

MODEL H30 OPERATION MANUAL

Model H30 Version 1.0

Houston Street Technologies

August 1, 2007

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1. Introduction

Houston Street Technologies' Model H30 diesel engine controller was designed to provide simple, accurate and consistent engine control for a variety of diesel power applications. When used with an ECU controlled engine the H30 utilizes SAE J1939 CAN bus protocol to communicate desired engine control characteristics as well as display all relevant engine operating parameters and fault codes, both stored and active.

In addition to its core functionality of MANUAL RAMP, MANUAL STEP, AUTO and ENGINE STALL PROTECTION (ESP), the H30 can also be tailored to any customer's request for a wide range of unique industrial applications.

2. Specifications

| | |
|---------------------------|--|
| Environmental Protection: | IP65 (pending) |
| Operating Voltage: | 8-32VDC |
| Operating Temperature: | -20° to +70°C (-4 to +158°F) [without LCD heater] |
| Operating Temperature: | -30° to +70°C (-22 to +158°F) [with LCD heater] |
| Storage Temperature: | -30° to +80°C (-22 to +176°F) |
| Display: | FSTN, LED Backlit, 240 X 320 Pixels, 3.9" Diagonal, Full Monochrome Graphics |
| Housing Connectors: | (1) Deutsch DT04-12PA, (1) Deutsch DT04-12PB, (1) Deutsch DT04-12PC |
| Mating Connectors: | (1) Deutsch DT06-12SA, (1) Deutsch DT06-12SB, (1) Deutsch DT06-12SC |
| Digital Outputs: | (3) Dedicated SPST, 10 Amp Relays (4) Programmable SPST, 3 Amp Relays |
| Digital Inputs: | (8) Common Ground, Digital Inputs |
| Analog Inputs: | (4) Programmable 4-20 mA, 0-5 VDC or Resistive Inputs |
| Standard Communications: | J1939 CAN bus, RS485 |
| Optional Communications: | Cellular, RF (FUTURE DEVELOPMENT) |

3. User Interface

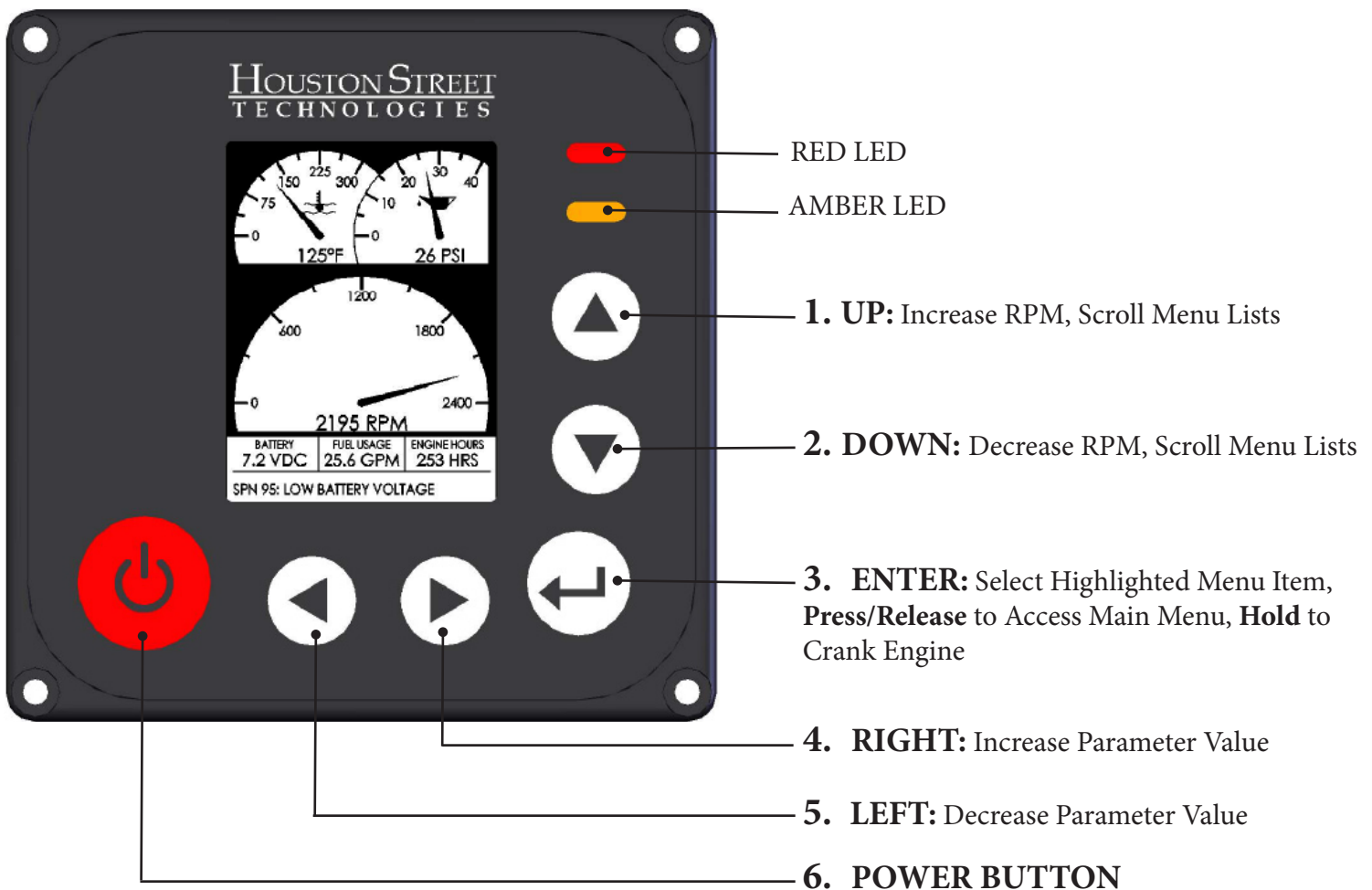
The H30's monochrome graphical LCD display is used as a visual interface for the operator. The H30's primary screen is the Operation Screen (shown below), which displays user-defined operating parameters on three analog gauge faces as well as scrolling text for a total of six parameters in addition to any active fault codes being broadcast by the engine ECU.

The power button is used to regulate power to the H30 and stop the engine from running. The engine can only be started when the H30 is powered and displaying the Operation Screen. The engine can be shutdown by pressing the power button when the engine is running.

CAUTION: Engine manufacturer recommendations should always be followed when shutting down the engine.

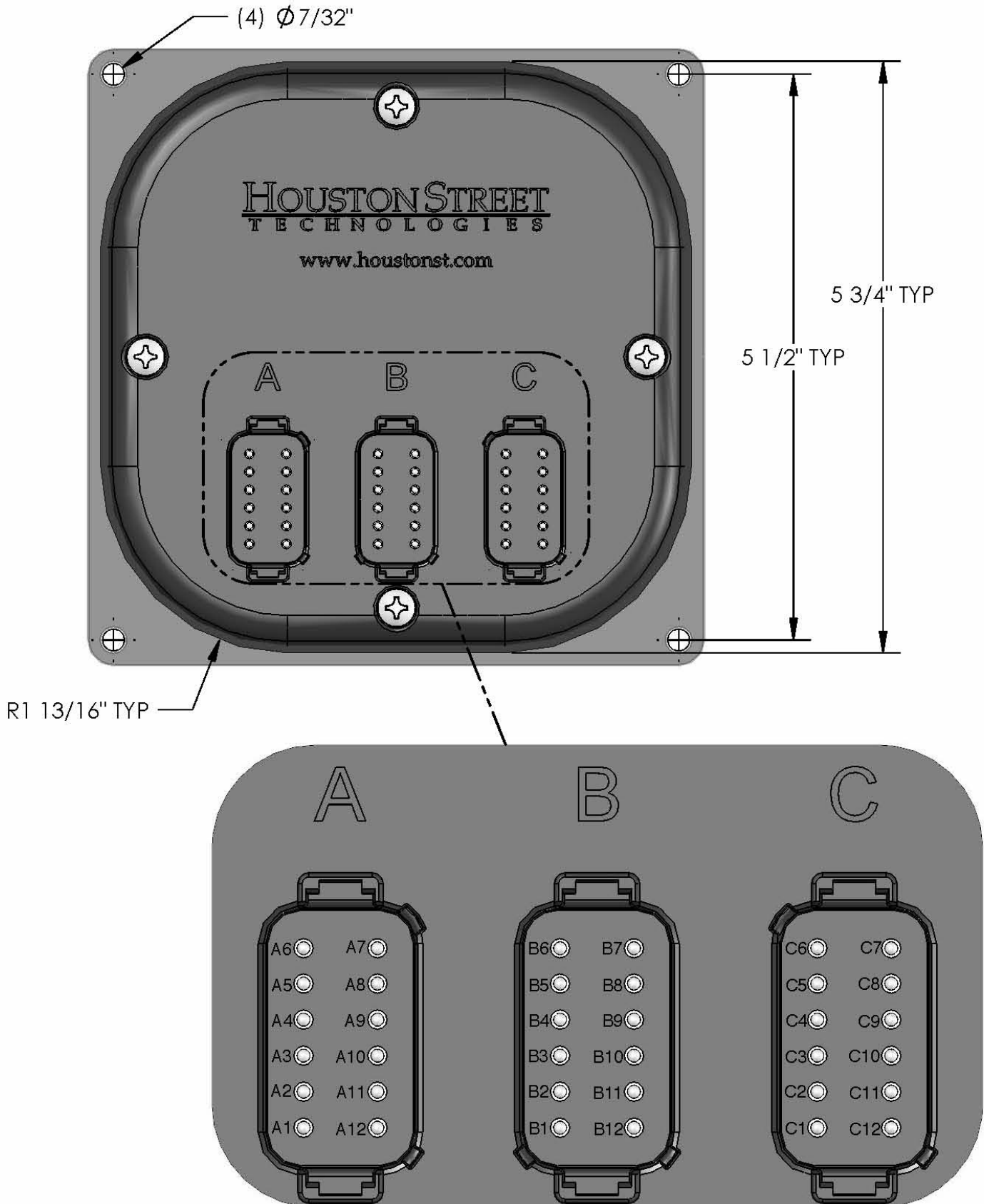
On the face of the controller an amber LED is used as an active warning fault indicator, while a red LED is used as a derate or shutdown indicator.

The six tactile push buttons on the face of the H30 have the following general functions:



4. Installation

The cutout pattern required for surface mounting the H30 is shown below:



CAUTION: Power supply at pin 2 of Connector A (ECU Power) should be protected with a 10 Amp fuse or circuit breaker.

Connector A is required for electronic engines.

Connectors A and B are required for mechanical engines.

Connector C is required for extended features only.

| CONNECTOR/ PIN NO. | DESCRIPTION |
|--------------------|--------------------------------|
| A1 | GROUND |
| A2 | FUSED ECU POWER SUPPLY, 10 AMP |
| A3 | ALTERNATOR EXCITE |
| A4 | START RELAY |
| A5 | ECU POWER/FUEL SOLENOID HOLD |
| A6 | CAN SHIELD |
| A7 | CAN LO |
| A8 | CAN HI |
| A9 | RS485 (+) |
| A10 | RS485 (-) |
| A11 | DIGITAL OUTPUT POWER SUPPLY |
| A12 | H30 POWER SUPPLY |
| B1 | DIGITAL INPUT #1 |
| B2 | DIGITAL INPUT #2 |
| B3 | DIGITAL INPUT #3 |
| B4 | DIGITAL INPUT #4 |
| B5 | ANALOG INPUT #1 (+) |
| B6 | ANALOG INPUT #1 (-) |
| B7 | ANALOG INPUT #2 (+) |
| B8 | ANALOG INPUT #2 (-) |
| B9 | MAGNETIC PICKUP INPUT (+) |
| B10 | MAGNETIC PICKUP INPUT (-) |
| B11 | DIGITAL OUTPUT #1 |
| B12 | DIGITAL OUTPUT #2 |
| C1 | DIGITAL INPUT #5 |
| C2 | DIGITAL INPUT #6 |
| C3 | DIGITAL INPUT #7 |
| C4 | DIGITAL INPUT #8 |
| C5 | DIGITAL OUTPUT #3 |
| C6 | DIGITAL OUTPUT #4 |
| C7 | ANALOG INPUT #3 (+) |
| C8 | ANALOG INPUT #3 (-) |
| C9 | ANALOG INPUT #4 (+) |
| C10 | ANALOG INPUT #4 (-) |
| C11 | RS232 Tx |
| C12 | RS232 Rx |

5. Quick Start Guidelines

POWER UP

When the power button is pressed the H30 will display a splash screen that will show a company logo and controller information. After the splash screen has timed out and if START UP SECURITY is not enabled, the Operation Screen will be displayed. If START UP SECURITY is enabled, a 4-digit PIN is required to access the functionality of the controller.

CONTROLLER SETUP

The Main Menu can be accessed by pressing and releasing the ENTER button while at the Operation Screen. All other sub menus can be accessed from the Main Menu.

See detailed controller setup instructions in the following sections of this manual.

ENGINE START UP

While at the Operation Screen the engine can be started by pressing and holding the ENTER button. The engine can only be started from the Operation Screen.

NOTE: The H30 protects the engine starter from damage by limiting the time that the operator can crank the engine to 15 seconds with a 30 second rest between cranks.

When used with an electronically controlled engine, the engine ECU may be programmed to use a cold start aid (block heater, air intake heater, glow plugs, etc.), a notice will be displayed informing the user that an engine preheat is taking place and to wait for the preheat operation to complete before attempting to start the engine.

If the ECU COMMUNICATION ERROR is flashing on the H30 screen, the engine will not start.

ENGINE CONTROL

While the engine is running and the H30 is displaying the Operation Screen, the UP and DOWN buttons will increase and decrease the engine speed, respectively. The manner in which the speed increases or decreases depends on the current Operation Mode: MANUAL RAMP, MANUAL STEP or AUTO RAMP (MANUAL RAMP is the default Operating Mode).

ENGINE SHUTDOWN

When the power button is pressed while the engine is running, the engine will shutdown immediately.

CAUTION: Always follow engine manufacturer recommendations for controlled engine shutdowns prior to pressing the power button.

If operating conditions cause the engine ECU to derate or shutdown the engine, the controller's red LED will flash and the engine will derate or shutdown based on the engine ECU's programming.

6. Manual Operation Modes

MANUAL RAMP

When in **MANUAL RAMP** mode the engine will operate within a range of configurable low and high RPM values, increasing and decreasing speed in one of two manners: 5 second linearly or exponentially.

When using 5 second linear ramp rate the engine speed will increase from the low RPM setting to the high RPM setting in a 5 second interval when the UP button is held. Engine speed will decrease in the same manner when the DOWN button is held.

When using exponential ramp rate the engine speed will rapidly increase from the low RPM setting to the high RPM setting when the UP button is held. Engine speed will decrease in the same manner when the DOWN button is held.

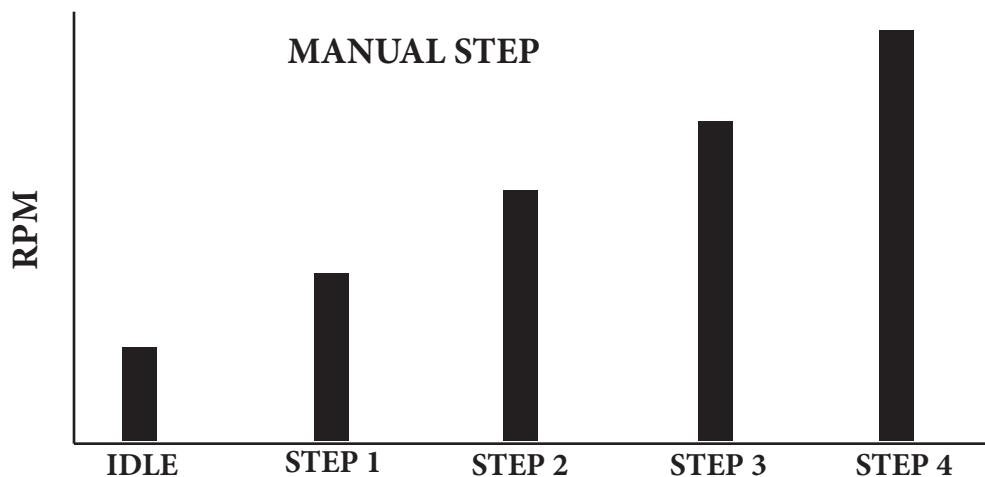
When operating the engine using either ramp rate, each individual press of the **UP** or **DOWN** button will increase or decrease the engine speed by approximately 16 RPM.

To access the **MANUAL RAMP SETUP** screen:

- 1) Press ENTER while at the Operation Screen to access the Main Menu.
- 2) Use U/D buttons to highlight OPERATING MODE and press ENTER.
- 3) Use L/R buttons to change the Operating Mode to MANUAL RAMP.
- 4) Use U/D buttons to highlight MANUAL RAMP SETUP and press ENTER.

MANUAL STEP

When in **MANUAL STEP** mode the engine will operate within a range of low and high RPM values, increasing and decreasing speed in set increments. A maximum of (10) steps can be used to quickly (or slowly) increase or decrease engine speed with each press of the UP or DOWN button.

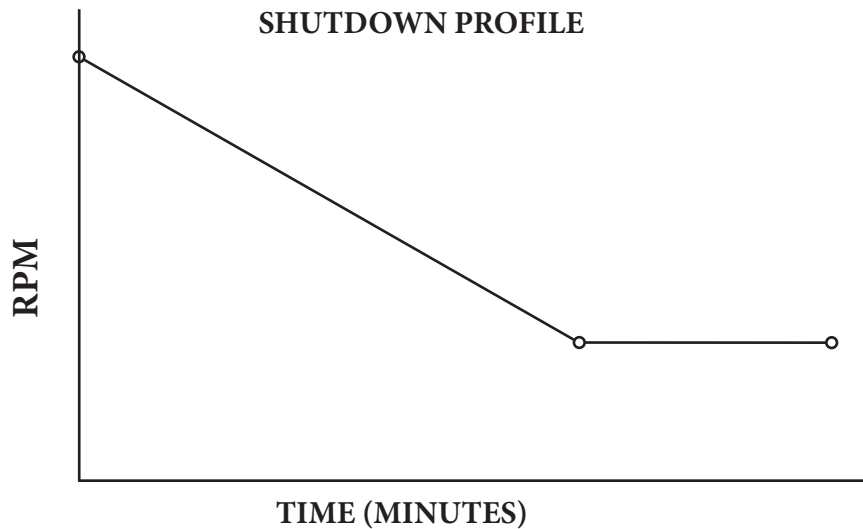
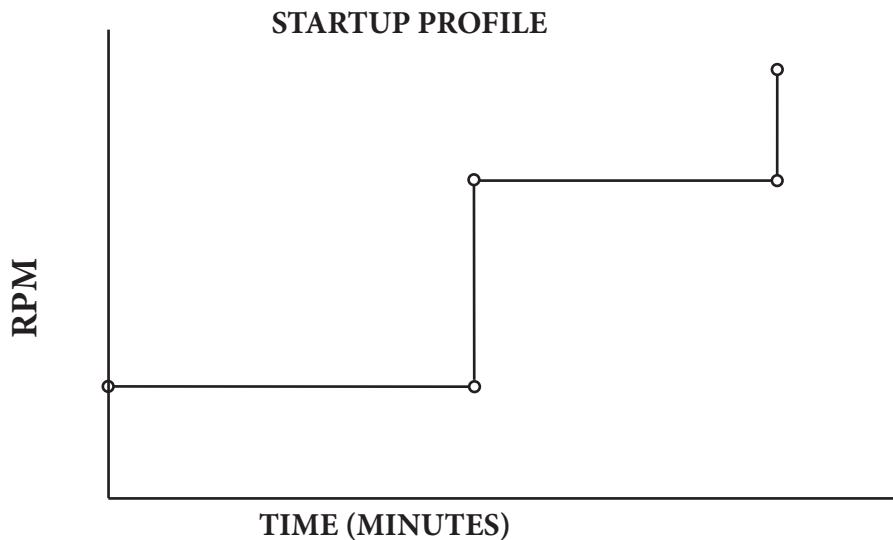


To access the **MANUAL STEP SETUP** screen:

- 1) Press ENTER while at the Operation Screen to access the Main Menu.
- 2) Use U/D buttons to highlight OPERATING MODE and press ENTER.
- 3) Use L/R buttons to change the Operating Mode to MANUAL STEP.
- 4) Use U/D buttons to highlight MANUAL STEP SETUP and press ENTER.

7. Auto Operation Modes

When in **AUTO RAMP** mode the engine will start and stop based off of digital inputs or pressing the U/D buttons. Startup and shutdown profiles of **TIME vs. RPM** are configurable, allowing for warm up and cool down cycles to minimize stress on both the engine and engine-driven equipment.



To access the **AUTO RAMP SETUP** screen:

- 1) Press ENTER while at the Operation Screen to access the Main Menu.
- 2) Use U/D buttons to highlight OPERATING MODE and press ENTER.
- 3) Use L/R buttons to change the Operating Mode to AUTO RAMP.
- 4) Use U/D buttons to highlight AUTO RAMP SETUP and press ENTER.

8. Engine Stall Protection (ESP)

When **ENGINE STALL PROTECTION (ESP)** is enabled, the H30 can be used to engage and disengage feed rollers that may be overloading the engine, causing it to stall. One of the H30's digital outputs can be configured to engage the feed forward solenoid at a set RPM limit, while a second digital output can be used to reverse the feed direction for a set amount of time (0.0 to 1.0 seconds) when a low RPM limit is reached. Reversing the feed direction is optional, the H30 can be configured to simply stop feeding until the engine RPM's increase to a minimum threshold speed and then re-engage the feed forward solenoid.

ESP can be used with single- or dual-valve feed systems. See the following sections for details on each system are below.

ESP - SINGLE VALVE

A single-valve feed system is comprised of a single 3-position valve that uses two solenoids to control hydraulic oil flow, and ultimately the feed direction.

| | |
|------------------------|--|
| ENGAGE SPEED | Minimum engine RPM at which the feed rollers will begin feeding forward |
| DISENGAGE SPEED | Engine RPM that the feed rollers will stop (and reverse if enabled) |
| FEED FORWARD | The digital output used to control the feed forward solenoid |
| FEED REVERSE | The digital output used to control the feed reverse solenoid |
| REVERSE TIME | Length of time the feed rollers will be reversed |
| VALVE DELAY | Solenoid time delay between switching from forward to reverse and vice versa (used to minimize stress on the hydraulic system) |
| MANUAL FORWARD | Digital input used to manually forward the feed rollers when the engine is running |
| MANUAL REVERSE | Digital input used to manually reverse the feed rollers when the engine is running |

ESP SETUP - SINGLE VALVE

ENGAGE SPEED: 2200 RPM
DISENGAGE SPEED: 1800 RPM
FEED FORWARD: D/O#
FEED REVERSE: D/O#
REVERSE TIME: 0.3 SECONDS
VALVE DELAY: .05 - 1.0 SECONDS

MANUAL FORWARD: D/I#
MANUAL REVERSE: D/I#

RETURN TO OPERATING MODE

SCREENSHOT - ESP SINGLE VALVE

ESP - DUAL VALVE

A dual-valve feed system is comprised of dual 2-position valves that use one solenoid each to control hydraulic oil flow, and ultimately the feed direction. The first valve is an ON/OFF valve that controls hydraulic oil flow to the feed system, while the second valve determines the direction of the feed rollers.

| | |
|------------------------|---|
| FEED CONTROL | Option to control feed rollers, use OPEN TO RUN to allow rollers to feed forward in the event of a relay or solenoid failure, use CLOSE TO RUN to prevent wheel operation in the event of a relay or solenoid failure |
| ENGAGE SPEED | Minimum engine RPM at which the feed rollers will begin feeding forward |
| DISENGAGE SPEED | Engine RPM that the feed rollers will reverse |
| FEED FORWARD | The digital output used to control the feed forward solenoid |
| FEED REVERSE | The digital output used to control the feed reverse solenoid |
| REVERSE TIME | Length of time the feed rollers will be reversed |
| MANUAL FORWARD | Digital input used to manually forward the feed rollers when the engine is running |
| MANUAL REVERSE | Digital input used to manually reverse the feed rollers when the engine is running |

ESP SETUP - DUAL VALUE

FEED CONTROL: OPEN TO RUN
 ENGAGE SPEED: 2200 RPM
 DISENGAGE SPEED: 1800 RPM
 FEED FORWARD: D/O#
 FEED REVERSE: D/O#
 REVERSE TIME: .03 SECONDS

MANUAL FORWARD: D/I#
 MANUAL REVERSE: D/I#

RETURN TO OPERATING MODE

SCREENSHOT - ESP DUAL VALVE

To enable/disable ESP:

- 1) Press ENTER while at the Operation Screen to access the Main Menu.
- 2) Use U/D buttons to highlight OPERATING MODE and press ENTER.
- 3) Use U/D buttons to highlight ESP.
- 4) Use L/R buttons to ENABLE or DISABLE.

(ESP settings can be configured by highlighting CONFIGURE ESP after it has been enabled.)

When purchasing your controller you must specify the feed system that you will be using, controllers do not come with both the single- and dual-valve system controls enabled.

NOTE: The above operating modes are included in the full feature H30. Your H30 may not include all of the above operating modes.

9. Digital Inputs

Below is a list of settings for the (8) digital inputs currently available. Contact HST for additional input settings.

| DIGITAL INPUT SETTING | CONTROLLER/ENGINE RESPONSE | DISPLAYED MESSAGE |
|-------------------------|---------------------------------|---------------------------|
| FLOAT SWITCH HIGH | BEGINS AUTO STARTUP SEQUENCE | "HIGH FLOAT SWITCH" |
| FLOAT SWITCH LOW | BEGINS AUTO SHUTDOWN SEQUENCE | "LOW FLOAT SWITCH" |
| HYDRAULIC OIL TEMP | SHUTS ENGINE DOWN IMMEDIATELY | "HYDRAULIC OIL TEMP HIGH" |
| LOW COOLANT SWITCH | NONE, TEXT WARNING ONLY | "LOW COOLANT LEVEL" |
| LOW FUEL LEVEL | NONE, TEXT WARNING ONLY | "LOW FUEL LEVEL" |
| LOW OIL LEVEL | NONE, TEXT WARNING ONLY | "LOW OIL LEVEL" |
| COOLANT TEMP | DECREASES ENGINE SPEED TO IDLE | "HIGH COOLANT TEMP" |
| OIL PRESSURE | DECREASES ENGINE SPEED TO IDLE | "LOW OIL PRESSURE" |
| OIL TEMP | DECREASES ENGINE SPEED TO IDLE | "HIGH OIL TEMP" |
| THROTTLE UP | MIMICS CONTROLLER'S UP BUTTON | "THROTTLE UP" |
| THROTTLE DOWN | MIMICS CONTROLLER'S DOWN BUTTON | "THROTTLE DOWN" |
| AIR FILTER RESTRICTION | NONE, TEXT WARNING ONLY | "AIR FILTER RESTRICTION" |
| FUEL FILTER RESTRICTION | NONE, TEXT WARNING ONLY | "FUEL FILTER RESTRICTION" |
| REMOTE START | CRANKS ENGINE | "REMOTE START" |
| EMERGENCY STOP | SHUTS ENGINE DOWN IMMEDIATELY | "EMERGENCY STOP" |

10. Digital Outputs

Below is a list of settings for the (4) digital outputs currently available. Contact HST for additional output settings.

| DIGITAL OUTPUT SETTING | DESCRIPTION/USE |
|------------------------|--|
| SWITCHED POWER | POWER SUPPLIED WHEN CONTROLLER IS TURNED ON |
| AUDIBLE ALARM | USE TO DRIVE AN EXTERNAL WARNING/ SHUTDOWN ALARM |
| WARNING LIGHT | USE TO DRIVE AN EXTERNAL WARNING LIGHT, MIMICS AMBER LED |
| SHUTDOWN LIGHT | USE TO DRIVE AN EXTERNAL SHUTDOWN LIGHT, MIMICS RED LED |

11. Security

STARTUP SECURITY

A 4-digit code can be used to prevent use of the controller by unauthorized operators. When STARTUP SECURITY is enabled, the user will be prompted for a 4-digit code after the controller is turned on. If entered correctly the controller will continue on to the Operation Screen.

To enable/disable **STARTUP SECURITY**:

- 1) Press ENTER while at the Operation Screen to access the Main Menu.
- 2) Use U/D buttons to highlight UTILITIES and press ENTER.
- 3) Use U/D buttons to highlight STARTUP SECURITY and press ENTER.
- 4) To enable, enter a new 4-digit code.
- 5) To disable, enter the same 4-digit code used to enable STARTUP SECURITY.

CONFIGURATION SECURITY

A 4-digit code can be used to prevent unauthorized operators from changing controller settings. If CONFIGURATION SECURITY is enabled settings cannot be changed without first disabling CONFIGURATION SECURITY. Note that CONFIGURATION SECURITY and STARTUP SECURITY are two different security options and do not share their 4-digit codes with each other.

To enable/disable **CONFIGURATION SECURITY**:

- 1) Press ENTER while at the Operation Screen to access the Main Menu.
- 2) Use U/D buttons to highlight UTILITIES and press ENTER.
- 3) Use U/D buttons to highlight CONFIGURATION SECURITY and press ENTER.
- 4) To enable, enter a new 4-digit code.
- 5) To disable, enter the same 4-digit code used to enable CONFIGURATION SECURITY.

12. Contrast Adjustment

The H30 has an automatic contrast feature that will adjust the LCD screen contrast based off of temperature. If the contrast is too light or too dark the contrast can be manually adjusted by going to the MAIN MENU, then UTILITIES, then ADJUST DISPLAY. Increasing the CONTRAST setting will darken the display, decreasing it will lighten the display.

The automatic adjustment can be disabled if display contrast problems occur.

13. Troubleshooting

| SYMPTOM | SOLUTION |
|--|---|
| CONTROLLER WILL NOT POWER UP (NO LED's FLASHING AND NO LCD IMAGES) | CHECK THAT SYSTEM VOLTAGE (12/24 VDC) IS BEING SUPPLIED TO PIN A12 |
| "ECU COMMUNICATION ERROR" IS DISPLAYED | CHECK THAT SYSTEM VOLTAGE (12/24 VDC) IS BEING SUPPLIED TO PIN A2 |
| DIGITAL OUTPUTS DO NOT WORK | CHECK THAT SYSTEM VOLTAGE (12/24 VDC) IS BEING SUPPLIED TO PIN A11 |
| LCD DISPLAY IS TOO DARK OR TOO LIGHT | GO TO: MAIN MENU...UTILITIES...ADJUST DISPLAY, THEN INCREASE DISPLAY SETTING TO DARKEN THE DISPLAY, DECREASE TO LIGHTEN THE DISPLAY |
| CONTROLLER DOES NOT RESPOND TO DIGITAL INPUTS | CHECK THAT THE INPUT BEING PROVIDED IS SYSTEM GROUND |
| DISPLAY DOES NOT WORK | CALL 866-441-7997 |
| RED AND/OR AMBER LED's DO NOT WORK | CALL 866-441-7997 |
| MEMBRANE SWITCH BUTTONS DO NOT RESPOND | CALL 866-441-7997 |
| ENGINE WILL NOT CRANK WHILE HOLDING THE ENTER BUTTON | CALL 866-441-7997 |

14. Contact

If you have questions regarding the operation of the H30, suggestions for enhancements or the need for custom programming, contact Houston Street Technologies.

Phone: 866.441.7997

Email: tech@houstonst.com OR info@houstonst.com

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