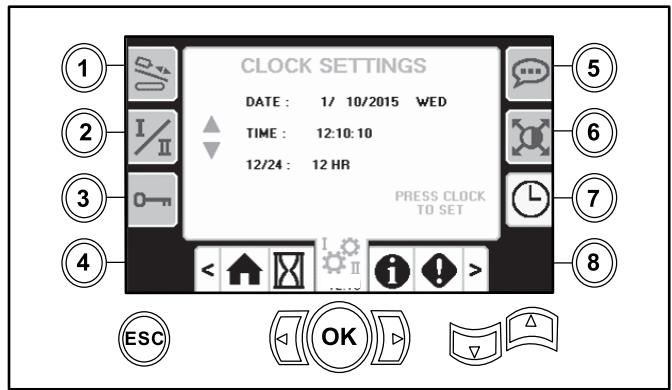


Figure 60

g224023

Screen Settings

Push button 6 on the Settings screen to switch between zoom delay, brightness, and day or night mode. Use the up and down arrows to adjust the parameters.

The Main Drilling Screen zooms into the drilling functions. These settings adjust the delay on how long it takes to zoom.

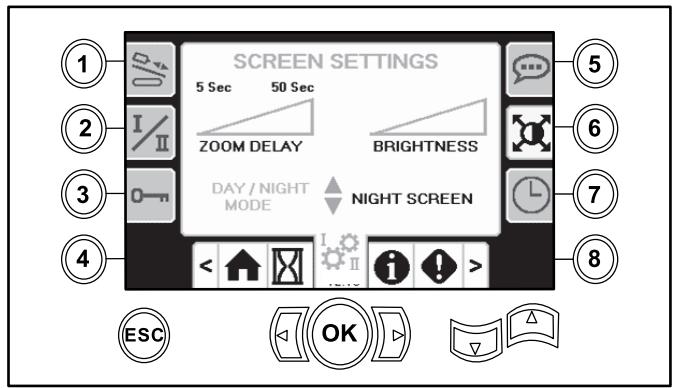


Figure 59

g224028

Mud or Air Hammer Selection Screen

Push button 8 on the Settings screen to access this screen. Use the up and down arrows to switch been mud and air hammer.

Push the OK button to select the option.

Important: Ensure that you set up the valves per your selection. Refer to the *Air Hammer Installation Instructions*.

This updates the display on the home screen (Figure 3).

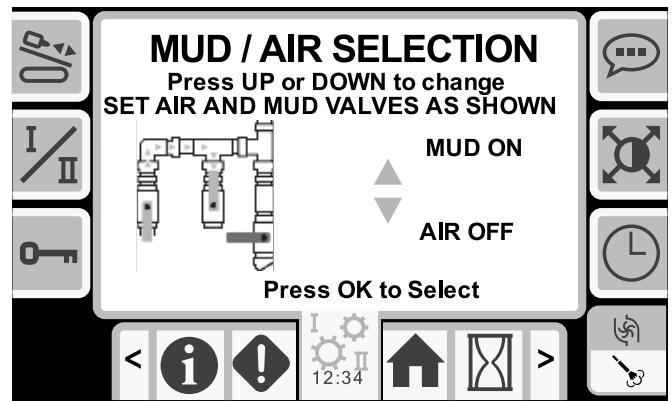


Figure 61

g288048

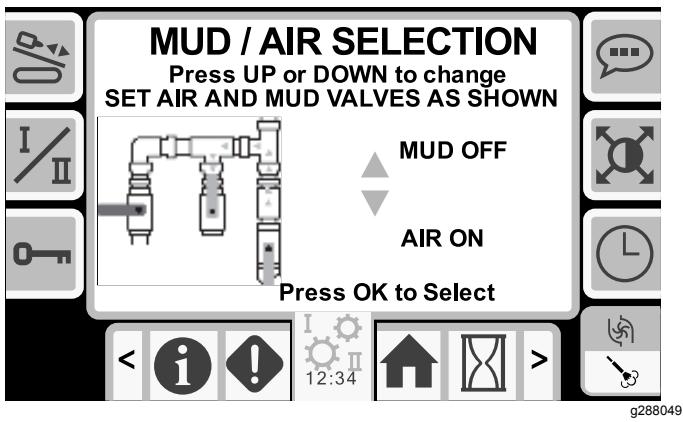


Figure 62

- The lower center icon indicates if the 2-speed selection of the carriage speed has been selected.
- The lower right icon indicates the status of the Exit Side Lockout (ESL). If the indicator is black, the carriage and rotary actions are inhibited.

Engine I/O Screen

To access this screen push button 2 on the I/O screen.

This screen displays engine information.

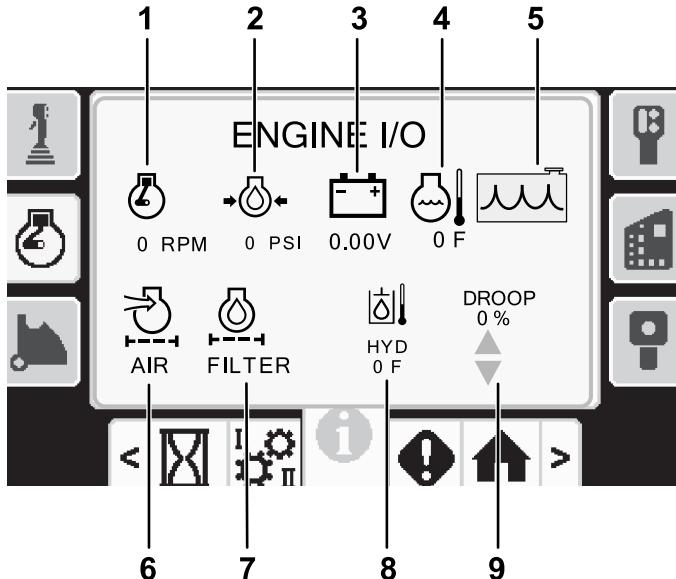


Figure 64

1. Engine speed (rpm)
2. Engine-oil pressure
3. Battery voltage
4. Engine coolant temperature
5. Engine coolant level
6. Air-filter indicator
7. Hydraulic-fluid filter
8. Hydraulic-fluid temperature (not available)
9. Engine droop

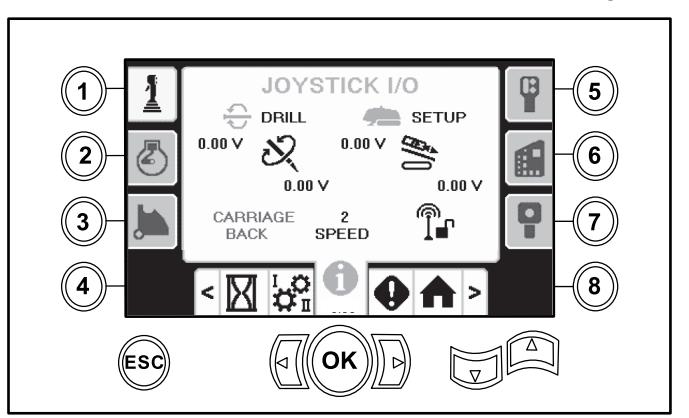


Figure 63

- The rotary voltage ranges from 0.0 to 8.5 V and can be present for either make (upper icon) or break (lower icon) as the selected rotary joystick is moved.
- The carriage indicates a voltage range from 0.0 to 10.0 V in the joystick selected direction for thrust or pullback.
- The lower left icon indicates the carriage position of wrench, load, or carriage back as the carriage moves to the most rearward positions.

Engine speed (rpm) icon: displays, in steps of 100, the engine speed (rpm).

Engine-oil pressure icon: displays the engine-oil pressure (bar or psi).

Battery voltage icon: displays the battery voltage.

- If the engine is shut off, the voltage is measured by the Toro controller.
- If the engine is running, the voltage is supplied by engine controller.

Engine temperature icon: displays the engine coolant temperature measured at the reservoir. The temperature drops to 40°F when the engine is shut off.

Engine coolant icon: displays if the engine coolant is low.

Air filter icon: the air filter icon is green unless the filter is plugged then the indicator is red.

Hydraulic-fluid filter icon: the hydraulic-fluid filter icon is green unless the filter is plugged then the indicator is red.

Engine droop icon: select the allowable engine droop of 80, 90, or 100%. The droop value is the lowest point below low-load speed (rpm) (under 75 percent load) that the engine may decrease before the drive to the rotary head is decreased to maintain the lowest value. Push the up and down arrows to select the droop value.

Cam Arm I/O Screen

To access this screen push button 3 on the I/O screen.

Use this screen to adjust the cam and pipe loader calibration options.

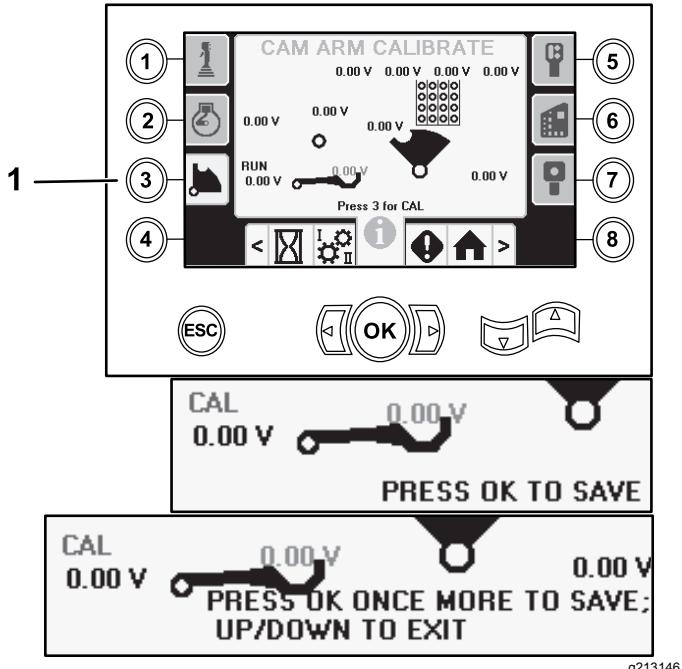


Figure 65

1. Push button 3 to calibrate.

1. Push button 3 to toggle the calibration on and off.
2. Push the up and down buttons on the display to select the load position and the pipe-row position.
3. Push the OK button 2 times on the desired position to save the calibration.

The 2 voltages on the bottom indicate the loader arm and cam actual voltage from the sensors. The voltages range from 1.0 to 4.0 V. Any voltage higher or lower indicates either sensor failure or incorrect calibration.

Joystick Help Screens

To access these screens push button 4 on the I/O screen.

These screens show the function of each joystick button.

Push the up and down arrows to scroll through the screens.

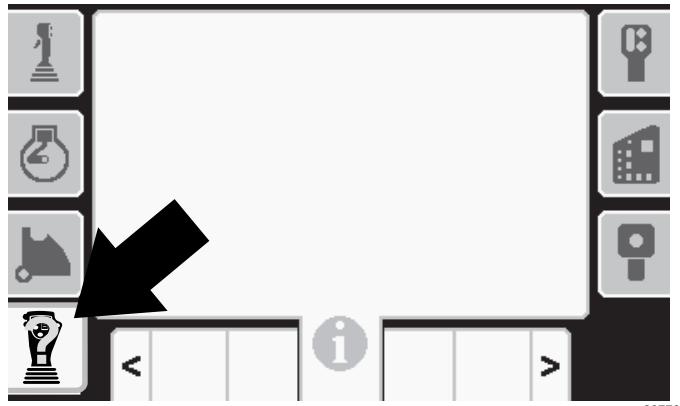


Figure 66

4-Button Joysticks

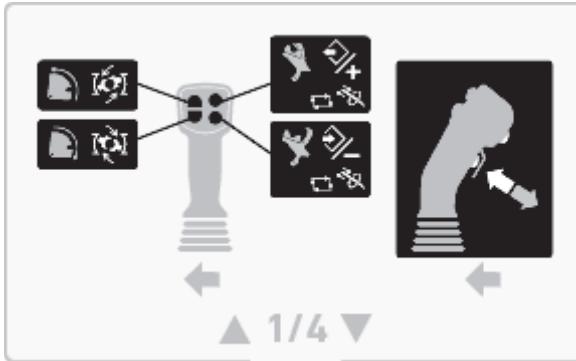


Figure 67

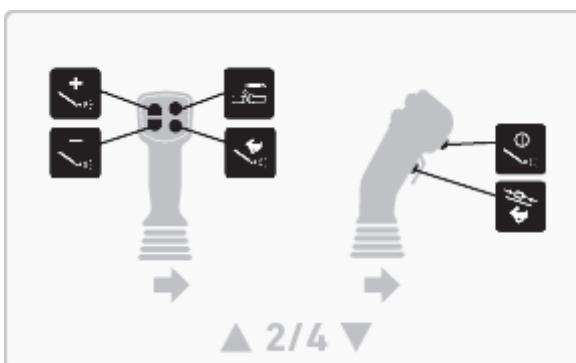


Figure 68



Figure 69

g287759

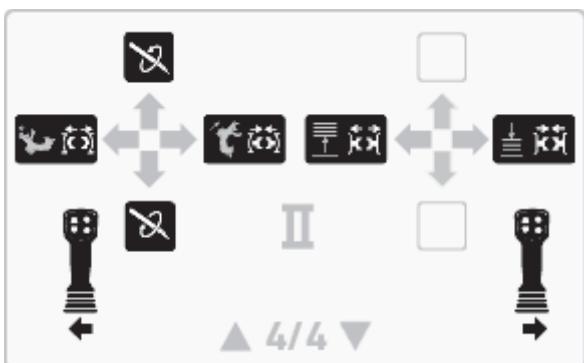


Figure 70

g287760

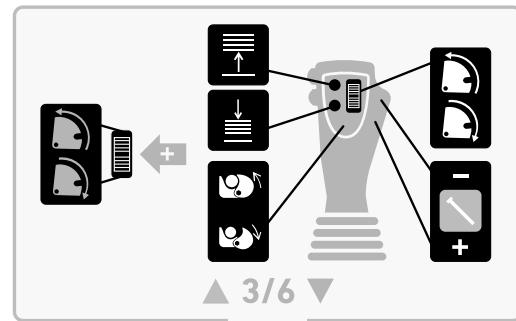


Figure 73

g290340

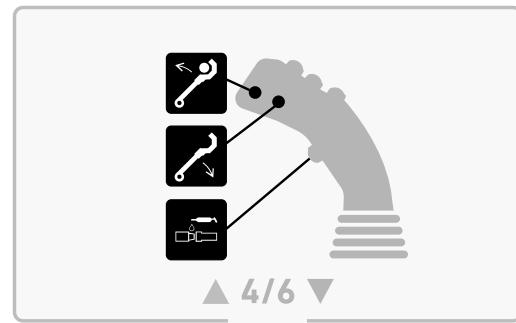


Figure 74

g290341

8 or 9-Button Joysticks

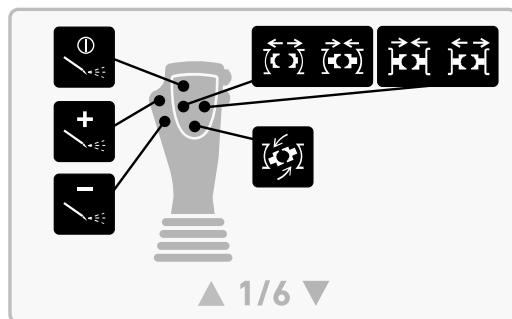


Figure 71

g290338

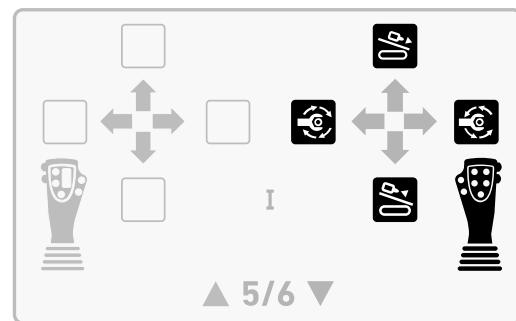


Figure 75

g290342

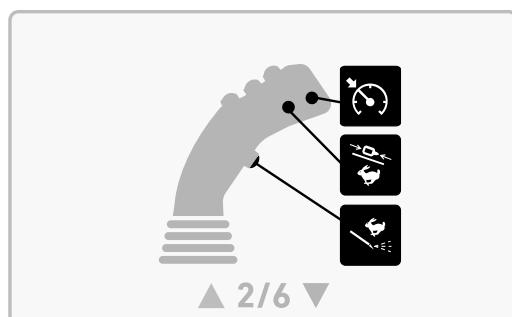


Figure 72

g290339

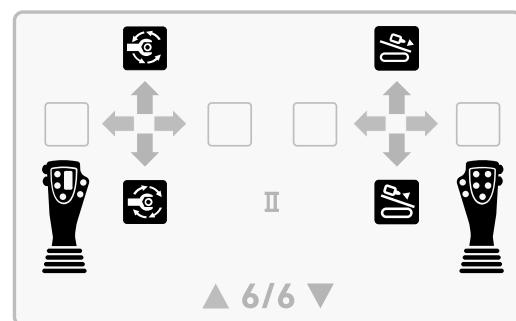


Figure 76

g290343

Auxiliary I/O Screen

To access this screen push button 5 on the I/O screen.

All icons change from black to green when you operate the associated functions.

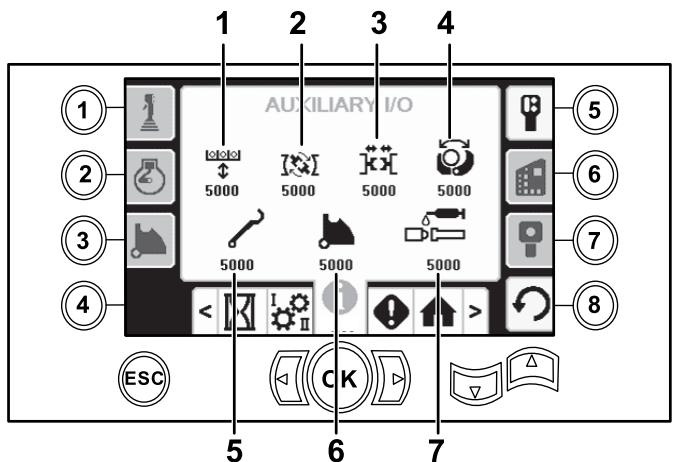


Figure 77

g213173

1. Raise/Lower elevator	5. Loader arm
2. Breakout wrench	6. Rotate pipe cam
3. Upper or lower wrench	7. TJC grease
4. Gripper	

Controller I/O Screen

To access this screen push button 6 on the I/O screen.

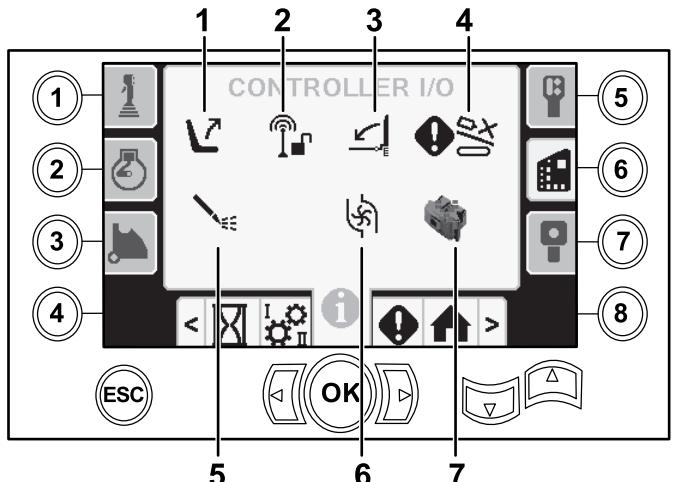


Figure 78

g213147

1. Seat switch	5. Mud pump status
2. Exit side lockout	6. Mud pump flow
3. Pedestrian gate	7. Processor indicator
4. Cam override input	

Seat switch icon: shows an arrow out when the operator seat is empty; the switch shows a figure icon when you are in the operator seat.

- Shows the seat with an arrow when the operator seat is unoccupied
- Shows the seat with a figurine when the operator seat is occupied

Exit side lockout icon: changes from black to green when in operation.

Pedestrian gate icon:

- Shown in the UP position with a figurine: the gate is not in the correct position for drilling
- Shown in the DOWN position: the gate is correctly positioned for drilling

Cam override input icon: turns green when the override button is pushed on the joystick.

Mud pump status icon:

- Black: mud pump is off
- Yellow: mud pump is in standby
- Green: mud pump is in on
- Green with 100: mud pump is in max flow

Mud pump flow icon: indicates the input from the rocker switch on the joystick.

- When the rocker switch is actuated up, the indicator turns green with a blue up/increase arrow.
- When the rocker switch is actuated down, the indicator turns green with a blue down/decrease arrow.
- The icon is black when the rocker switch is not pressed.

Processor indicator icon: shows a red X to indicate a problem with the expansion processor located next to the main controller.

Travel Pendant I/O Screen

To access this screen push button 7 on the I/O screen.

The travel pendant screen shows the voltage and position of the joystick located on the pendant.

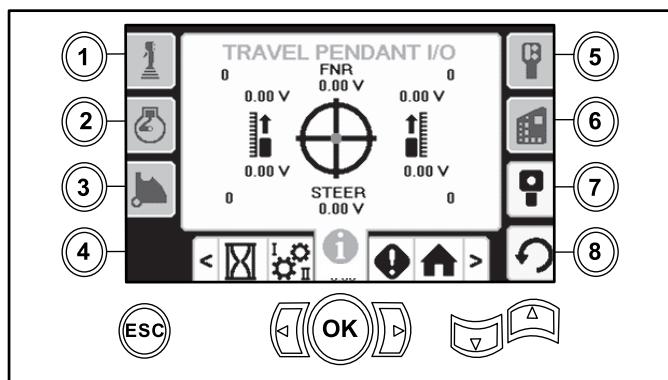


Figure 79

g213169

The red dot appears in the center of the target and the FNR (forward, neutral, reverse) and Steer voltage shows 2.5 V prior to allowing the drill to move. If the red dot travels outside of the outermost black ring, service or replace the pendant with a new pendant. The indicators to the right and left of the circle show the direction of the track travel. The voltages show a range from 0 to 10.0 V.

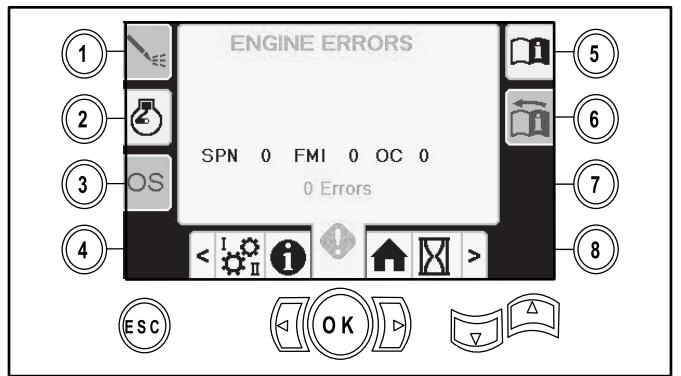


Figure 81

Errors and Machine Information Screens

Drill Errors Screens

To access this screen push button 1 on the Errors and Machine Information screen.

This screen displays any drill errors.

Use the up and down arrows to scroll through the errors. Contact your Authorized Service Dealer for codes that cannot be cleared.

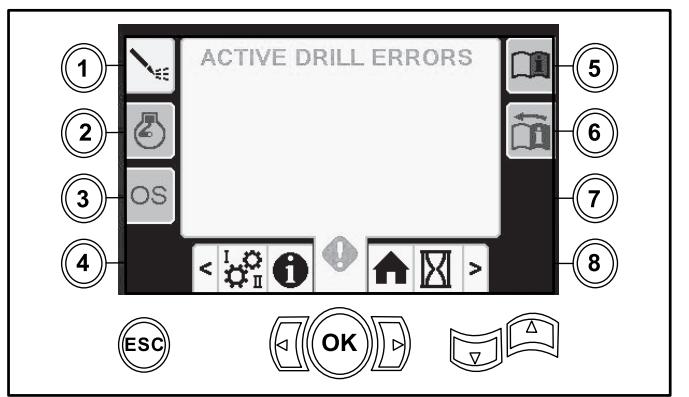


Figure 80

Engine Errors Screen

To access this screen push button 2 on the Errors and Machine Information screen.

This screen displays any engine errors.

Use the up and down arrows to scroll through the errors. Contact your Authorized Service Dealer for codes that cannot be cleared.

Machine Information Screen

To access this screen push button 3 on the Errors and Machine Information screen.

This screen displays the machine information including the model, serial number, and software version.

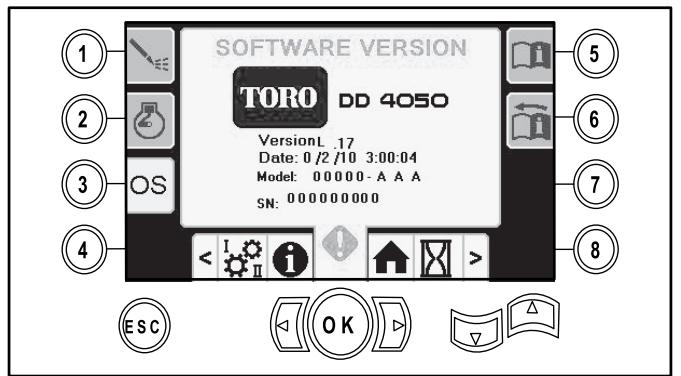


Figure 82

Warning Icons

Warning	Icon	Description	Resolution
Carriage Crash		<ul style="list-style-type: none"> The carriage is in the drill area and you try to operate the loader arm or pipe cam or You try to operate the carriage when the loader arm or pipe cam is not in the home position 	To clear this warning, do the following: <ul style="list-style-type: none"> Move the cam assembly to the home position and/or Reverse the carriage
Pipe Loading Guard		The pipe loading guard is not in the lowered position.	Lower the pipe loading guard.
Stake Down Cage (CE models only)		The stake down cage door is not closed.	Close the stake down cage door.
Maintenance Required		Maintenance is required on the machine.	<ul style="list-style-type: none"> Press ok to exit. Review the Lubrication and Maintenance Screens (page 13).
Check Engine		The engine sensors detect an engine fault.	Review the messages on the Engine Errors Screen (page 20)
Stop Engine		There is an engine error that needs to be addressed.	<ul style="list-style-type: none"> Review the messages on the Engine Errors Screen (page 20) Contact your Authorized Service Dealer

Notes:

Notes:



Count on it.