CURTIS

A KOHLER COMPANY

Manual

Model 3301T

Digital Instrumentation

» Software Device Profile: 103.0.0.0 «

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1 — OVERVIEW

The Curtis model 3301T is a highly configurable HMI that is suitable for demanding and cost-sensitive applications. A color 3.5", 320 × 240 pixel high-brightness LCD allows vehicle operators to view data in any lighting condition. An LCD heater is optional for operation in cold temperatures.

Vehicle operators use buttons to work with the user interface. The buttons make the 3301T ideal for gloved operators and for applications that require precise tactile feedback.

The 3301T's configurability allows various screen elements to be displayed. These elements include gauges, bar graphs, hour meters, warning icons, speedometers, and so on.

For example, the 3301T-7001 model provides two preset user interfaces: one for counterbalanced forklifts and the other for reach trucks and order pickers. For applications that require a tailor-made user interface, the 3301T is easily customizable by Curtis engineers.

The 3301T provides four inputs that can be used as switch, analog resistive, analog voltage, and frequency inputs. It also provides a pin that can be used for either a switch input or an output driver. The 3301T also transmits and receives data over the CANbus.

Figure 1
Curtis 3301T HMI

USING THIS MANUAL

The next section describes the 3301T's features. The following list describes the topics that apply to various types of tasks:

- Vehicle operators should read the Using the 3301T chapter.
- Technicians who work on installation and wiring, or who need information on specifications, should read the Installation and Wiring chapter and the Specifications appendix.
- Application developers should be familiar with the following chapters:
  - Programmable Parameters
  - Monitor Parameters
  - CANopen Communications

FEATURES

The following sections describe the 3301T's major features.

Display Elements

The following list describes the 3301T's major display elements:

- **Gauges**: Gauges represent various types of data. For example, an application can include gauges that indicate the vehicle speed, BDI percentage, forklift status, and steering angle.
- **Icons**: Icons indicate states such as on/off. For example, icons can indicate whether the seat belt is on or whether lift lockout is active.
- **Hour meter**: Hour meters provide a resolution of 0.1 hours and a maximum of 99999.9 hours. There are four hour meters: one is for the 3301T and three are for Curtis devices on the CANbus.
- **Speed mode**: The 3301T provides buttons for four speed modes. The selected mode is transmitted over the CANbus.

Fault Codes and Names

The 3301T displays fault codes and names for Curtis devices. There are a few ways in which the 3301T can receive fault codes:

- The CANbus.
- A switch input for Curtis DC pump controllers such as the 1253 and 1253C models.
- A switch input for Curtis DC traction controllers such as the 1243 and 1244 models.

The corresponding fault names of the fault codes are stored by the 3301T and are displayed on the Fault Name screen.

Programming

The 3301T provides the basic functions of the Curtis 1313 Handheld Programmer. Users can read and write parameters for the 3301T and for other Curtis devices that are on the CANbus or connected through the serial port. For more information, see View and Edit Parameters.

LCD Heater

Some models include an LCD heater for vehicles that operate in cold temperatures. The heater extends the minimum operating temperature from −20°C to −40°C. The 3301T turns the heater on when the LCD temperature is below −15°C and off when the LCD is heated to 5°C.

The model number indicates whether a 3301T model has an LCD heater. See the Model Encodement section in the Specifications appendix.

Miscellaneous Features

The following list describes other major features:

- Designed to meet regulatory requirements. For details, see the Specifications appendix.
- Multi-language support.
- A buzzer alarm that indicates faults.
- CANopen, J1939, and an adjustable baud rate allow for seamless communication with any node on the CANbus.
- Password protection for the following functions:
  - Power on. A power-on password can optionally be specified. The power-on password is entered with either the 3301T's buttons or the Curtis Electronic Code Switch (ECS).
  - Programming parameters for the 3301T and for other Curtis devices that are on the CANbus or connected to the serial port. There are different passwords for the OEM and User access levels.
  - Resetting the hour meters.

Note: For additional information on the 3301T's features, see the data sheet on the Curtis Instruments CAN & Serial Instrumentation page at https://www.curtisinstruments.com/products/can-serial-instrumentation-programmable.

CONVENTIONS

The following topics describe terms and notations used in this manual.

Numeral System Notation

The following table describes how this manual denotes decimal, binary, and hexadecimal numbers.

Note: The letter *n* in the format column represents a digit.

Numeral System	Format	Example
Decimal	Either of the following: • *nnn* • *nnn*d	• 127 • 127d
Hexadecimal	Either of the following: • *nnn*h • *0xnnn*	• 62Ah • 0x62A
Binary	*nnn*b	1011b

In addition, some CANopen examples have hexadecimal values without notation. Those examples are formatted with a monospace font and with the bytes delimited by spaces, as shown in the following example:

```
21 FF 01 11 22 01 00 00
```

Miscellaneous Conventions

- All voltages listed in this manual are DC voltages.
- *RO* means read-only.
- *RW* means read-write.
- *N/A* means not applicable.

2 — USING THE 3301T

This chapter describes how to use the 3301T's buttons and screens.

BUTTONS

The following table describes the 3301T's buttons. The buttons' functions depend upon which screen is active.

Button	Home Screen	Parameter Menu Screens	Password Screens
	Specifies the high speed mode.	Scrolls up to the previous menu item on the screen.	Specifies whether the password is for the User or OEM access level.
	Specifies the turtle speed mode.	Scrolls down to the next menu item on the screen.	Specifies whether the password is for the User or OEM access level.
	Specifies the standard speed mode.	Returns to the previous menu. If the menu is the device's top menu, pressing this button returns to the home screen.	Specifies whether the password is for the User or OEM access level.
	Specifies the economy speed mode.	If a menu is selected, opens the menu.	Specifies whether the password is for the User or OEM access level.
	Opens the 3301T's main parameter menu, which does not require a password.	Returns to the home screen from the 3301T's main parameter menu.	Specifies the number 1.
	Opens the 3301T's password-protected parameter menus.	Returns to the home screen from the 3301T's password-protected parameter menus.	Specifies the number 2.
	Opens the parameter menus of other Curtis devices connected through the CANbus or the serial port.	Returns to the home screen from the parameter menus of other Curtis devices.	Specifies the number 3.
	Opens the parameter menus of Curtis devices that support the ESP/SP protocol and are connected through the serial port. The menus have read-only access.	Depends upon how the parameter menu screens were accessed: • If accessed with the F4 button, returns to the home screen. • If accessed with the F2 or F3 button, rapidly increases the selected parameter's value by step sizes of 10, 100, and 1000.	Specifies the number 4.
	No function.	• When a writable parameter is selected, decreases the parameter value. • When a menu is selected, navigates to the previous menu.	• If password characters have been entered, clears the last number. • If password characters either have not been entered or have been cleared, returns to the home screen.
	Opens the Fault Name screen. **Note**: This button also exits the Fault Name screen.	• When a writable parameter is selected, increases the parameter value. • If a menu is selected, opens the menu.	Submits the password.

POWER-ON 3301T PASSWORD OR ECS AUTHORIZATION

The 3301T can be configured so that only authorized users can access the device. There are two methods for authorizing access:

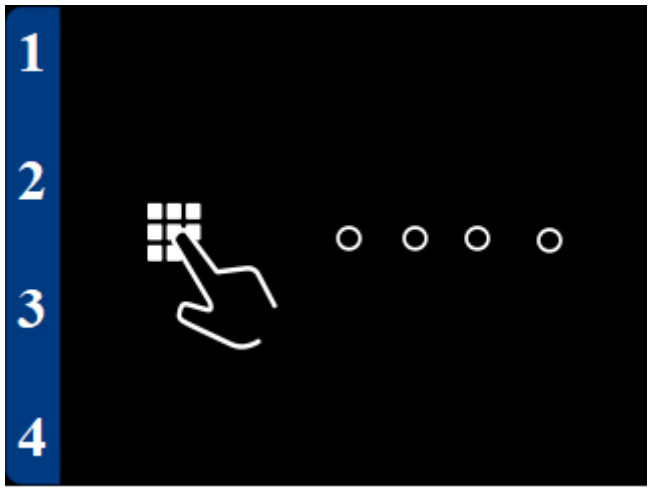
- Enter a password on the 3301T keypad.
- Log onto the Curtis Electronic Code Switch (ECS).

Note: The ECS ensures that only authorized users can operate a vehicle. Users log on by entering a user ID and PIN code or by swiping an RFID tag. For more information, see the Input Devices page on the Curtis Instruments website.

The following topics describe the two methods.

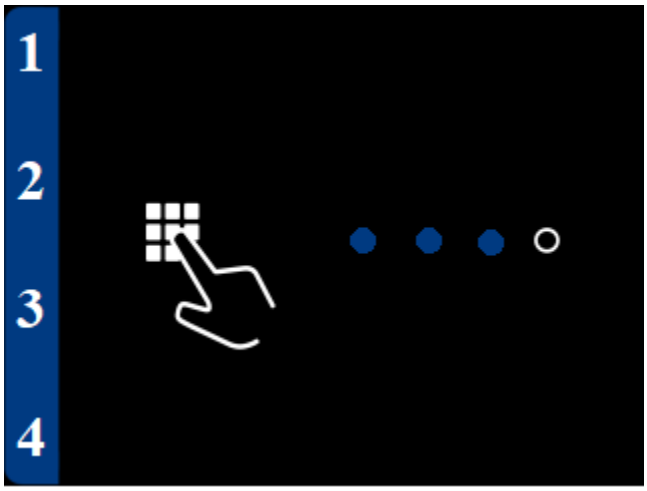
Power-On 3301T Password

If the 3301T is configured to require a password after the device is powered on, the following screen is displayed:



If this screen is visible, take the following steps to access the 3301T:

1. Use the F1–F4 buttons to enter the four-digit password, which consists of the numbers 1–4. Pressing an F1–F4 button enters the number that follows the letter "F" in the button name: for example, the F2 button enters 2.
2. To indicate how many of the password characters have been entered, the corresponding circle in the middle of the screen turns blue when a button is pushed. In the following example, three numbers have been entered:



   Tip: To clear the most recently entered number, press the C button; the corresponding circle turns white.
3. Press the ↵ button to submit the password. If the password is correct, the home screen is displayed.
   If the password screen indicates that the wrong password was entered, press the C button to clear the password, then repeat this procedure.

Note: The default power-on password is 1234. Curtis recommends that you change the default password. The power-on password is specified with the PIN Code parameter.

ECS Authorization

If the 3301T is configured to allow only authorized ECS users to access the device, the following screen is displayed when a user is not logged onto the ECS:

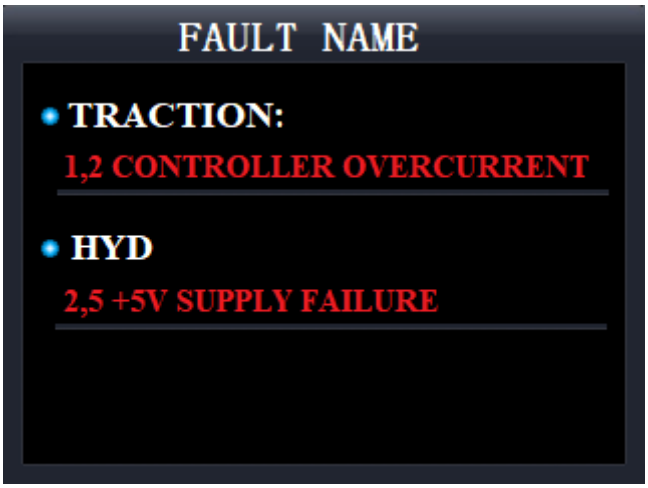
If this screen is visible, log onto the ECS by swiping an RFID tag or by entering an ECS user ID and PIN code on the ECS keypad. If the RFID tag or user ID and PIN code are valid, the home screen is displayed.

Note: The CANbus must be in the Operational NMT state in order to log on with the ECS. If you successfully log onto the ECS but the screen shown in the previous image is still visible, the CANbus is probably in a different NMT state.

After you log off of the ECS, the 3301T displays the screen shown in the previous image.

VIEW FAULT NAMES

The Fault Name screen displays the names and fault codes of active faults. In the following example, faults are active for traction and pump controllers:



Take the following steps to access the Fault Name screen:

1. Go to the home screen.
2. Press the button.
3. If there are too many faults to display on one screen, the bottom of the Fault Name screen will display upward-facing and downward-facing triangles. Use the and buttons to scroll through the screens.

To exit the home screen, press the button.

VIEW AND EDIT PARAMETERS

You can use the 3301T to view and edit parameters for the 3301T and for other Curtis devices connected through the CANbus or the serial port. The 3301T parameters are contained by the menus described in the Programmable Parameters and Monitor Parameters chapters. The parameter menus can be accessed when the home screen is visible.

Parameters have two access levels: User and OEM. The OEM level provides access to more parameters than the User level. The following table describes how the 3301T access levels correspond to the access levels for Curtis programming devices:

Table 1 3301T and Curtis Programming Device Access Levels

3301T	Curtis Programming Device
User	Field Intermediate
OEM	OEM Dealer

A password is required to access the 3301T's parameter menus and the read-write parameter menus of other Curtis devices. The access levels have different passwords. When you enter a password, the password is not cleared when the device returns to the home screen; this is for convenience when testing and debugging parameter changes. After you have finished working with parameters, cycle the keyswitch to clear the password.

The following list describes the default passwords for accessing parameter menus:

- User access level: 1111
- OEM access level: 2222

Curtis recommends that you change the default passwords. Passwords are changed with the OEM Menu Password and USER Menu Password parameters on the Password menu.

The following topics describe how to open and use the screens.

Open the 3301T's Main Menu

The 3301T's main menu is not password-protected. Take the following steps to open the main menu.

Note: The parameters contained by the Monitor and Program menus are password-protected. To open them, perform the steps in the next section.

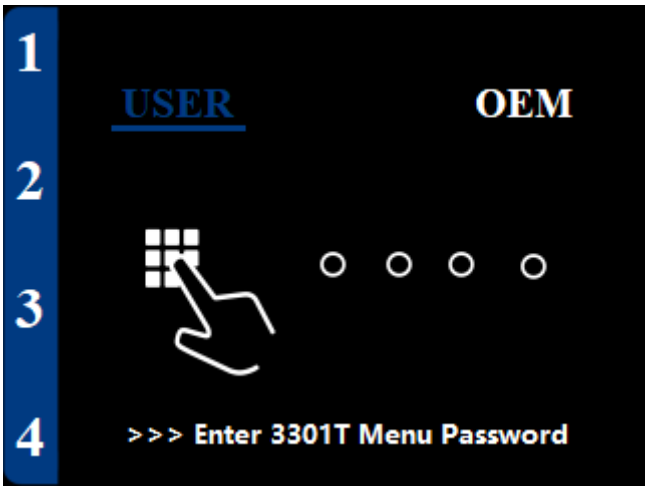
1. Go to the home screen.
2. Press the F1 button. The main menu displays and you can now view and edit parameters.

To exit the menu, press the F1 button.

Open the 3301T's Parameter Menus

You must enter a password to open all of the 3301T's menus, which include the main menu, Program menu, and Monitor menu. Take the following steps to open these menus.

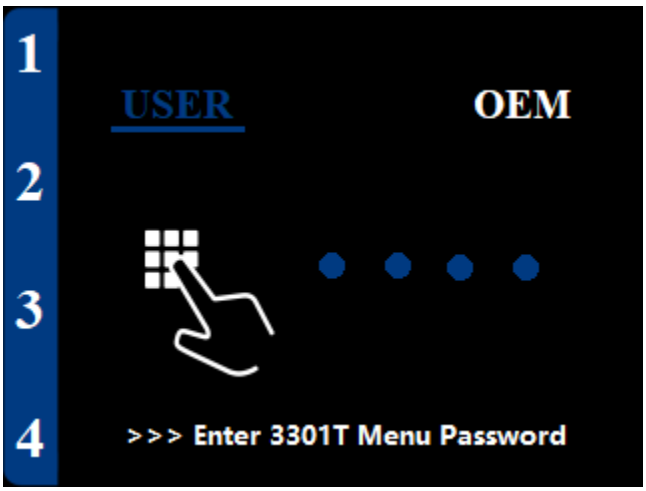
1. Go to the home screen.
2. Press the F2 button. The Password screen displays:



You can enter a password for either the User or OEM access level. The screen's active access level is highlighted in blue; in the example above, the User access level is active.

3. To change the active access level, press the S, E, H, or button.
4. Use the F1–F4 buttons to enter the four-digit password, which consists of the numbers 1–4. Pressing an F1–F4 button enters the number that follows the letter "F" in the button name: for example, the F2 button enters 2.

   To indicate how many of the password characters have been entered, the corresponding circle in the middle of the screen turns blue when a button is pushed. In the following example, four numbers have been entered:



   Tip: To clear the most recently entered number, press the C button; the corresponding circle turns white. To exit the password screen, press the C button until the password is cleared, then press the button again.

5. Press the button to submit the password. If the password is correct, the main menu displays and you can now view and edit parameters.

   If the password screen indicates that the wrong password was entered, press the C button to clear the password, then repeat steps 3–5.

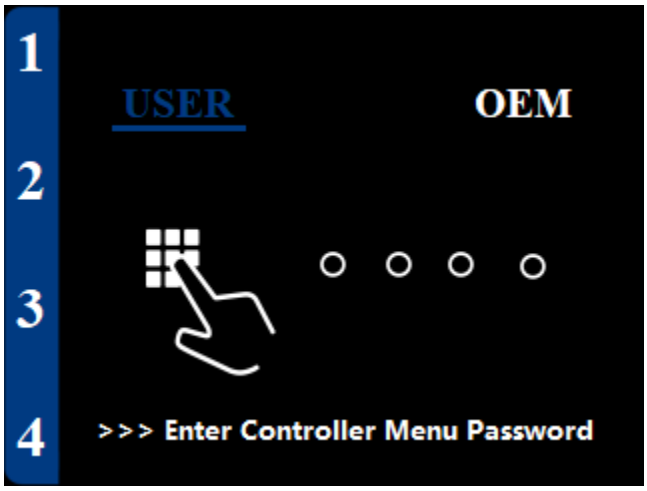
To exit the menu, press the F2 button.

IMPORTANT: After you have finished working with parameters, cycle the keyswitch to clear the password.

Open Read-Write Parameter Menus for Other Curtis Devices

The 3301T allows you to view and edit parameters of Curtis devices that are connected through the CANbus or that support the ESP/SP protocol and are connected through the serial port. Take the following steps to open other Curtis devices' menus.

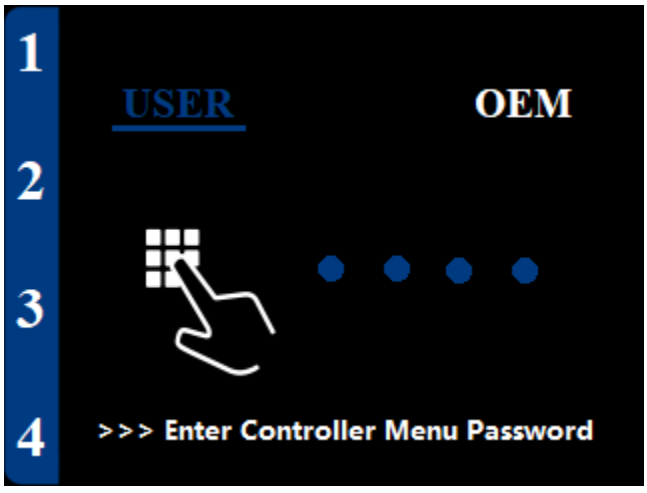
1. Go to the home screen.
2. Press the F3 button. The Password screen displays:



   You can enter a password for either the User or OEM access level. The screen's active access level is highlighted in blue; in the example above, the User access level is active.

3. To change the active access level, press the S, E, H, or button.
4. Use the F1–F4 buttons to enter the four-digit password, which consists of the numbers 1–4. Pressing an F1–F4 button enters the number that follows the letter "F" in the button name: for example, the F2 button enters 2.

   To indicate how many of the password characters have been entered, the corresponding circle in the middle of the screen turns blue when a button is pushed. In the following example, four numbers have been entered:



   Tip: To clear the most recently entered number, press the C button; the corresponding circle turns white. To exit the password screen, press the C button until the password is cleared, then press the button again.

5. Press the button to submit the password. If the password is correct, the 3301T will list the Curtis devices on the CANbus.
   If the password screen indicates that the wrong password was entered, press the C button to clear the password, then repeat steps 3–5.
6. If multiple devices are listed, use the and buttons to select the device you want to work with.
7. Press the button. The 3301T downloads the device's menu and then displays the main menu. You can now view and edit parameters.

To exit the menu, press the F3 button.

IMPORTANT: After you have finished working with parameters, cycle the keyswitch to clear the password.

Open Read-Only Parameter Menus of Devices Connected to the Serial Port

The 3301T provides read-only access to the main and Monitor menus of Curtis devices that support the ESP/SP protocol and are connected through the serial port. Take the following steps to open these menus:

1. Go to the home screen.
2. Press the F4 button. The main menu displays and you can now view parameters.

To exit the menus, press the F4 button.

Using the Parameter Menu Screens

The following table describes how to use the 3301T's buttons to navigate the menus and change parameter values:

Action	Button
Scroll up to the previous menu item on the screen.	H
Scroll down to the next menu item on the screen.	
Open the selected menu.	E or
Return to the previous menu. **Note**: If the device's main menu is displayed, pressing this button returns to the home screen.	S or C
Increment a parameter value.	
Decrement a parameter value.	C

In addition, you can rapidly change parameter values by factors of 10, 100, or 1000 times the parameter's step size. For example, suppose that you need to increase a parameter's value by 1000 step sizes. Instead of incrementing the value 1000 times, you can increase the value by pressing a few buttons.

Take the following steps to rapidly change the selected parameter's value:

1. Press the F4 button until the screen's upper right corner indicates the factor by which to change the value. The following table lists the indicators:

Indicator	Factor
x1	1 **Note**: x1 is the default, and indicates that the parameter value will be incremented or decremented by one step size.
x10	10
x100	100
x1000	1000

2. Perform one of the following steps:
   - To increase the value by the specified factor, press the ↵+ button.
   - To decrease the value by the specified factor, press the C- button.
3. If the value needs further adjustment but by a different factor, repeat this procedure.

ALARM BUZZER

The 3301T has a buzzer that emits sounds through the rear of the device. The buzzer is activated when the 3301T receives a fault code through the CANbus or through the fault code inputs for the DC traction and pump controllers.

Preset User Interfaces — 3301T-7001 Model

The 3301T-7001 model provides applications with preset user interfaces for the following types of vehicles:

- Counterbalanced forklifts.
- Reach trucks and order pickers.

Figure 2 and Figure 3 show the home screens of both applications' user interfaces. The home screens consist of the areas indicated with callouts, which are described in Table 2.

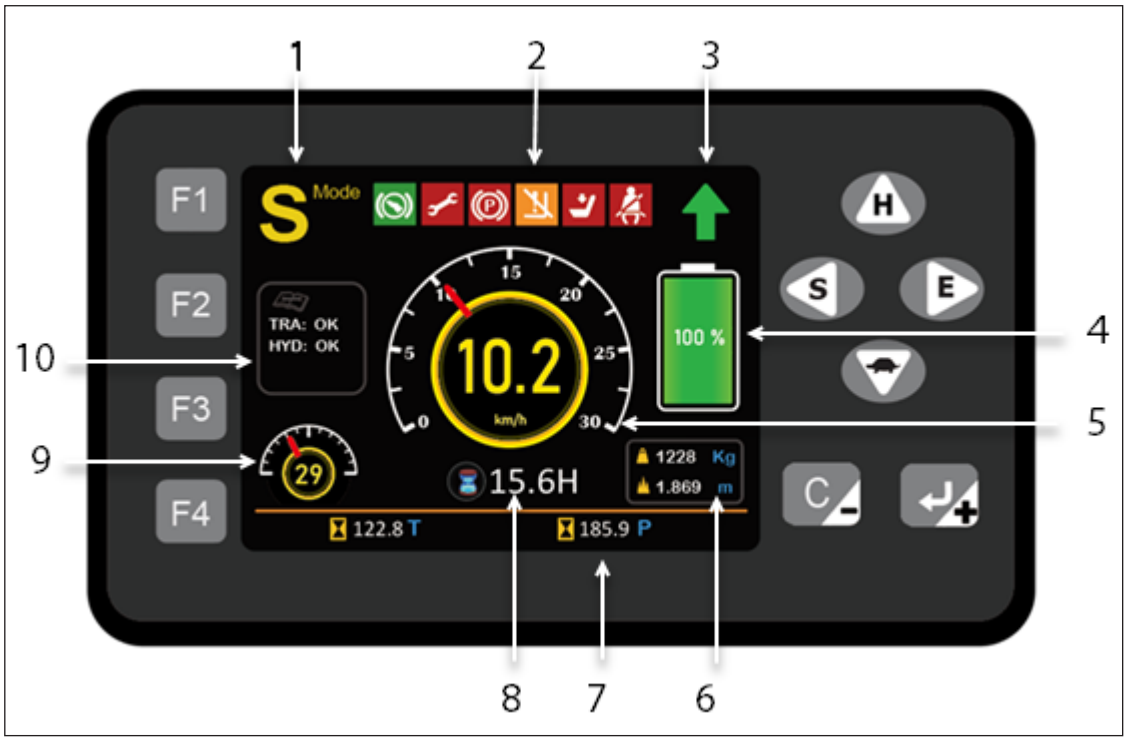


Figure 2

Counterbalanced Forklifts Application — 3301T-7001

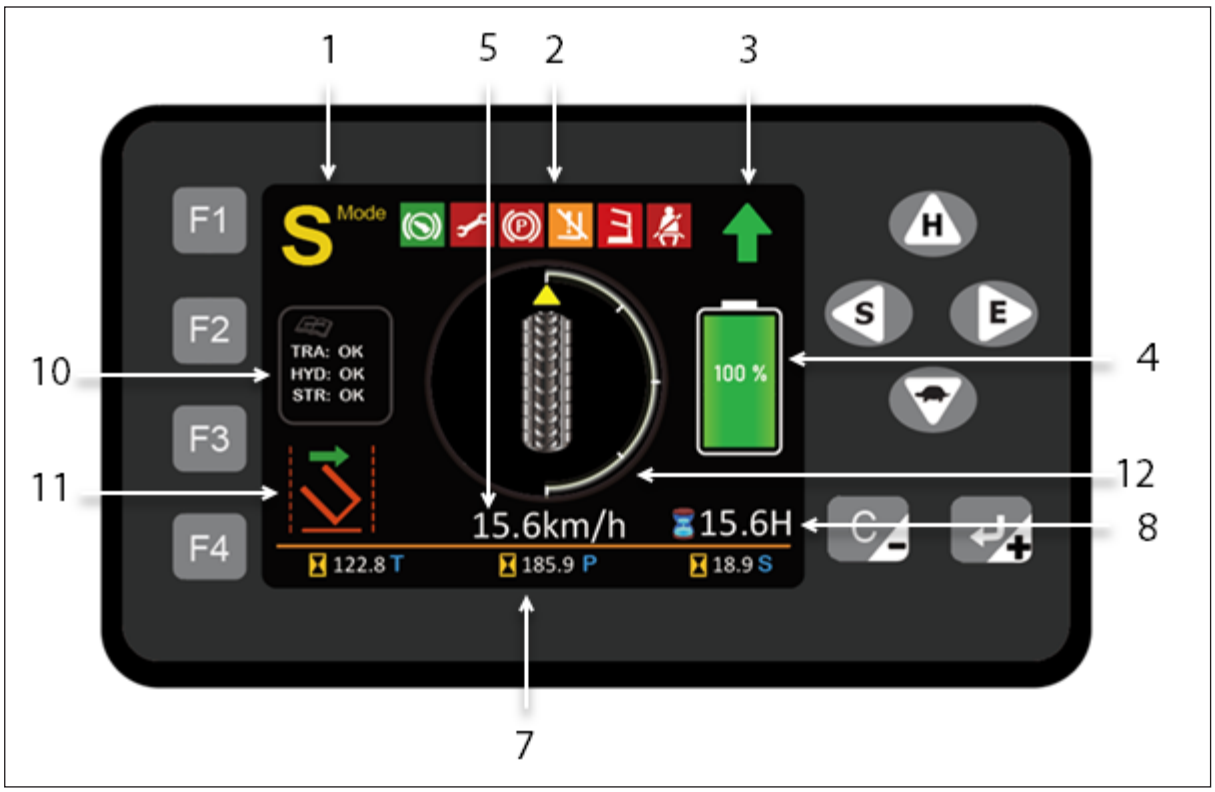


Figure 3

Reach Trucks and Order Pickers Application — 3301T-7001

The following table describes the areas contained by the home screens. Unless otherwise indicated, these areas are contained by both home screens.

Table 2 3301T-7001 Home Screen Areas

Number	Area
1	Speed mode.
2	Signal icons.
3	Direction.
4	BDI.
5	Speedometer.
6	Cargo weight and lift height *(counterbalanced forklifts application only).*
7	Controller hour meters.
8	Keyswitch hour meter.
9	Steering angle *(counterbalanced forklifts application only).*
10	Fault codes.
11	Forklift status *(reach trucks and order pickers application only).*
12	Steering angle *(reach trucks and order pickers application only).*

The following topics describe these areas.

Speed Mode

The speed mode area indicates the selected mode. When a user presses a speed mode button, TPDO1 transmits the selected mode. The following table describes the icons that indicate the speed modes and the buttons that specify the modes:

Icon	Speed Mode	Button
S Mode	Standard	
H Mode	High speed	
E Mode	Economy	
	Turtle	

Signal Icons

The signal icons indicate vehicle actions and states, and are described in the following table:

Icon	Description
	Parking
	Seat
	Seat belt
	Safety pedal
	Guardrail
	Left hand
	Right hand
	Roadway mode
	Oil filter
	Chain
	Lift lockout
	Fault active **Note**: The fault icon blinks when a fault is detected or when the 3301T is not receiving fault signals from other devices.

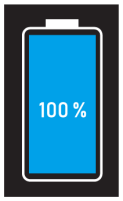
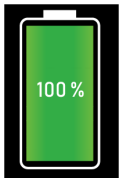
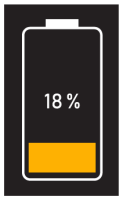
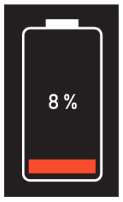
Direction Icons

The following icons indicate the vehicle's direction:

Icon	Description
	Forward
	Backward
	Neutral
	Left turn
	Right turn

BDI

The BDI area uses the following gauges to indicate the battery's state of charge. The gauge colors depend upon the BDI percentage:

Icon	BDI Status	BDI Percentage
The color depends upon the battery type: **Lithium:**  **Lead acid:** 	Okay	20–100%
	Warning	10–19%
	Low	0–9%

The Warning and Low icons flash when they are active. If the BDI percentage is too low, lift lockout is activated, and the icon displays.

Speedometer

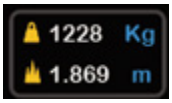
The speedometer displays the speed in km/h or mph; the unit of measurement is specified with the Speed Unit parameter. The following figures show how the preset user interfaces display the speedometer:

Figure 4
Speedometer — Counterbalanced Forklifts

Figure 5
Speedometer — Reach Trucks and Orders Pickers

Cargo Weight and Lift Height

The counterbalanced forklifts application can be configured to display the vehicle's cargo weight or lift height or both:



Controller Hour Meters

The 3301T-7001 provides hour meters for the controllers listed in the following table:

Icon	Hour Meter
185.9 P	Pump controller hour meter
122.8 T	Traction controller hour meter
18.9 S	Steering controller hour meter

Keyswitch Hour Meter

The keyswitch hour meter indicates the number of hours that the 3301T's keyswitch has been on since the hour meter was last reset:

Steering Angle

Both preset user interfaces provide gauges that display the steering angle; however, the gauges have different appearances.

The following example shows the steering angle gauge displayed by the counterbalanced forklifts application:

The following example shows the steering angle gauge displayed by the reach trucks and order pickers application:

Fault Codes

The fault codes area indicates whether faults are active for the vehicle system components listed in the following table. The components' indicators are identified with the abbreviations listed in the second column:

Component	Abbreviation
Traction controller	Depends upon whether the vehicle system has one or two traction controllers: • One controller: TRA • Two controllers: ◦ TRA L ◦ TRA R
Pump controller	HYD
Steering controller	STR
Lithium battery	BAT

If a component has no active faults, OK is displayed. In the following example, no faults are active for the traction controller, pump controller, and steering controller:

A fault code displays if a component has active faults. In the following example, the steering controller has an active fault identified by the fault code 1, 8:

Note: The 3301T also displays fault names. See View Fault Names.

Forklift Status

The reach trucks and order pickers application contains the forklift status area. The following icons indicate the lift's action and direction:

Icon	Lift Status
	Inactive lift
	Lift up
	Lift down
	Lift left
	Lift right
	Lift up and left
	Lift up and right
	Lift down and left
	Lift down and right
	Rotate clockwise
	Rotate counterclockwise
	Shift left
	Shift right

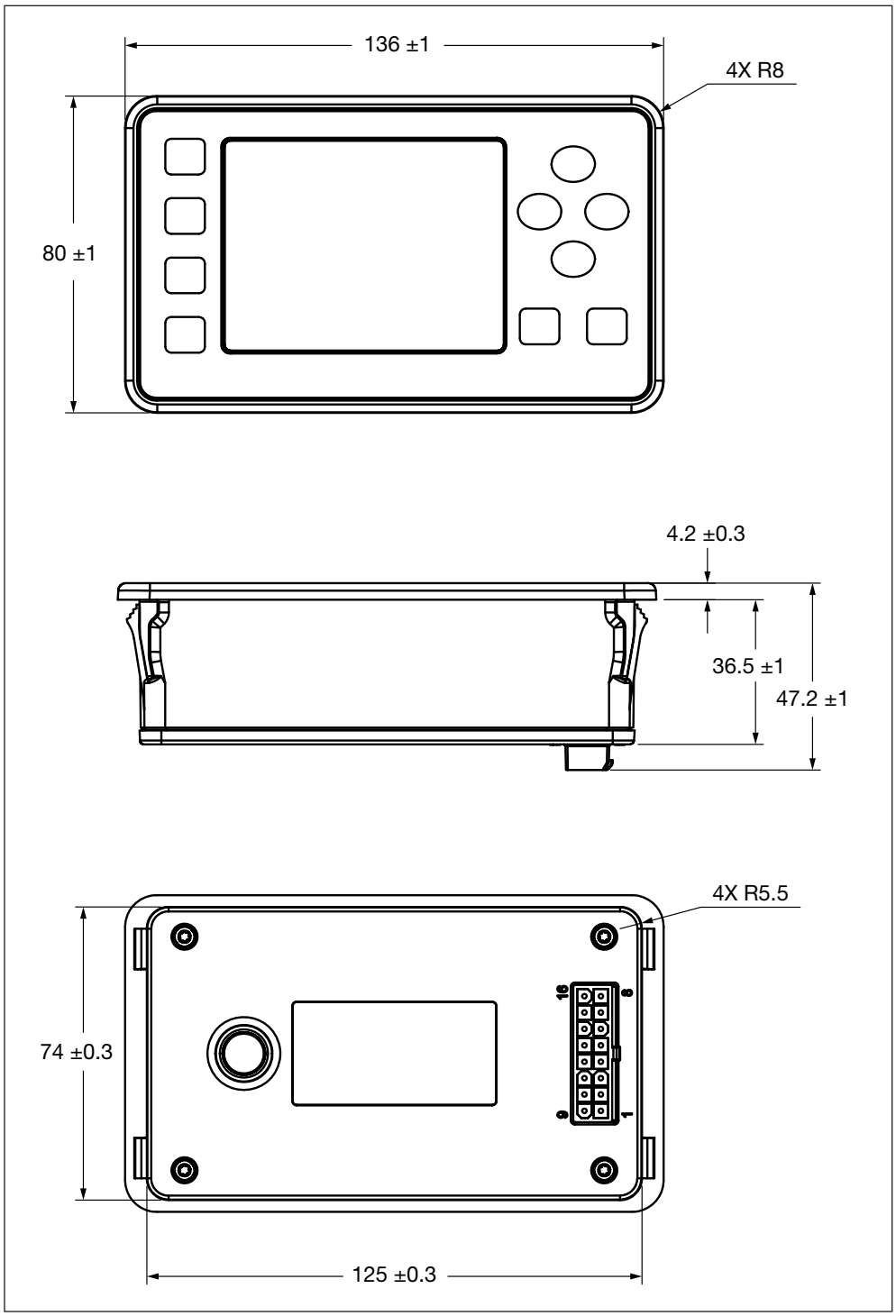
3 — INSTALLATION AND WIRING

This chapter explains how to install and wire the 3301T.

INSTALLING THE 3301T

Install the 3301T in a location that will keep the device clean and dry. The recommended panel cutout is 74.3 + 0.8/–0 × 125.3 + 0.8/–0 mm, with a panel thickness between 2.0–4.0 mm.

Figure 6
Mounting Dimensions



I/O CONNECTOR

The mating connector is a 16-pin Mini-Universal MATE-N-LOK housing from TE Connectivity. The face is sealed to IP65. The rear is sealed to IP65 for electronic components and IP40 for the connector. Curtis recommends that you increase the connector's protection to IP54 by using the parts listed in Table 4.

The following tables list the TE Connectivity parts for IP40 and IP54 protection.

Table 3 Mating Connector Parts — IP40 Protection

Part	TE Connectivity Part Number
Connector Housing	770583-1
Terminal (18–22 AWG)	770904-*X*

Table 4 Mating Connector Parts — IP54 Protection

Part	TE Connectivity Part Number
Connector Housing	794824-1
Terminal (18–22 AWG)	770904-*X*
Interface Seal	1-1586362-6
Single Wire Seal or Gang Seal	• Single: 794758-1 • Gang: 1-1586359-6
Cavity Plug Seal (for unused terminal positions)	794995-1

I/O PINS

Table 5 I/O Pins

Pin	Signal Name	Description
1	SCI Rx	Serial communications — Rx.
2	SCI GND	Serial communications — ground.
3	CAN_L	CAN low.
4	CAN_L Termination	CAN 120Ω termination resistor — low.
5	Switch Input1/Analog Input1/Frequency Input 1	Input for switch, analog, or frequency signals.
6	Switch Input3/Analog Input3/HYD Fault Code Input	Input for switch, analog, or hydraulic controller fault code signals.
7	Keyswitch	
8	Switch Input5/MOSFET OUTPUT	Switch input or driver output.
9	SCI Tx	Serial communications — Tx.
10	CAN_GND	CAN ground.
11	CAN_H	CAN high.
12	CAN_H Termination	CAN 120Ω termination resistor — high.
13	Switch Input2/Analog Input2/Frequency Input 2	Input for switch, analog, or frequency signals.
14	Switch Input4/Analog Input4/TRA Fault Code Input	Input for switch, analog, or traction controller fault code signals.
15	B–	
16	B+	

WIRING DIAGRAM

Figure 7 is a representative wiring diagram for Curtis 3301T models.

Note: The diagram may differ from your application's requirements. However, the controller provides the I/Os and programmable parameters needed to meet almost all requirements. To discuss how to implement your application, contact your Curtis distributor or the Curtis sales and support office in your region.

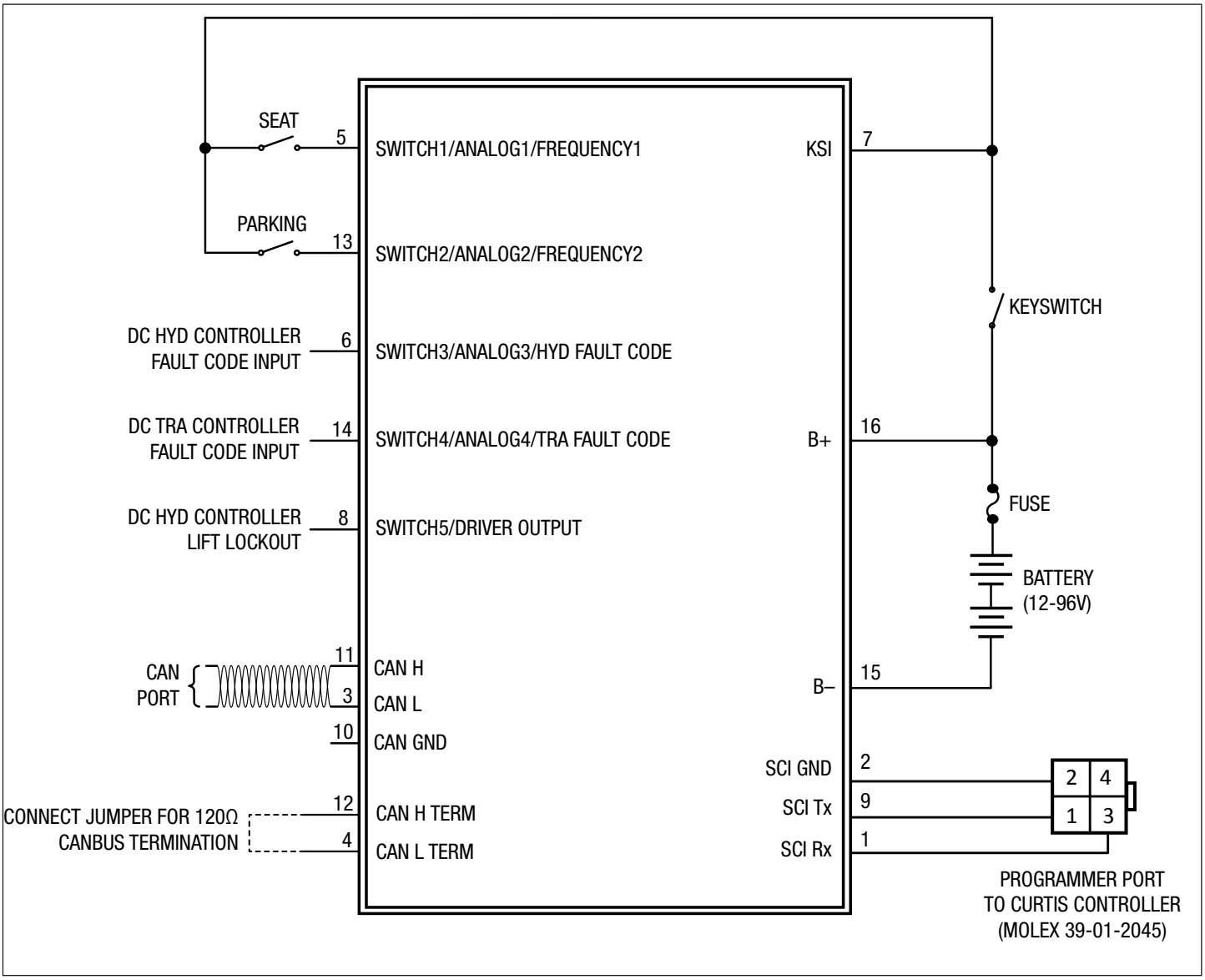


Figure 7
Wiring Diagram

OPERATING VOLTAGE

The following table describes the B+ startup and operating voltages:

Minimum	Minimum Startup	Nominal	Maximum
9VDC	10VDC	12–96VDC	120VDC

Applying B+ voltages above 120V may damage the 3301T and is not recommended. The device is designed to withstand continuous reverse polarity connections.

Note: All voltages listed in this manual are DC voltages.

OPERATING CURRENT

The following tables describe the B+ pin's operating current with the LCD heater off and on:

Table 6 Operating Current — LCD Heater Off

B+ Voltage	Keyswitch on		Keyswitch off
	Typical	Maximum	
12V	166mA	209mA	110mA
24V	80mA	100mA	54mA
36V	56mA	69mA	39mA
48V	46mA	54mA	32mA
60V	39mA	54mA	28mA
72V	36mA	42mA	26mA
80V	34mA	40mA	25mA
96V	33mA	37mA	24mA

Table 7 Operating Current — LCD Heater On

B+ Voltage	Typical	Maximum
12V	645mA	685mA
24V	575mA	596mA
36V	536mA	550mA
48V	524mA	530mA
60V	488mA	503mA
72V	482mA	486mA
80V	470mA	475mA
96V	463mA	466mA

BATTERY CONNECTIONS

Connect the battery to the B+ and B– inputs (pins 16 and 15). Curtis recommends that you include a fuse in the circuit that connects the battery to the B+ input, as shown in Figure 7. The fuse will protect the power system from external shorts and should be sized according to your application's requirements.

KEYSWITCH

The keyswitch input (pin 7) is active high. Connect the keyswitch input to B+ via a keyswitch.

SWITCH 1–5 INPUTS

The switch 1–5 inputs can be configured for various functions. The following table lists the inputs' pins, functions, and the parameters used to configure the functions:

Switch Input	Pin	Switch	Traction Fault Code	Hydraulic Fault Code	Analog	Frequency	Driver	Parameter
1	5	x			x	x		Sender 1 Type
2	13	x			x	x		Sender 2 Type
3	6	x		x	x			Sender 3 Type
4	14	x	x		x			Sender 4 Type
5	8	x					x	Output Mode

Note: The analog and frequency functions are reserved.

The following sections describe these inputs.

Switch Inputs

The switch 1–4 inputs can be configured as active high (switched to B+) or active low (switched to B–). Switch input 5 is active high. The switches' statuses can be used to turn signal icons on or off.

The voltage range of the switch inputs is identical to the B+ operating voltage range. The input signals must be within the range of threshold voltages listed in the following table:

Threshold	Minimum	Maximum
Active high	4.0V	Maximum B+ voltage
Active low	*N/A*	1.0V

Fault Code Inputs

Switch inputs 3 and 4 can be used to detect fault codes of Curtis DC controllers. Fault information is displayed in the fault codes area and the Fault Name screen:

- Switch input 3 is for Curtis DC pump controllers such as the 1253 and 1253C models.
- Switch input 4 is for Curtis DC traction controllers such as the 1243 and 1244 models.

Sender Inputs

Switch inputs 1–4 can be used as analog resistive or voltage inputs. The analog signals can be used to display data such as temperature, fuel, and tire pressure. Switch inputs 1 and 2 can also be used as frequency inputs for devices such as speedometers and tachometers.

The analog and frequency functions are reserved. Curtis engineers use these functions to create custom applications. If you need a custom application, contact your Curtis distributor or the Curtis sales and support office in your region.

MOSFET Driver

Switch input 5 can be used as a low side MOSFET driver. The continuous output current is limited to 1A. The driver can be configured for the following output modes:

- Current
- Voltage
- PWM
- Lift lockout

In current, voltage, and PWM modes, the PWM frequency is 16 kHz. In lift lockout mode, the MOSFET output indicates on or off. The Output menu contains parameters that configure the output.

CAN CONNECTIONS

To connect the 3301T to the CANbus, connect CAN Low and CAN High to pins 3 and 11, respectively. Use twisted-pair wiring to minimize the likelihood of picking up a voltage bias on only one signal.

The device contains a 120Ω terminating resistor. To enable the resistor, short pins 4 and 12.

Note: For information on the 3301T's CAN parameters and features, see CAN Menu and CANopen Communications.

4 — PROGRAMMABLE PARAMETERS

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- — Serial Number
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- — Language
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- — Buzzer Alarm
- — Programmer Protocol
- — Vehicle Config
- — Startup Logo Select

The programmable parameters allow you to configure the 3301T so that it meets your application's requirements. Curtis programming devices provide a user-friendly way to read and write to the parameters. You can also use the 3301T to read and write to parameters; see View and Edit Parameters.

Restart the device after you change a parameter marked as [PCF]. If the device is not restarted, a Parameter Change fault will occur.

The parameters are grouped into menus. This chapter describes the main menu and the menus contained by the Program menu, and the Monitor Parameters chapter describes the menus contained by the Monitor menu.

The following columns in the parameter description tables contain multiple types of information:

- **Parameter** and **CAN Index**: The parameter name, followed by the CAN index and sub-index. This column also identifies parameters marked as [PCF].

  Note: CAN indexes and sub-indexes are delimited by colons. For example, a parameter with an index of `0x640F` and a sub-index of `0x00` would be represented as `0x640F:00`.
- **Values** and **Raw Values**: The allowed values as displayed in Curtis programming devices, followed by allowed values in raw units suitable for CAN messages.
- **Access Level** and **Default Value**. The parameter's access level for Curtis programming devices, followed by the default value.

  Note: Table 1 describes how the Curtis programming device access levels correspond to the 3301T access levels.

Most of the parameters described in this chapter are read-write. If a parameter is read-only, the last line of the Description column will consist of "RO".

MAIN MENU PARAMETERS

The 3301T's main menu contains the following parameters:

MAIN MENU

PARAMETER CAN INDEX	VALUES RAW VALUES	DATA SIZE	ACCESS LEVEL DEFAULT VALUE	DESCRIPTION
Model Number 0x600D:00	–32768 to 32767 –32768 to 32767	32-bit	Field Basic 0	Indicates the model number. RO
Serial Number 0x1018:04	0–999999 0–999999	32-bit	Field Basic 0	Indicates the serial number. RO
CDEV 0x690D:00	–2147483648 to 2147483647 –2147483648 to 2147483647	32-bit	Field Basic 0	Indicates the device profile's version. RO
OS Version 0x690C:00	–2147483648 to 2147483647 –2147483648 to 2147483647	32-bit	Field Basic 0	Indicates the operating system's version. RO
LCD Backlight 0x640F:00	1–10 1–10	32-bit	Field Basic 5	Indicates the brightness of the device's backlight, with 10 indicating the maximum brightness.
Speed Unit 0x6040:00	Enumerated 0–1	32-bit	Field Basic 0	Indicates the speedometer's unit of measurement: 0 = KPH 1 = MPH
Language 0x4802:00	Enumerated 0–1	32-bit	Field Basic 0	Indicates the language in which the 3301T displays information: 0 = English 1 = Chinese
Battery Type 0x690B:00	Enumerated 0–1	32-bit	Field Basic 0	Indicates the battery type: 0 = Lead-Acid 1 = Lithium

SET HOURMETERS MENU

Use the Set Hourmeters menu to specify the password for resetting hour meters. After the password has been entered the Set Hourmeters submenu is displayed. The submenu contains parameters that reset the hour meters.

Note: The default password for resetting the hour meters is 1234. Curtis recommends that you change the default password.

Take the following steps to specify the password:

1. Specify the password as the Input Hrm Password parameter value.
2. Set the Confirm Input Password parameter to On. If the password is valid, the Set Hourmeters submenu is displayed.

SET HOURMETERS MENU

PARAMETER CAN INDEX	VALUES RAW VALUES	DATA SIZE	ACCESS LEVEL DEFAULT VALUE	DESCRIPTION
Input Hrm Password 0x6906:00	1111–9999 1111–9999	32-bit	OEM Dealer 5555	Specifies the password for resetting hour meters. **Note**: The default value is not the same value as the actual password.
Confirm Input Password 0x6908:00	Off/On 0–1	32-bit	OEM Dealer Off	Submits the password specified with the Input Hrm Password parameter.
Status of Set Hourmeters 0x6907:00	Enumerated 0–1	32-bit	OEM Dealer Disable	Indicates whether the hour meters can be reset: 0 = Disable 1 = Enable When a valid hour meter password has been specified, the value changes to Enable. RO

Set Hourmeters Submenu

Use the Set Hourmeters submenu to reset the hour meters and to change the password for resetting hour meters.

SET HOURMETERS SUBMENU

PARAMETER CAN INDEX	VALUES RAW VALUES	DATA SIZE	ACCESS LEVEL DEFAULT VALUE	DESCRIPTION
Reset KSI Hourmeter 0x646A:00	Off/On 0–1	16-bit	OEM Dealer Off	Specify On to reset the keyswitch hour meter.
Reset TRA Hourmeter 0x646B:00	Off/On 0–1	16-bit	OEM Dealer Off	Specify On to reset the traction controller hour meter.
Reset HYD Hourmeter 0x646C:00	Off/On 0–1	16-bit	OEM Dealer Off	Specify On to reset the pump controller hour meter.
Reset STR Hourmeter 0x646D:00	Off/On 0–1	16-bit	OEM Dealer Off	Specify On to reset the steering controller hour meter.
Set KSI Hourmeter 0x642C:00	0–99999.9 hours 0–999999	32-bit	OEM Dealer 0	Sets the keyswitch hour meter to a specific value.
Change Hrm Password 0x6905:00	1111–9999 1111–9999	32-bit	OEM Dealer 1234	Specifies the password for resetting the hour meters.

CAN MENU

The following table describes the parameters on the CAN menu.

Note: The CAN menu also contains the RPDO 1–4 Byte Map and TPDO 1–4 Byte Map menus, which specify the objects for which the PDOs transmit and receive data.

CAN MENU

PARAMETER CAN INDEX	VALUES RAW VALUES	DATA SIZE	ACCESS LEVEL DEFAULT VALUE	DESCRIPTION
CAN Node ID 0x2000:01	1–127 1–127	16-bit	Field Intermediate 46	Specifies the 3301T's node ID.
CAN Baud Rate 0x2001:01	–1 to 4 –1 to 4	16-bit	Field Intermediate 1	Specifies the 3301T's baud rate: –1 = 100 Kbps 0 = 125 Kbps 1 = 250 Kbps 2 = 500 Kbps 3 = 800 Kbps 4 = 1 Mbps
ECS CAN Node ID 0x3104:00	1–127 1–127	32-bit	Field Intermediate 70	Specifies the node ID for the ECS.

RPDO and TPDO Byte Map Menus

The parameters on the RPDO 1–4 Byte Map and TPDO 1–4 Byte Map menus are used to configure PDOs. RPDO 1–3 and TPDO 1–2 are preconfigured to transmit and receive messages; see Preconfigured PDOs. Modify a preconfigured PDO only if the application does not require the PDO's preconfigured functions.

Note: RPDO4 and TPDO 3–4 are reserved for future use.

The menus contain parameters with the same names, allowed values, and data sizes. The only differences between parameters of the same name are their CAN indexes and default values. For simplicity's sake, the following table describes the PDO Byte Map menus' parameters and Table 8 lists the parameters' CAN indexes and default values.

RPDO AND TPDO BYTE MAP MENU

PARAMETER	VALUES RAW VALUES	DATA SIZE	ACCESS LEVEL	DESCRIPTION
Length	0–8 0–8	8-bit	OEM Dealer	Specifies the number of objects mapped to the PDO.
Map 1	0–FFFFFFFFh 0–FFFFFFFFh	32-bit	OEM Dealer	Specifies the PDO's first mapped object.
Map 2	0–FFFFFFFFh 0–FFFFFFFFh	32-bit	OEM Dealer	Specifies the PDO's second mapped object.
Map 3	0–FFFFFFFFh 0–FFFFFFFFh	32-bit	OEM Dealer	Specifies the PDO's third mapped object.
Map 4	0–FFFFFFFFh 0–FFFFFFFFh	32-bit	OEM Dealer	Specifies the PDO's fourth mapped object.
Map 5	0–FFFFFFFFh 0–FFFFFFFFh	32-bit	OEM Dealer	Specifies the PDO's fifth mapped object.
Map 6	0–FFFFFFFFh 0–FFFFFFFFh	32-bit	OEM Dealer	Specifies the PDO's sixth mapped object.
Map 7	0–FFFFFFFFh 0–FFFFFFFFh	32-bit	OEM Dealer	Specifies the PDO's seventh mapped object.
Map 8	0–FFFFFFFFh 0–FFFFFFFFh	32-bit	OEM Dealer	Specifies the PDO's eighth mapped object.

Table 8 PDO Byte Map Menus — CAN Indexes and Default Values

PARAMETER	PDO	CAN INDEX	DEFAULT VALUE
Length	RPDO1	0x1600:00	8
Map 1	RPDO1	0x1600:01	0x66010008
Map 2	RPDO1	0x1600:02	0x66030008
Map 3	RPDO1	0x1600:03	0x66040008
Map 4	RPDO1	0x1600:04	0x66000008
Map 5	RPDO1	0x1600:05	0x66020008
Map 6	RPDO1	0x1600:06	0x64170008
Map 7	RPDO1	0x1600:07	0x66050008
Map 8	RPDO1	0x1600:08	0x66060008
Length	TPDO1	0x1A00:00	4
Map 1	TPDO1	0x1A00:01	0x66070008
Map 2	TPDO1	0x1A00:02	0x660C0008
Map 3	TPDO1	0x1A00:03	0x642C0020
Map 4	TPDO1	0x1A00:04	0x66170008
Map 5	TPDO1	0x1A00:05	0
Map 6	TPDO1	0x1A00:06	0
Map 7	TPDO1	0x1A00:07	0
Map 8	TPDO1	0x1A00:08	0
Length	RPDO2	0x1601:00	5
Map 1	RPDO2	0x1601:01	0x66090008
Map 2	RPDO2	0x1601:02	0x660A0020
Map 3	RPDO2	0x1601:03	0x660D0008
Map 4	RPDO2	0x1601:04	0x660F0008
Map 5	RPDO2	0x1601:05	0x660E0008
Map 6	RPDO2	0x1601:06	0
Map 7	RPDO2	0x1601:07	0
Map 8	RPDO2	0x1601:08	0
Length	TPDO2	0x1A01:00	2
Map 1	TPDO2	0x1A01:01	0x660B0008
Map 2	TPDO2	0x1A01:02	0x660B0020
Map 3	TPDO2	0x1A01:03	0
Map 4	TPDO2	0x1A01:04	0
Map 5	TPDO2	0x1A01:05	0
Map 6	TPDO2	0x1A01:06	0
Map 7	TPDO2	0x1A01:07	0
Map 8	TPDO2	0x1A01:08	0
Length	RPDO3	0x1602:00	3
Map 1	RPDO3	0x1602:01	0x66100008
Map 2	RPDO3	0x1602:02	0x66080010
Map 3	RPDO3	0x1602:03	0x66110020
Map 4	RPDO3	0x1602:04	0
Map 5	RPDO3	0x1602:05	0
Map 6	RPDO3	0x1602:06	0
Map 7	RPDO3	0x1602:07	0
Map 8	RPDO3	0x1602:08	0

Table 8 PDO Byte Map Menus — CAN Indexes and Default Values, cont'd

PARAMETER	PDO	CAN INDEX	DEFAULT VALUE
Length	TPDO3	0x1A02:00	0
Map 1	TPDO3	0x1A02:01	0
Map 2	TPDO3	0x1A02:02	0
Map 3	TPDO3	0x1A02:03	0
Map 4	TPDO3	0x1A02:04	0
Map 5	TPDO3	0x1A02:05	0
Map 6	TPDO3	0x1A02:06	0
Map 7	TPDO3	0x1A02:07	0
Map 8	TPDO3	0x1A02:08	0
Length	RPDO4	0x1603:00	0
Map 1	RPDO4	0x1603:01	0
Map 2	RPDO4	0x1603:02	0
Map 3	RPDO4	0x1603:03	0
Map 4	RPDO4	0x1603:04	0
Map 5	RPDO4	0x1603:05	0
Map 6	RPDO4	0x1603:06	0
Map 7	RPDO4	0x1603:07	0
Map 8	RPDO4	0x1603:08	0
Length	TPDO4	0x1A03:00	0
Map 1	TPDO4	0x1A03:01	0
Map 2	TPDO4	0x1A03:02	0
Map 3	TPDO4	0x1A03:03	0
Map 4	TPDO4	0x1A03:04	0
Map 5	TPDO4	0x1A03:05	0
Map 6	TPDO4	0x1A03:06	0
Map 7	TPDO4	0x1A03:07	0
Map 8	TPDO4	0x1A03:08	0

BDI MENU

The source of the BDI percentage displayed by the 3301T can be either the 3301T's internal BDI calculations or RPDO1. The parameters on the BDI menu are used for the internal calculations.

BDI MENU

PARAMETER CAN INDEX	VALUES RAW VALUES	DATA SIZE	ACCESS LEVEL DEFAULT VALUE	DESCRIPTION
Nominal Voltage 0x6400:00	Enumerated 0–2	32-bit	Field Intermediate 0	Specifies the battery's nominal voltage: 0 = 12/48/80V 1 = 24/60/96V 2 = 36/72V The BDI algorithm requires that the nominal voltage is correctly specified.
Charge Full 0x6420:00	1.500–2.500V 1500–2500	32-bit	Field Intermediate 2.350V	Specifies the battery cell voltage above which the battery is considered charged. Charge Full must be at least 0.200V above Charge Empty.
Charge Empty 0x6421:00	1.500–2.500V 1500–2500	32-bit	Field Intermediate 2.100V	Specifies the battery cell voltage above which the battery is considered as starting to charge. Charge Empty must be at least 0.200V below Charge Full and at least 0.010V above Discharge Full.
Discharge Full 0x641E:00	1.500–2.500V 1500–2500	32-bit	Field Intermediate 2.040V	Specifies the battery cell voltage at which the state of charge is considered 100%. Discharge Full must be at least 0.120V more than Discharge Empty and must be between the following values: • Charge Empty – 0.010V • OCR Reset – 0.030V
Discharge Empty 0x641F:00	1.500–2.500V 1500–2500	32-bit	Field Intermediate 1.730V	Specifies the battery cell voltage at which the state of charge is considered 0%. Discharge Empty must be at least 0.120V less than Discharge Full.
OCR Reset 0x6422:00	1.500–2.500V 1500–2500	32-bit	Field Intermediate 2.090V	Specifies the battery cell voltage above which the BDI percentage is reset to 100%. OCR Reset is checked only once; the check occurs when the 3301T is powered up. OCR Reset must be at least 0.030V above Discharge Full and at least 0.010V less than Charge Empty.
Integration Rate 0x6423:00	2–600 minutes 2–600	32-bit	Field Intermediate 30 minutes	Specifies the minimum time for the BDI algorithm to decrease the BDI percentage from 100% to 0% or increase the percentage from 0% to 100%.
Lift Lockout 0x6424:00	0.0–20.0% 0–200	32-bit	Field Intermediate 10.0%	Specifies the BDI percentage below which lift lockout is activated. TPDO1 transmits the lift lockout status.

PASSWORD MENU

The Password parameters specify the passwords for powering on the 3301T and for viewing and editing parameters.

Note: The passwords' ranges of values are 1111–4444. However, passwords can only consist of the digits 1, 2, 3, and 4.

PASSWORD MENU

PARAMETER CAN INDEX	VALUES RAW VALUES	DATA SIZE	ACCESS LEVEL DEFAULT VALUE	DESCRIPTION
OEM Menu Password 0x6011:00	1111–4444 1111–4444	32-bit	OEM Dealer 2222	Specifies the password for accessing parameter menus that have the OEM access level.
USER Menu Password 0x600F:00	1111–4444 1111–4444	32-bit	Field Intermediate 1111	Specifies the password for accessing parameter menus that have the User access level.
PIN Code 0x6010:00	1111–4444 1111–4444	32-bit	Field Intermediate 1234	Specifies the password for powering on the 3301T. **Note**: The PIN Code Source parameter indicates whether a password is required.

MAINTENANCE MENU

The 3301T provides three countdown maintenance monitors. The Maintenance parameters specify intervals for the maintenance monitors and reset the monitors.

Note: The parameters on the Maintenance menu of the Monitor menu indicate how much time remains on the maintenance monitors.

MAINTENANCE MENU

PARAMETER CAN INDEX	VALUES RAW VALUES	DATA SIZE	ACCESS LEVEL DEFAULT VALUE	DESCRIPTION
Maintenance Interval 1 0x643E:00	0.0–3276.7 hours 0–32767	32-bit	Field Intermediate 999.9 hours	Specifies the countdown interval for maintenance monitor 1.
Maintenance Interval 2 0x6444:00	0.0–3276.7 hours 0–32767	32-bit	Field Intermediate 999.9 hours	Specifies the countdown interval for maintenance monitor 2.
Maintenance Interval 3 0x644A:00	0.0–3276.7 hours 0–32767	32-bit	Field Intermediate 999.9 hours	Specifies the countdown interval for maintenance monitor 3.
Reset Maintenance Interval 1 0x6471:00	Off/On 0–1	16-bit	Field Intermediate Off	When On is specified, resets maintenance monitor 1.
Reset Maintenance Interval 2 0x6472:00	Off/On 0–1	16-bit	Field Intermediate Off	When On is specified, resets maintenance monitor 2.
Reset Maintenance Interval 3 0x6473:00	Off/On 0–1	16-bit	Field Intermediate Off	When On is specified, resets maintenance monitor 3.

ODOMETERS MENU

The 3301T provides three odometers. The Odometers parameters reset the odometers.

Note: The parameters on the Odometers menu of the Monitor menu indicate the odometer data.

ODOMETERS MENU

PARAMETER CAN INDEX	VALUES RAW VALUES	DATA SIZE	ACCESS LEVEL DEFAULT VALUE	DESCRIPTION
Reset Odometer 1 0x646E:00	Off/On 0–1	16-bit	Field Intermediate Off	When On is specified, resets odometer 1 to 0.
Reset Odometer 2 0x646F:00	Off/On 0–1	16-bit	Field Intermediate Off	When On is specified, resets odometer 2 to 0.
Reset Odometer 3 0x6470:00	Off/On 0–1	16-bit	Field Intermediate Off	When On is specified, resets odometer 3 to 0.

SENDERS MENU

The Senders parameters specify the types of data received by the switch 1–4 inputs.

SENDERS MENU

PARAMETER CAN INDEX	VALUES RAW VALUES	DATA SIZE	ACCESS LEVEL DEFAULT VALUE	DESCRIPTION
Sender 1 Type 0x6300:00	Enumerated 0–3	32-bit	Field Intermediate 0	Configures the switch 1 input: 0 = Switch Input. 1 = Resistor Input *(reserved).* 2 = Voltage Input *(reserved).* 3 = Frequency Input *(reserved).*
Sender 2 Type 0x6301:00	Enumerated 0–3	32-bit	Field Intermediate 0	Configures the switch 2 input: 0 = Switch Input. 1 = Resistor Input *(reserved).* 2 = Voltage Input *(reserved).* 3 = Frequency Input *(reserved).*
Sender 3 Type 0x6302:00	Enumerated 0–3	32-bit	Field Intermediate 3	Configures the switch 3 input: 0 = Switch Input. 1 = Resistor Input *(reserved).* 2 = Voltage Input *(reserved).* 3 = HYD Fault Input (pump controller).
Sender 4 Type 0x6303:00	Enumerated 0–3	32-bit	Field Intermediate 3	Configures the switch 4 input: 0 = Switch Input. 1 = Resistor Input *(reserved).* 2 = Voltage Input *(reserved).* 3 = TRA Fault Input (traction controller).

OUTPUT MENU

The Output Mode parameter specifies how pin 8 (Switch Input5/MOSFET OUTPUT) is used. The Driver Output Setting parameter and the parameters on the following submenus apply when the pin is used as a driver:

- Ramp
- Initial
- Current Limit
- Dither
- PI

OUTPUT MENU

PARAMETER CAN INDEX	VALUES RAW VALUES	DATA SIZE	ACCESS LEVEL DEFAULT VALUE	DESCRIPTION
Output Mode 0x6620:00	Enumerated 0–5	16-bit	OEM Dealer 4	Specifies the function for pin 8: 0 = Turn Off. 1 = PWM Mode. 2 = Voltage Mode. 3 = Current Mode. 4 = Lift Lock Mode. 5 = Switch Input Mode.
Driver Output Setting 0x66F0:00	0.0–100.0% 0–1000	16-bit	OEM Dealer 0.0%	Specifies the output when pin 8 is used as a driver. How the parameter is used depends upon the Output Mode: • PWM mode: The actual duty cycle. • Voltage mode: The product of this value and the Nominal Voltage parameter is the actual output voltage. • Current mode: The product of this value and the Maximum Current parameter is the actual output current.

Ramp Menu

The following table describes the parameters on the Ramp menu.

RAMP MENU

PARAMETER CAN INDEX	VALUES RAW VALUES	DATA SIZE	ACCESS LEVEL DEFAULT VALUE	DESCRIPTION
Ramp Up Time 0x6650:00	0–10000ms 0–10000	16-bit	OEM Dealer 8ms	Specifies the time it takes to go from minimum to maximum output current.
Ramp Down Time 0x6660:00	0–10000ms 0–10000	16-bit	OEM Dealer 8ms	Specifies the time it takes to go from maximum to minimum output current.

Initial Menu

The following table describes the parameters on the Initial menu.

INITIAL MENU

PARAMETER CAN INDEX	VALUES RAW VALUES	DATA SIZE	ACCESS LEVEL DEFAULT VALUE	DESCRIPTION
Initial PWM Duty 0x6670:00	0.0–100.0% 0–1000	16-bit	OEM Dealer 0.0%	Specifies the PWM duty cycle when the driver output is in its initial stage.
Initial Time 0x6680:00	0–10000ms 0–10000	16-bit	OEM Dealer 0ms	Specifies the initial stage time of the driver output, in 8ms steps.

Current Limit Menu

The parameters on the Current Limit menu specify the driver's minimum and maximum currents. These parameters apply only when the driver is operating in Current mode.

CURRENT LIMIT MENU

PARAMETER CAN INDEX	VALUES RAW VALUES	DATA SIZE	ACCESS LEVEL DEFAULT VALUE	DESCRIPTION
Maximum Current 0x6630:00	0–1000mA 0–1000	16-bit	OEM Dealer 1000mA	Specifies the maximum output current.
Minimum Current 0x6640:00	0–1000mA 0–1000	16-bit	OEM Dealer 0mA	Specifies the minimum output current.

Dither Menu

The parameters on the Dither menu configure the driver's dither pulses. These parameters apply only when the driver is operating in Current mode.

DITHER MENU

PARAMETER CAN INDEX	VALUES RAW VALUES	DATA SIZE	ACCESS LEVEL DEFAULT VALUE	DESCRIPTION
Dither Period 0x66A0:00	2–1000ms 2–1000	16-bit	OEM Dealer 1000ms	Specifies the time between dither pulses for each output, in 2ms steps. A Dither Period of 4–200ms provides a frequency range of 250–5 Hz.
Dither Amount 0x6690:00	0–100% 0–32767	16-bit	OEM Dealer 0%	Specifies how much dither is added or subtracted, in 10mA steps, for each output.

PI Menu

The 3301T has a proportional/integral current controller, which is configured by the parameters on the PI menu.

PI MENU

PARAMETER CAN INDEX	VALUES RAW VALUES	DATA SIZE	ACCESS LEVEL DEFAULT VALUE	DESCRIPTION
Kp 0x66B0:00	1–100% 20–2048	16-bit	OEM Dealer 8%	Specifies the proportional gain factor of the current PI controller.
Ki 0x66C0:00	1–100% 20–2048	16-bit	OEM Dealer 20%	Specifies the integral gain factor of the current PI controller.

MISC MENU

The following table describes the parameters on the Misc menu.

MISC MENU

PARAMETER CAN INDEX	VALUES RAW VALUES	DATA SIZE	ACCESS LEVEL DEFAULT VALUE	DESCRIPTION
Mode Saving 0x4800:00	Off/On 0–1	32-bit	Field Intermediate On	Specifies whether the speed mode is saved when the 3301T is powered down. On indicates that the speed mode is saved.
PIN Code Source 0x3102:00	Enumerated 0–2	32-bit	Field Intermediate None	Specifies whether a password is required when the 3301T is powered up and whether the 3301T or the ECS is used to enter the password: 0 = None. A password is not required. 1 = Internal. The 3301T is used. 2 = External. The ECS is used.
HYD Controller Enable 0x6900:00	Off/On 0–1	32-bit	Field Intermediate On	Specifies whether fault codes for the hydraulic controller are displayed. On indicates the fault codes are displayed.
Buzzer Alarm 0x6901:00	Off/On 0–1	32-bit	Field Intermediate On	Enables or disables the buzzer. On enables the buzzer.
Programmer Protocol 0x6902:00	Enumerated 0–1	32-bit	Field Immediate ESP/SP	Specifies the protocol used for a Curtis programming device: 0 = ESP/SP. For the serial version of the 1313 Handheld Programmer. 1 = CIT. For the Curtis Integrated Toolkit™ (CIT) and the CANbus version of the 1313 Handheld Programmer.
Vehicle Config 0x6909:00	1–65535 1–65535	32-bit RW	OEM Dealer 1	Specifies the type of vehicle that is being used with the 3301T. The correct value must be entered in order to view fault names. If you are not sure of the correct value, contact your Curtis distributor or the Curtis sales and support office in your region.
Startup Logo Select 0x3108:00	Enumerated 0–1	32-bit	Field Intermediate None	Specifies whether the Curtis logo is displayed when the 3301T is powered up: 0 = None 1 = Curtis

5 — MONITOR PARAMETERS

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— PWM Duty
— Current

TEMPERATURE MENU..... p. 45
— Internal Temperature

The Monitor menu contains read-only parameters that indicate real-time data. You can use this data when you are configuring or troubleshooting the application.

Note: For descriptions of the columns in this chapter's parameter description tables, see Programmable Parameters. The parameter descriptions do not include the Default Value column.

HOURMETERS MENU

The following table describes the parameters on the Hourmeters menu.

HOURMETERS MENU

PARAMETER CAN INDEX	VALUES RAW VALUES	DATA SIZE	ACCESS LEVEL	DESCRIPTION
Hourmeter 1 0x6800:00	0–99999.9 hours 0–999999	32-bit	Field Intermediate	Indicates how many hours are on the keyswitch hour meter.
Hourmeter 2 0x6801:00	0–99999.9 hours 0–999999	32-bit	Field Intermediate	Indicates how many hours are on the traction controller hour meter.
Hourmeter 3 0x6802:00	0–99999.9 hours 0–999999	32-bit	Field Intermediate	Indicates how many hours are on the pump controller hour meter.
Hourmeter 4 0x6809:00	0–99999.9 hours 0–999999	32-bit	Field Intermediate	Indicates how many hours are on the steering controller hour meter.

MAINTENANCE MENU

The following table describes the parameters on the Maintenance menu.

MAINTENANCE MENU

PARAMETER CAN INDEX	VALUES RAW VALUES	DATA SIZE	ACCESS LEVEL	DESCRIPTION
Maintenance 1 0x6803:00	0–3276.7 hours 0–32767	16-bit	Field Intermediate	Indicates the remaining time on maintenance monitor 1.
Maintenance 2 0x6804:00	0–3276.7 hours 0–32767	16-bit	Field Intermediate	Indicates the remaining time on maintenance monitor 2.
Maintenance 3 0x6805:00	0–3276.7 hours 0–32767	16-bit	Field Intermediate	Indicates the remaining time on maintenance monitor 3.

ODOMETERS MENU

The following table describes the parameters on the Odometers menu.

ODOMETERS MENU

PARAMETER CAN INDEX	VALUES RAW VALUES	DATA SIZE	ACCESS LEVEL	DESCRIPTION
Odometer 1 0x6806:00	0–9999999 0–9999999	32-bit	Field Intermediate	Indicates the value of odometer 1.
Odometer 2 0x6807:00	0–9999999 0–9999999	32-bit	Field Intermediate	Indicates the value of odometer 2.
Odometer 3 0x6808:00	0–9999999 0–9999999	32-bit	Field Intermediate	Indicates the value of odometer 3.

SENDERS MENU

The parameters on the Senders menu indicate the raw AD data for switch inputs 1–4.

SENDERS MENU

PARAMETER CAN INDEX	VALUES RAW VALUES	DATA SIZE	ACCESS LEVEL	DESCRIPTION
Sender 1 0x6311:00	0–4095 0–4095	32-bit	Field Intermediate	Indicates the raw AD data for switch input 1.
Sender 2 0x6313:00	0–4095 0–4095	32-bit	Field Intermediate	Indicates the raw AD data for switch input 2.
Sender 3 0x6319:00	0–4095 0–4095	32-bit	Field Intermediate	Indicates the raw AD data for switch input 3.
Sender 4 0x6315:00	0–4095 0–4095	32-bit	Field Intermediate	Indicates the raw AD data for switch input 4.

OUTPUT MENU

The following table describes the parameters on the Output menu.

OUTPUT MENU

PARAMETER CAN INDEX	VALUES RAW VALUES	DATA SIZE	ACCESS LEVEL	DESCRIPTION
PWM Duty 0x6700:00	0.0–100.0% 0–1000	16-bit	Field Intermediate	Indicates the PWM percentage when pin 8 is configured as a driver.
Current 0x66E0:00	0–1000mA 0–1000	16-bit	Field Intermediate	Indicates the current sunk when pin 8 is configured as a driver.

TEMPERATURE MENU

The Temperature menu contains the Internal Temperature parameter:

TEMPERATURE MENU

PARAMETER CAN INDEX	VALUES RAW VALUES	DATA SIZE	ACCESS LEVEL	DESCRIPTION
Internal Temperature 0x6618:00	–50°C to +120° –500 to +1200	16-bit	Field Intermediate	Indicates the temperature of the LCD.

6 — CANopen COMMUNICATIONS

The 3301T complies with the CAN in Automation (CiA) CANopen DS 301 specification. This chapter describes the 3301T's CANopen features.

Some familiarity with CANopen is a prerequisite. For CANopen information, see the following pages on the CiA web site:

- Overview: https://www.can-cia.org/canopen/
- Specifications: https://www.can-cia.org/groups/specifications/

BYTE AND BIT SEQUENCE ORDER

CANopen message byte sequences are transmitted with the least significant byte first (little-endian format).

Note: This manual uses the LSB 0 Numbering convention when referring to byte and bit numbers.

For example, the following table shows an SDO that writes the data 04E2h to the object with the index and sub-index 334C-01h:

0	1	2	3	4	5	6	7
Control Byte	Index		Sub-index	Data			
2Bh	4Ch	33h	01h	E2h	04h	00h	00h

Strings are read from left to right. The following example shows how the 3301T transmits an SDO segment for the string "3301T-7":

0	1	2	3	4	5	6	7
Control Byte	Data						
00h	33h = "3"	33h = "3"	30h = "0"	31h = "1"	54h = "T"	2Dh = "-"	37h = "7"

Bit sequences are transmitted from most significant to least significant bit (big-endian format). The following example shows how the 3301T transmits the bits for the value 2Bh:

7	6	5	4	3	2	1	0
0	0	1	0	1	0	1	1

NODE IDS

The 3301T's node ID is specified with the CAN Node ID parameter. The default node ID is 0x2E.

If the Curtis Electronic Code Switch (ECS) is on the CANbus, the ECS CAN Node ID parameter specifies its node ID. Both parameters are on the CAN menu.

BAUD RATE

The 3301T's baud rate is specified with the CAN Baud Rate parameter on the CAN menu. The default baud rate is 250 Kbps.

MESSAGE CAN-IDS

The 3301T's CAN messages are identified by 11-bit CAN IDs. The 3301T does not use 29-bit CAN IDs.

EXPEDITED SDOS

The least significant byte of an expedited SDO is known as the *control byte*. The following table describes the control byte fields:

7	6	5	4	3	2	1	0
Command Specifier			0b	*n*		*e*	*s*

The following list describes the control byte:

- The *Command Specifier* field indicates the SDO's transfer type, which is described in the following table:

Transfer Type	Value
Write data to a device	001b
Confirm a write	011b
Request data from a device	010b
Device responds with requested data	010b
Abort SDO	100b

- Bit 4 is always 0b.
- The values of bits 0–3 depend upon whether the SDO transfers data. If the SDO does **not** transfer data, these bits are always 0b. If the SDO transfers data, the bit values are as follows:
  - *n* indicates the number of unused data bytes.
  - *e* = 1b, which indicates the message contains data.
  - *s* = 1b, which indicates that the *n* field specifies the number of unused data bytes.

The following table lists the control byte values for the various transfer types:

Transfer Type	Command Byte
Write data to a device	Depends upon the data size: • 1 byte = 2Fh • 2 bytes = 2Bh • 3 bytes = 27h • 4 bytes = 23h
Confirm a write	60h
Request data from a device	40h
Device responds with requested data	Depends upon the data size: • 1 byte = 4Fh • 2 bytes = 4Bh • 3 bytes = 47h • 4 bytes = 43h
Abort SDO	80h

PDOs

TPDOs 1–2 and RPDOs 1–3 are preconfigured to transmit and receive data used by the 3301T-7001's preset user interfaces. The following topics describe PDO considerations and the preconfigured PDOs.

Note: TPDOs 3–4 and RPDO4 are reserved.

PDO COB-IDs

The following table lists the COB-IDs of the preconfigured PDOs:

PDO	COB-ID
RPDO1	22Eh
RPDO2	32Eh
RPDO3	42Eh
TPDO1	1AEh
TPDO2	2AEh

PDO Timing

The 3301T's PDOs are asynchronous and are periodically transmitted and received. The 3301T does not support synchronous PDOs. The following list describes the PDOs' event times:

- RPDOs: 60,000ms (1 minute). If the 3301T does not receive data within one minute, the LCD will display *.* to indicate that data is not being received.
- TPDOs: 40ms

Preconfigured PDOs

The following topics describe the preconfigured PDOs.

RPDO1

Byte(s)	Description
0	The fault code for the right traction controller. The four most significant digits indicate the fault code's first digit. The four least significant bits indicate the second digit. For example, if the fault code is 92, the value would be 92h. 0h indicates there is not an active fault.
1	The fault code for the pump controller. The four most significant digits indicate the fault code's first digit. The four least significant bits indicate the second digit. 0h indicates there is not an active fault.
2	The following bits indicate whether various signal icons are displayed. 1b = displayed: • 0: Parking icon. • 1: Seat icon. • 2: Seatbelt icon. • 3: Safety pedal icon. • 4: Guardrail icon. • 5: Left hand icon. • 6: Right hand icon. • 7: Roadway mode icon.
3	The following bits indicate various types of data: • 0: Whether the right traction controller's fault code is from pin 14 (Switch Input4/Analog Input4/TRA Fault Code Input) or the CANbus. 0b indicates pin 14. • 1: Whether the left traction controller's fault code is from pin 14 (Switch Input4/Analog Input4/TRA Fault Code Input) or the CANbus. 0b indicates pin 14. • 2: Whether the pump controller's fault code is from pin 6 (Switch Input3/Analog Input3/HYD Fault Code Input) or the CANbus. 0b indicates pin 6. • 3: Whether the data for the parking icon is from pin 13 (Switch Input2/Analog Input2/ Frequency Input 2) or the CANbus. 0b indicates pin 13. • 4: Whether the data for the seat icon is from pin 5 (Switch Input1/Analog Input1/Frequency Input 1) or the CANbus. 0b indicates pin 5. • 5: Whether BDI data is from the 3301T or from the CANbus. 0b indicates the data is from the 3301T. • 6: Whether the steering angle is displayed on the counterbalanced forklifts screen. 1b = displayed. • 7: Whether the chain icon is displayed. 1b = displayed.
4	The fault code for the left traction controller. The four most significant digits indicate the fault code's first digit. The four least significant bits indicate the second digit. 0h indicates there is not an active fault.
5	The speedometer data. The scaling of the displayed speed depends on bit 7 of Byte 5 of RPDO2. For example, suppose that this byte specifies FFh. If the RPDO2 bit is 0b, the speedometer displays 25.5 km/h, otherwise it displays 51.0 km/h.
6	The BDI percentage. The maximum displayed value is 100%. The raw data ranges from 0–100.

Byte(s)	Description
7	The following bits indicate the statuses of various display elements: • 0: Whether the oil filter icon is displayed. 1b = displayed. • 1–3: The direction icons: – 001b = Neutral. – 010b = Forward. – 011b = Backward. – 100b = Left turn. – 101b = Right turn. – Other values: A direction icon is not displayed. • 4–7: The forklift status icons (reach trucks and order pickers screen): – 0001b: Inactive lift. – 0010b: Lift up. – 0011b: Lift down. – 0100b: Lift left. – 0101b: Lift right. – 0110b: Lift up and left. – 0111b: Lift up and right. – 1000b: Lift down and left. – 1001b: Lift down and right. – 1010b: Rotate clockwise. – 1011b: Rotate counterclockwise. – 1100b: Shift left. – 1101b: Shift right. – Other values: A forklift status icon is not displayed.

TPDO1

Byte(s)	Description
0	The following bits indicate various types of data: • 0–1: The speed mode: – 00b: High. – 01b: Standard. – 10b: Economy. – 11b: Turtle. • 2: Lift lock status. 0b = inactive. • 3: Parking status. 0b = inactive. • 4: Seat status. 0b = inactive. • 5: Pump status. 0b = off. • 6–7: *Reserved*.
1	The BDI percentage.
2–5	The keyswitch hour meter data. The 3301T hour meters provide a resolution of 0.1 hours. For example, F423Fh indicates 99999.9 hours.
6	The vehicle unlock control status. 0b = lock, 1b = unlock.
7	*Reserved*.

RPDO2

Byte(s)	Description
0	The following bits indicate hour meter data: • 0–2: The hour meter for which the data specified with bytes 1–4 applies: – 001b: Keyswitch hour meter. – 010b: Traction controller hour meter. – 011b: Pump controller hour meter. – 100b: Steering controller hour meter. – Other values: None of the hour meters. • 3: Whether the “T” on the traction hour meter blinks. 1b = blink. • 4: Whether the “P” on the pump hour meter blinks. 1b = blink. • 5: Whether the “S” on the steering hour meter blinks. 1b = blink. **Note**: The Display Hourmeters object specifies whether the traction, pump, and steering hour meters are displayed. • 6–7. *Reserved*.
1–4	The data for the hour meter specified with bits 0–2 of byte 0: • Byte 1 indicates the data’s last two numbers. The range of valid values is 0–99. • Bytes 2–4 indicate the data’s first four numbers. The range of valid values is 0–9999. For example, if byte 1 specifies 63h and bytes 2–4 specify 270Fh, the hour meter data is 999999.
5	The following bits indicate various types of data: • 0: Whether cargo weight is displayed in the cargo weight and lift height area. 1b = displayed. **Note**: The cargo weight and lift height area is displayed on the counterbalanced forklifts screen. • 1: Whether lift height is displayed in the cargo weight and lift height area. 1b = displayed. • 2–3: Whether the data specified in bytes 3–6 of RPDO3 applies to the cargo weight or lift height: – 01b: Weight. – 10b: Height. – Other values: The data applies to neither weight nor height. • 4: Whether fault codes for the lithium battery are displayed. 1b = displayed. • 5: Whether fault codes for the steering controller are displayed. 1b = displayed. • 6: Whether the battery voltage is displayed in the BDI area. 1b = displayed. • 7: How the data specified with byte 5 of RPDO1 is scaled when it is displayed on the speedometer: – 0: The speed data is divided by 10. – 1: The speed data is divided by 5.
6	The fault code for the lithium battery. The four most significant digits indicate the fault code’s first digit. The four least significant bits indicate the second digit. 0h indicates there is not an active fault.
7	The fault code for the steering controller. The four most significant digits indicate the fault code’s first digit. The four least significant bits indicate the second digit. 0h indicates there is not an active fault.

TPDO2

Byte(s)	Description
0	The following bits indicate whether an hour meter is being reset. 1b = reset: • 0: Keyswitch hour meter. • 1: Traction controller hour meter. • 2: Pump controller hour meter. • 3: Steering controller hour meter. • 4–7: *Reserved*.
1–4	Battery type. 0h indicates lead-acid, 1h indicates lithium.
5–7	*Reserved*.

RPDO3

Byte(s)	Description
0	The following bits specify how steering angle data is displayed: • 0–2: Whether the steering angle on the reach trucks and order pickers screen is displayed as a circle or a semicircle. If a semicircle is specified, the bits also specify the semicircle's location within the steering angle area: – 000b: Circle. – 001b: Semicircle on the top. – 010b: Semicircle on the bottom. – 011b: Semicircle on the left. – 100b: Semicircle on the right. – Other values: *Reserved.* • 3–4: The default wheel angle if RPDO3 does not receive data before its timeout expires: – 00b: 0° – 01b: 90° – 10b: 180° – 11b: –90° • 5: Whether the steering angle indicator on the reach trucks and order pickers screen displays an arrow. 0b = displayed. • 6–7: *Reserved*.
1–2	The wheel angle. The range of values depends upon which screen is active: • Counterbalanced forklifts screen: –90° to +90° (FFA6h–005Ah). • Reach trucks and order pickers screen: –180° to 180° (FF4Ch–00B4h).
3–6	The data for the cargo weight and lift height area on the counterbalanced forklifts screen. The range of allowed values is 0–99999. Whether the data applies to the cargo weight or lift height, as well as the displayed data's scaling and unit of measurement, depends upon whether bits 2–3 of byte 5 of RPDO2 indicate weight or height: • Weight: 0–99999 Kg is displayed. • Height: 0–99.999 m is displayed.
7	*Reserved*.

STANDARD CANOPEN OBJECTS

The following table describes objects required by the CANopen standard:

Name	Index	Sub-Index	Description	Read / Write	Values Data Size
Device Type	1000h	00h	Indicates whether a device follows a standard CiA device profile. The 3301T does not follow a standard CiA profile, so the value is 0.	RO	0 32-bit
Error Register	1001h	00h	Indicates if a fault is active: 0 = No active fault. 1 = One or more active faults.	RO	0–1 16-bit
Manufacturer Status Register	1002h	00h	*Reserved.*	*N/A*	*N/A*
Manufacturer Device Name	1008h	00h	Initiates a segmented SDO that uploads the model name and number as an ASCII string.	RO	String
Manufacturer's Hardware Version	1009h	00h	Initiates a segmented SDO that uploads the hardware version as an ASCII string.	RO	String
Manufacturer Software Version	100Ah	00h	*Reserved.* **Note**: The CDEV and OS Version parameters indicate the software version. See Main Menu Parameters.	*N/A*	*N/A*
Store Parameters	1010h	Saves changed parameter values to non-volatile memory (NVM).			
		00h	Indicates the size of the object.	RO	0–127 8-bit
		01h	Saves the current parameter values to NVM. The data bytes must represent the string "save."	RW	0–2147483647 32-bit
Restore Default Parameters	1011h	Resets parameters to their default values.			
		00h	Indicates the size of the object.	RO	0–127 8-bit
		01h	Restores parameters to their default values. The data bytes must represent the string "load."	RW	0–2147483647 32-bit
Emergency COB ID	1014h	00h	Indicates the Emergency Message COB-ID: • 0: The COB-ID consists of the emergency message function code (0001b) and the node ID. • Non-zero: The COB-ID consists of the emergency message function code (0001b) and the specified value. The COB-ID's four most significant bits represent the emergency message function code.	RO	0–16777215 32-bit
Emergency Message Inhibit Time	1015h	00h	Sets the minimum time that must elapse before another emergency message can be sent.	RW	4–100 (which represents 16–400ms) 32-bit

Name	Index	Sub-Index	Description	Read / Write	Values Data Size
Heartbeat Rate	1017h	00h	Specifies the cyclic rate of the device's heartbeat messages.	RW	100–1000 16-bit
Identity Object	1018h	Provides information on the device.			
		00h	Indicates the size of the object.	RO	0–127 8-bit
		01h	Indicates the CiA-assigned identifier of Curtis Instruments. The identifier is 4349h.	RO	0–2147483647 32-bit
		02h	Indicates the device's product code.	RO	0–2147483647 32-bit
		03h	Indicates the device's Curtis CAN protocol version. The upper 2 bytes contain the major version and the lower 2 bytes contain the minor version.	RO	0–2147483647 32-bit
		04h	Indicates the device's serial number.	RO	0–2147483647 32-bit

DISPLAY HOURMETERS OBJECT

The Display Hourmeters object specifies which of the traction, pump, and steering controllers' hour meters are displayed in the preset user interfaces:

Name	Index	Sub-Index	Description	Read / Write	Values Data Size
Display Hourmeters	3852h	00h	Indicates which hour meters are displayed in the preset user interfaces: • 0 = None • 1 = Traction • 2 = Pump • 3 = Steering • 4 = Traction and pump • 5 = Traction and steering • 6 = Pump and steering • 7 = Traction, pump, and steering	RW	0 32-bit

APPENDIX A — CURTIS PROGRAMMING DEVICES

Curtis programming devices provide programming, diagnostic, and test capabilities for Curtis devices. Two programming devices are available for the 3301T:

- 1313 Handheld Programmer
- Curtis Integrated Toolkit™ (CIT)

CIT has the advantage of a large, easy-to-read screen. On the other hand, the 1313 Handheld Programmer is more portable, making it convenient for working in the field.

The programming devices include the following features:

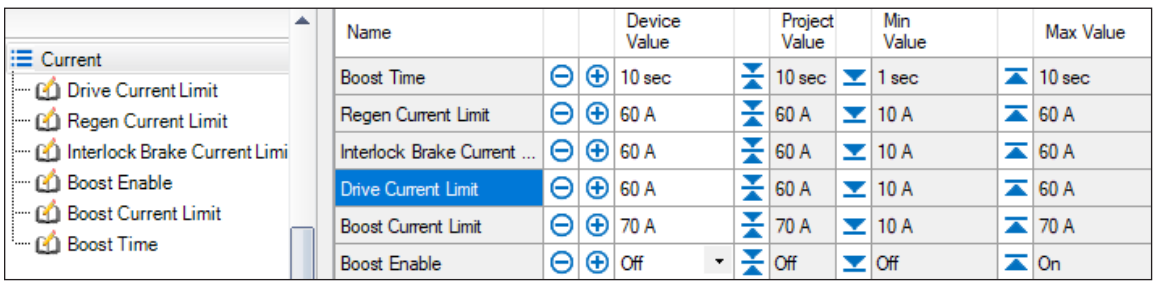
- Parameter adjustment. Save and restore the values of programmable parameters.
- Monitoring: Display real-time values during vehicle operation. These values include data for inputs and outputs.
- Diagnostics and troubleshooting: Display active faults and the fault history, and allows users to clear the fault history.
- Flashing: Update firmware of Curtis devices.

The programmers are available for the following access levels. The bullets are sorted from the highest to lowest access level:

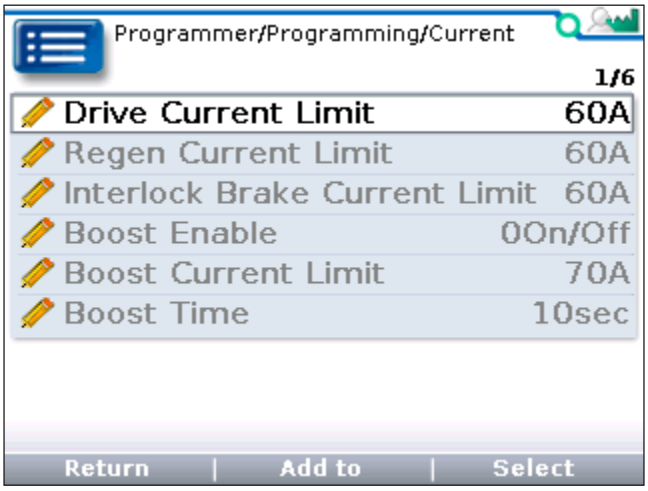
- OEM Factory
- OEM Dealer
- Field Advanced
- Field Intermediate
- Field Basic

A Curtis programmer can perform the actions available at or below its access level. For example, a Field Basic programmer can only perform actions available for the Field Basic access level, while an OEM Factory programmer can perform all actions available for any of these access levels.

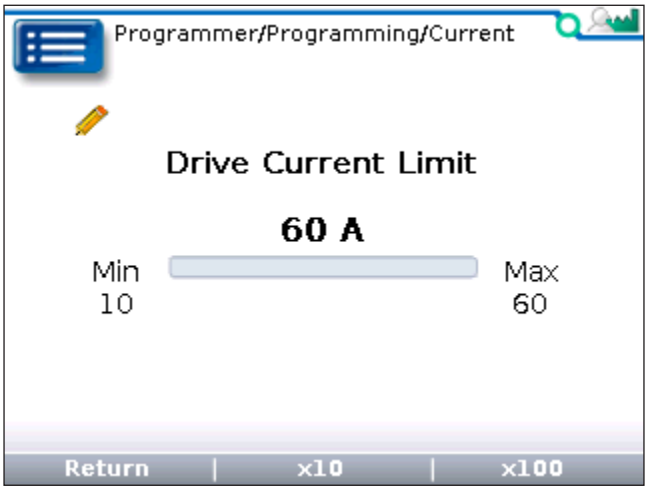
The following example shows the Current menu in the CIT Programmer application. You can view or edit a parameter by selecting it on the left-hand side. You can also view and edit all of a menu's parameters in one window by selecting the menu as shown below:



The following example shows the same menu in the Curtis 1313 Handheld Programmer:



To edit a parameter with the 1313 programmer, select the parameter:



For more information on Curtis programming devices, see the Curtis Instruments Programming page at https://www.curtisinstruments.com/products/programming.

APPENDIX B — SPECIFICATIONS

Nominal Voltage	12–96VDC
Minimum Voltage	9VDC
Maximum Voltage	120VDC
Minimum Startup Voltage	10VDC
Operating Current	• **Keyswitch on**: 33–209mA • **Keyswitch off**: 24–110mA • **LCD Heater On**: 463–685mA
Dimensions	136 × 80 × 47.2 mm
Operating Temperature	• **With the LCD heater**: –40°C to + 70°C • **Without the LCD heater**: –20°C to + 70°C
Storage Temperature	–40°C to + 85°C
Humidity	Designed to the following requirements: • **Soak**: EN 60068-2-78 • **Cyclic**: EN 60068-2-30
Ingress Protection	Designed to the requirements of EN 60529: • Face is sealed to IP65. • Rear is sealed to IP65 for electronic components and to IP40 for the connector. Optional parts can increase the connector's protection to IP54.
Salt Spray (Fog)	Designed to the requirements of ASTM B 117-73 as per SAE J1810.
Shock	Designed to the requirements of EN 60068-2-27.
Vibration	Designed to the following requirements: • **General**: EN 60068-2-6 • **Random**: EN 60068-2-64 • **Resonance**: EN 60068-2-6
Safety	Designed to the requirements of EN 61010-1: 2010, Part 1.
CE	Designed to the following requirements: • **EMC**: EN 12895: 2015. • **RoHS**: RoHS directive 2015/863/EU (RoHS 3).
UL	UL recognized component as per UL 583.
Model Encodement	The model number encodement is 3301T-*ZYYY* where: • *Z* indicates whether the model includes the optional LCD heater: – 5 = not included – 7 = included • *YYY* is a sequential number code.

Note: *Regulatory compliance of the complete system with the 3301T installed is the responsibility of the OEM.*