maximatecc.

maxAI 430 & maxAI 430v Technical Manual

Table of Contents

1. Scope and Use of This Manual

…provide the reader with enough background information to understand the overall operation of the maxAI 430i…

The intent of this manual is to provide the reader with all of the information required to install and troubleshoot the maxAI 430v display, as well as to provide background information regarding the overall operation of a data-bus. Additional data-bus information not covered in this manual is available from the SAE.

The user is expected to have a basic knowledge of the vehicle's electrical wiring, circuits, and schematics as well as operating parameters normally displayed on an instrument cluster, such as engine RPM, vehicle speed, engine temperature, transmission temperature, engine oil pressure, transmission oil pressure, etc.

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2. Installation Instructions

2.1 maxAI 430 & maxAI 430v Flush Mounting

- Recommended panel cut-out size for flush mounting is 125.6mm (4.945") x 103.41mm (4.071") with 5.97mm (0.235") radius on the corners.
- Insert the instrument in the panel and secure the brackets over the mounting points using supplied washer and screw.
- Tighten the screws (5 to 6 in.-lb.) to secure the instrument.

PANEL FLUSH MOUNTING

PANEL CUTOUT
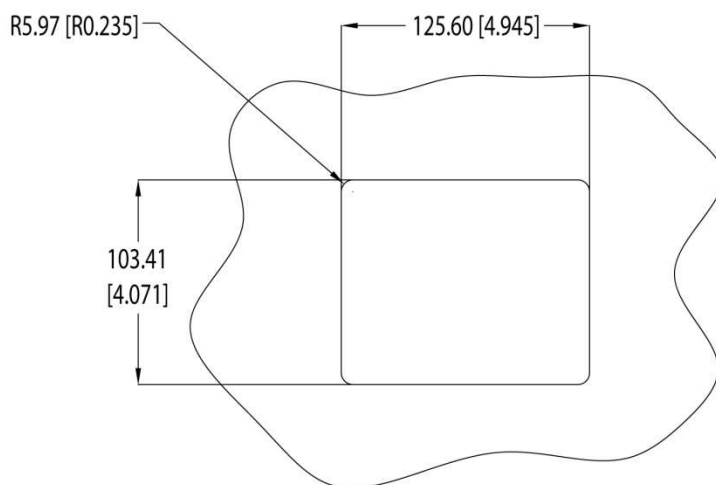
INSTRUMENT MOUNTING

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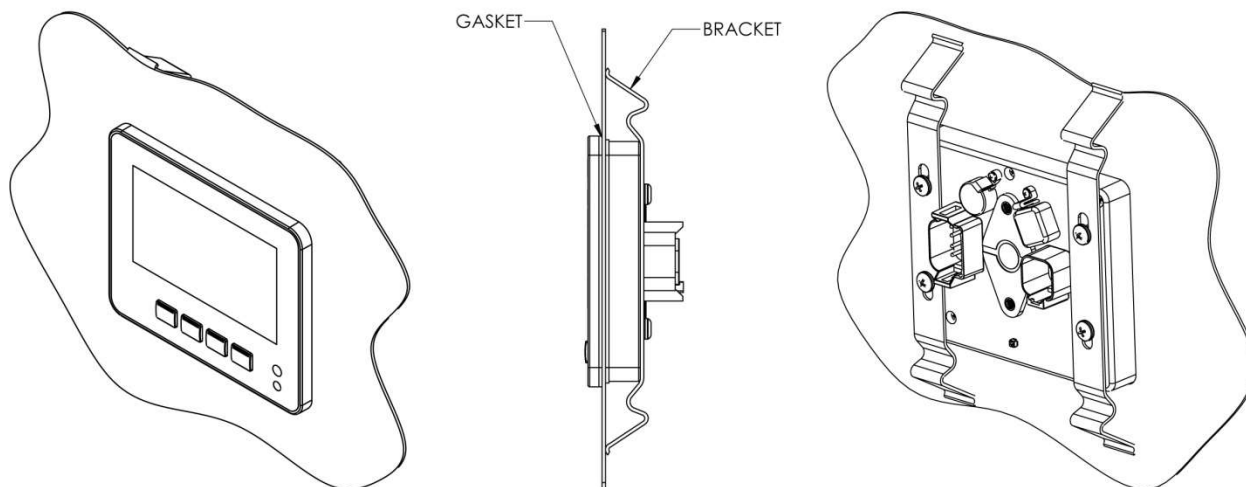
2.2 maxAI 430 & maxAI 430v Hole Mounting

- Recommended panel cut-out size for 3" hole mounting is 3.38" (85.852mm.)
- Insert the instrument in the panel and secure the brackets over the mounting points using supplied washer and screw.
- Tighten the screws (5 to 6 in.-lb.) to secure the instrument.

PANEL 3" HOLE MOUNTING

PANEL CUTOUT

⌀85.85 [⌀3.380]

46.24 [1.820]

3.64 [0.143]
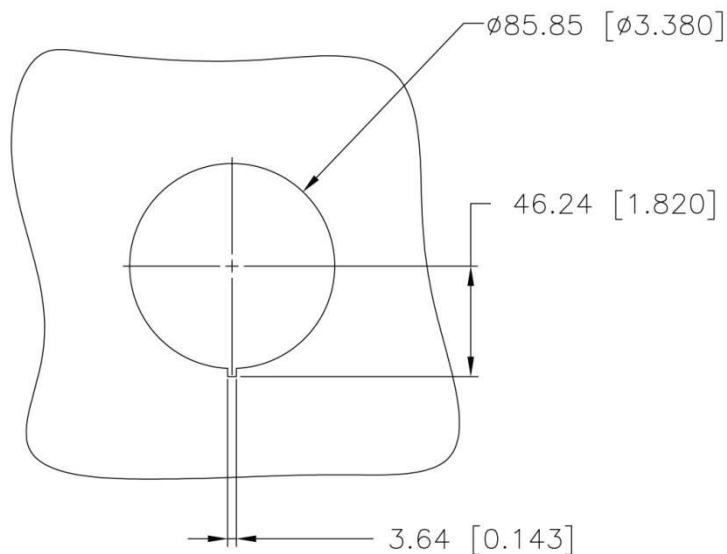
2.3 maxAI 430 & maxAI 430v Ram Mounting

- No panel cut-out is necessary for Ram mounting.
- Determine mounting location for Ram mount and secure the round ball base.
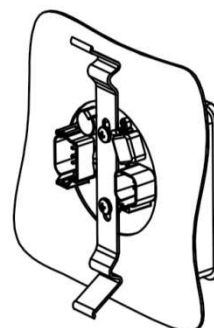- Secure diamond ball base to the diamond mounting point using supplied washer and screw.
- Tighten the screws (5 to 6 in.-lb.) to secure the instrument.
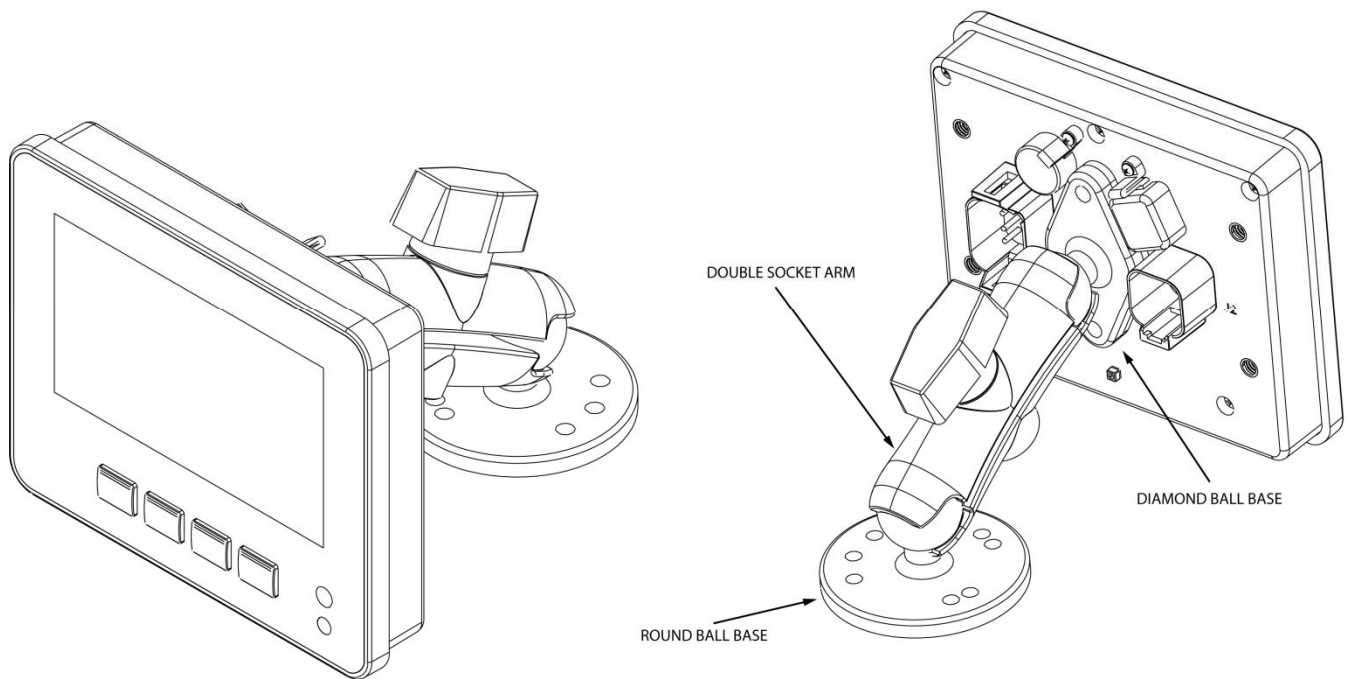- Loosen the double socket arm and insert the ball of the diamond base in one end and the ball of the round base in the other end and tighten the double socket arm.

RAM MOUNTING

DOUBLE SOCKET ARM

DIAMOND BALL BASE

ROUND BALL BASE

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2.4 maxAI 430 & maxAI 430v Wiring

Both connectors are used to make the electrical connections.

Only available for maxAI430v model

ELECTRICAL
CONNECTIONS

1. BATTERY +
2. IGNITION
3. CAN 1 -
4. CAN 1 +
5. CAN 2 +
6. CAN 2 -
7. DIGITAL OUTPUT
8. GROUND

J1

VIDEO INPUT   USB PORT

J1   J2

ELECTRICAL
CONNECTIONS

1. CONFIGURABLE INPUT 1
2. CONFIGURABLE INPUT 2
3. CONFIGURABLE INPUT 3
4. CONFIGURABLE INPUT 4
5. CONFIGURABLE INPUT 5
6. CURRENT INPUT

J2
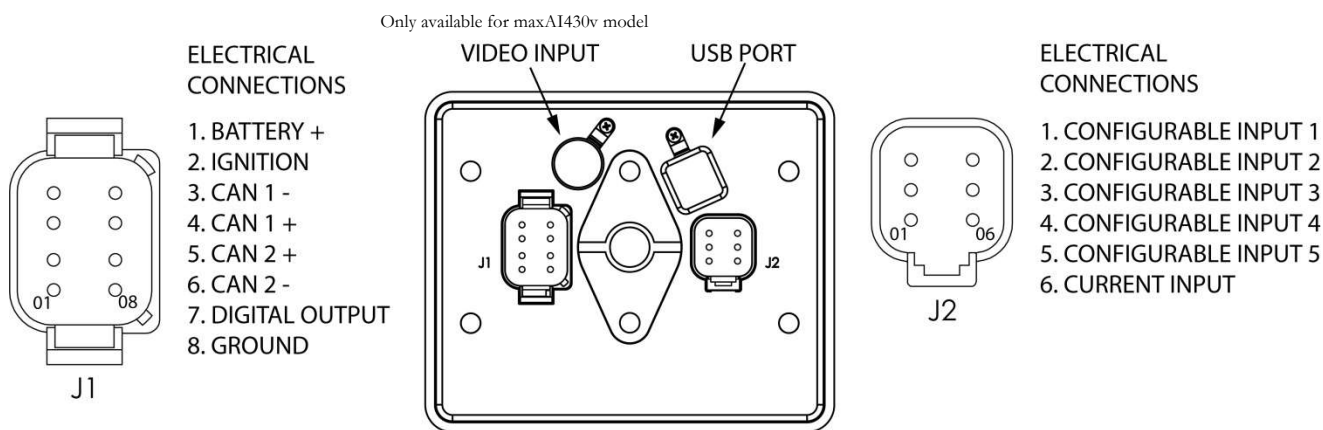
Connector J1

- Connect Pin (1) to the positive side of the battery.
- Connect Pin (2) to the positive side of the battery, through the ignition switch.
- Connect Pin (3) to data-bus 1 - (J1939 ONLY).
- Connect Pin (4) to data-bus 1 + (J1939 ONLY).
- Connect Pin (5) to data-bus 2 + (J1939 ONLY).
- Connect Pin (6) to data-bus 2 - (J1939 ONLY).
- Connect Pin (7) to digital output triggered device.
- Connect Pin (8) to Ground

Connector J2

- Connect Pin (1) to analog or digital input (configurable).
- Connect Pin (2) to analog or digital input (configurable).
- Connect Pin (3) to analog or digital input (configurable).
- Connect Pin (4) to analog or digital input (configurable).
- Connect Pin (5) to analog or digital input (configurable).
- Connect Pin (6) to current input

NOTE 1: The instrument does not internally contain a bus termination resistor, per SAE-J1939 specification. See Understanding Data-Bus Operation section for additional information.

NOTE 2: Of the six available inputs, five (1 to 5) can be configured to read voltage, resistance, frequency and digital inputs (LOW/HIGH). One input (6) is dedicated to read current, ideal for 4-20mA sensors. See Appendix C section for additional information.

3. Display Features

The image below is a detail of the maxAI 430 & maxAI 430v display features.
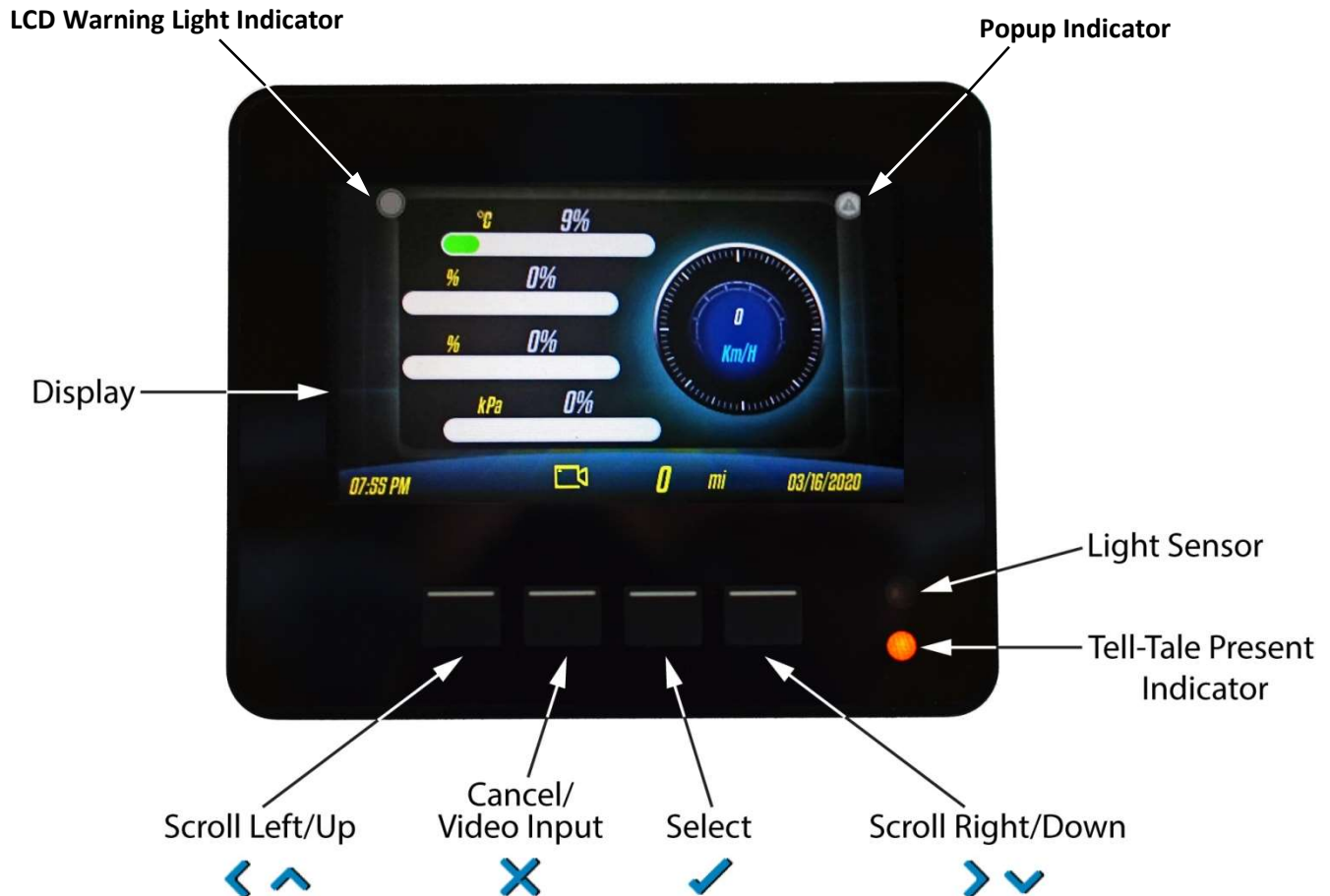
3.1 Navigation & Keypad Functions

Select ✔	**Select Key** - Select a menu or parameter
Cancel ✖	**Cancel Key** - Exit a screen or go back
Scroll Up ⌃	**Up Arrow** - Scroll up through screens or parameters
Scroll Down ⌄	**Down Arrow** - Scroll down through screens or parameters
Scroll Left ‹	**Left Arrow** - Scroll left through screens or parameters
Scroll Right ›	**Right Arrow** - Scroll right through screens or parameters

Basic Navigation

When the 3rd button is pressed, the main menu items are displayed.

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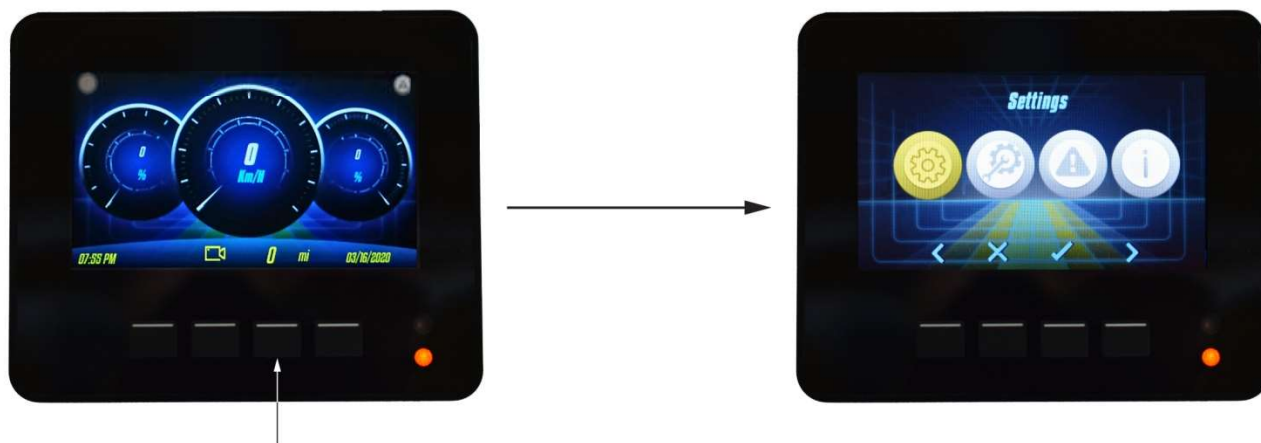
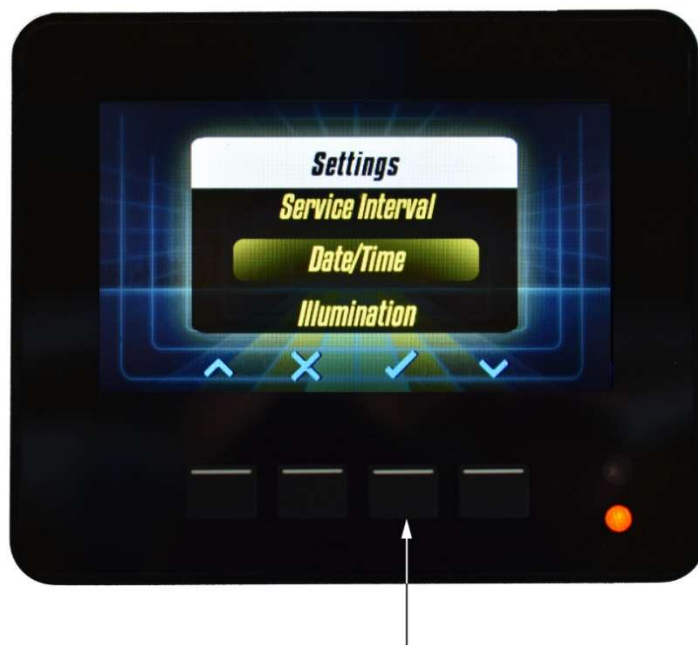Pressing the **Arrow Keys**   will move the menu selector to the other menu items.

Pressing the **Select Key** on the highlighted menu item will open up the particular menu page.

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Pressing the **Arrow Keys** ⌃ ⌄ will move the selection bar to other menu items.

When the desired item is highlighted by the selection bar, pressing **Select Key** ✓ will select that item.

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Pressing the **Cancel Key** ✕ will return to the previous menu page.

3.2 Settings and Menu Options
Getting Started

Basic display settings such as date/time, backlighting, color mode and contrast are adjusted on the maxAI 430v display. Other instrumentation configurations and controls are performed with the maxAI Configuration Software. See the Configuration Software Installation and Operation Manual for more information.

3.3 Accessing the Video Input

The camera video can be configured to be activated by the Keypad 2rd button or by a CAN message from channel 0 or channel 1 from the **PC Configuration Tool**.

When video is configured to keypad the camera icon can be found at the bottom of any of the main screens, and it can be activated from by pressing the 2rd button. This will switch to video mode and display the video from the attached camera. Press any of the other 3 buttons to return to return. For best video experience, use a camera with 420 lines of resolution.
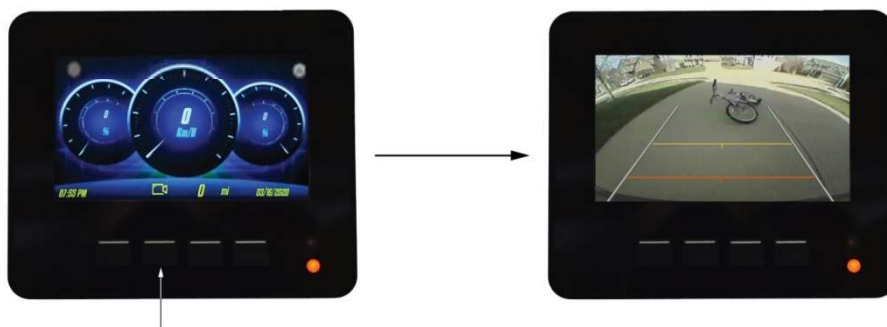
When video is configured to CAN message the camera icon will not be present and the cluster will switch to video mode when ever the configured CAN message is received with the proper value, if the value of the CAN message is different than the one that was configured, then video mode will be canceled and the cluster will return to the previous screen before activating the video.

3.4 Accessing the Menu

To enter the menu from any of the main screens, press the 3rd button and the 4 menu options will be displayed.
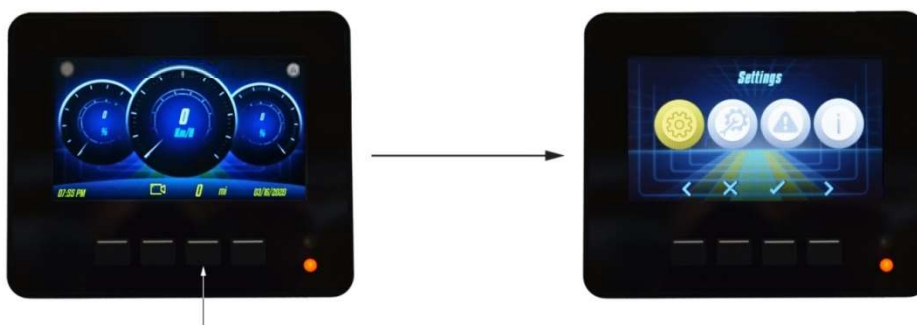
3.5 Display Menu Navigation

The display menu is broken down into 4 items with sub menus under each item as follows:

1. Settings
   - Date/Time
     - Set Time
     - Set Date
   - Illumination
     - Color Theme
     - Set Brightness
     - Keypad Backlight ON/OFF
   - Language/Units
     - Select Language
     - Select Units
   - Trip Information
     - Reset Trip Hourmeter
     - Reset Trip Odometer
   - Communications *
     - Set Baud Rate
   - Service Interval
     - Reset Service
     - Service Enable
     - Service Interval Mode
     - Set Interval
   - Change Pin Code **
2. Instrument Setup
   - Demo
     - Enable
     - Disable
   - Built-in Configuration*
     - Output
     - Screens
   - DPF Regeneration
3. Fault Codes
   - Active Fault Codes
   - Inactive Fault Codes
   - Clear All Fault Codes
   - LCD Warning Lights
4. System Information

* To enter these menu settings Pin Number is required, see Change Pin Code for more details

** To enter these menu settings Pin Number or Master Pin Number is required, see Change Pin Code for more details

3.5.1 Settings

Select settings from main menu by scrolling to **Settings** and pressing the **Select Key** ✓

3.5.1.1 Date/Time
Setting Date/Time

Change the values using the **Arrow Keys** ∧ ∨.

Once the value is set, press the **Select Key** ✓ to move to the next value. When the **Select Key** ✓ is pressed on the last value, the date/time will be set and the screen will return to the **Settings** sub menu.

If an error is made while setting these values, use the **Cancel Key** ✕ to return to the previous value.

NOTE: Although date is entered in Day/Month/Year format, it will be displayed in Month/Day/Year format.

3.5.1.2 Illumination

Changing Color Theme

Select **Color Theme**.

Select theme by scrolling to desired theme using the **Arrow Keys**.

Once the desired color theme is highlighted, press the **Select Key** to set the color theme. The color theme will be set and the screen will return to the **Illumination** sub menu.

NOTE: The default color theme is Daylight. The ambient light sensor will determine if the display changes to Nightlight. Once a specified theme is selected, the ambient light sensor will no longer change the color theme until ignition voltage is cycled off and back on.

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Changing Display Brightness

Select **Set Brightness**.

Adjust the contrast by scrolling up or down using the **Arrow Keys** .

Once the desired contrast has been reached, set the contrast by pressing the **Select Key** . The contrast will be set and the screen will return to the **Illumination** sub menu.

NOTE: In order to prevent shutoff of the screen, the lowest brightness accepted is 10%. The slider will not go below 10% in order to assure this feature.

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Changing Keypad Backlighting

Select **Keypad Backlight**.

Select **ON** or **OFF** by using the **Arrow Keys** . Once the desired backlight has been reached, set the backlight option by pressing the **Select Key** . The keypad backlight will be set and the screen will return to the **Illumination** sub menu.

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3.5.1.3 Language/Units
Selecting Language

Select **Language**.
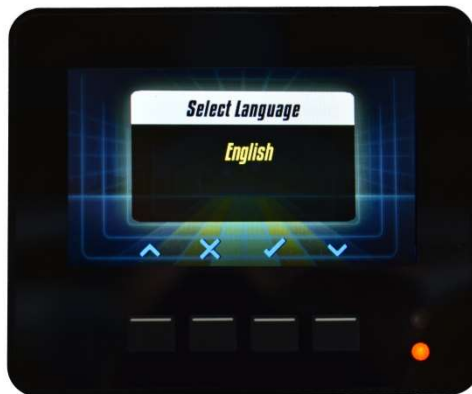
Select language by scrolling to desired language using the **Arrow Keys** [↑] [↓].

Once the desired language is highlighted, press the **Select Key** [✓] to set the language. The language will be set and the screen will return to the **Language/Units** sub menu.

NOTE: The current version of the maxAI 430v software only supports English language. Future software updates will include additional language options.

Selecting Units

Select **Units**.

Select units by scrolling to desired unit of measure using the **Arrow Keys** ⌃ ⌄.

Once the desired unit of measure is highlighted, press the **Select Key** ✓ to set the units. The units will be set and the screen will return to the **Language/Units** sub menu.

3.5.1.4 Trip Information

Resetting Trip Hourmeter

Select **Reset Trip Hourmeter**.

Press the **Select Key** [✓] to confirm reset or **Cancel Key** [✗] to cancel. At this point the screen will return to the **Trip Information** sub menu.

Resetting Trip Odometer

Select **Reset Trip Odometer**.

Press the **Select Key** to confirm reset or **Cancel Key** to cancel. At this point the screen will return to the **Trip Information** sub menu.

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3.5.1.5 Communications

Communications settings is protected with pin, enter pin and proceed, please refer to Change Pin Code section for futher information about Pin.

Once pin is entered Communications menu will be available.

Select either **Set Baud Rate CH0** or **Set Baud Rate CH1**.

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Select baud rate by scrolling to desired rate using the **Arrow Keys** .

Once the desired baud rate is highlighted, press the **Select Key** to set the rate. The baud rate will be set and the screen will return to the **Communications** sub menu.

3.5.1.6 Service Interval
Selecting Service Enable

Select **Service Enable**

Select **Enable** or **Disable** by using the **Arrow Keys** .

Once the desired option is highlighted, press the **Select Key** to make your selection. At this point the screen will return to the **Service Interval** sub menu.

Selecting Interval Mode
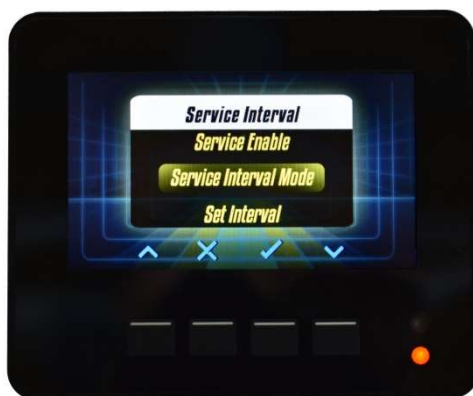
Select **Service Interval Mode**
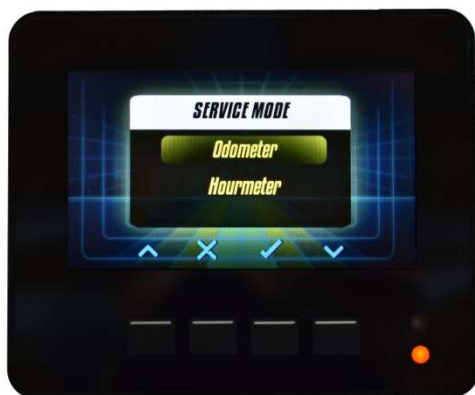
Select **Odometer** or **Hourmeter** by using the **Arrow Keys** .

Once the desire option is highlighted, press the **Select Key** to make your selection. At this point the screen will return to the **Service Interval** sub menu.

Selecting Set Interval

Select **Set Interval**

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The digit being adjusted will be highlighted. Adjust the digit by using the **Arrow Keys** .

Once the desired value is reached select it and move to the next digit by pressing the **Select Key** . Once all digits are set the screen will return to the **Service Interval** sub menu. If at any point in this process a previous digit needs to be adjusted, press the **Cancel Key** to move backwards through the digits. The maximum value that can be set is 99,999.

Reset Service Interval
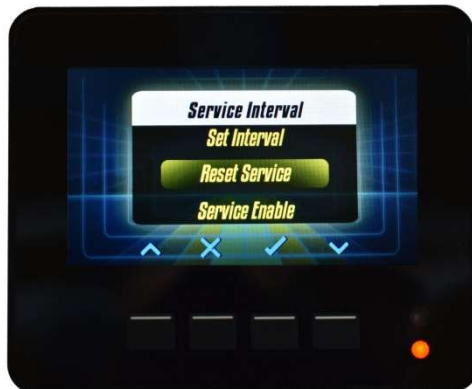
Select **Reset Service**

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A confirmation window will appear. Press the **Select Key** ![checkmark] to confirm the reset. If you do not wish to reset, press the **Cancel Key** ![x] to return to the service interval sub menu.

3.5.1.7 Change Pin Code

MaxAI430 cluster has Pin protected settings that can only be accesed by entering the correct Pin Number. The default Pin Number is **"0000"** and can be changed by user using this menu.

In case that Pin is forgotten the Pin number can be changed using Master Pin Number **"7512"**. This Pin Number will only allow to change the current Pin Number for a New Pin Number.

Current Pin Code

The digit being entered will be highlighted. Select the digit by using the **Arrow Keys**

Once the desired value is reached select it and move to the next digit by pressing the **Select Key** . Once all digits are set and the Pin Number is correct the screen change to the **New Pin Code** screen. If at any point in this process a previous digit needs to be adjusted, press the **Cancel Key** to move backwards through the digits.

New Pin Code

The New Pin Number can be entered in a similar matter as the Current Code.

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3.5.2 Instrument Setup

Select instrument setup from main menu by scrolling to **Instrument Setup** and pressing the **Select Key** ✓

3.5.2.1 Demo
Turning Demo Mode On/Off

Select **Demo**.

Select Enable or Disable by scrolling to desired option using the **Arrow Keys** ⌃ ⌄.

Once the desired option is highlighted, press the **Select Key** ✓ to enable or disable the demo mode. At this point the screen will return to the **Instrument Setup** sub menu.

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3.5.2.2 Built-In Configuration

Selecting Built-In Configuration

Communications settings is protected with pin, enter pin and proceed, please refer to Change Pin Code section for futher information about Pin.
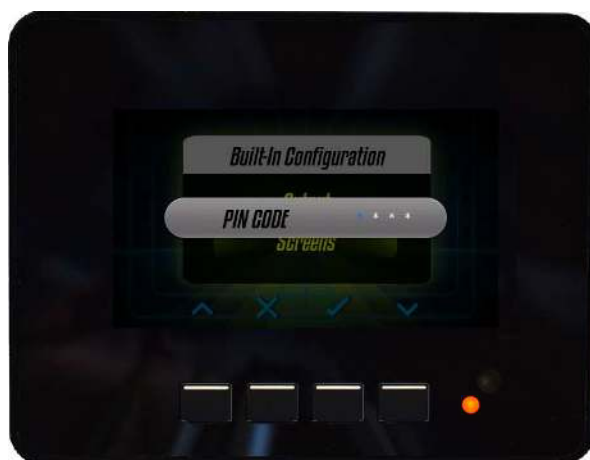
Select **Built-In Configuration**

You will have the option to configure the instrument **Screens** or the instrument **Output** type.

Select **Output** or **Screens** by scrolling to desired option using the **Arrow Keys** .

Once the desired option is highlighted, press the **Select Key** .

Setting up **Screens**

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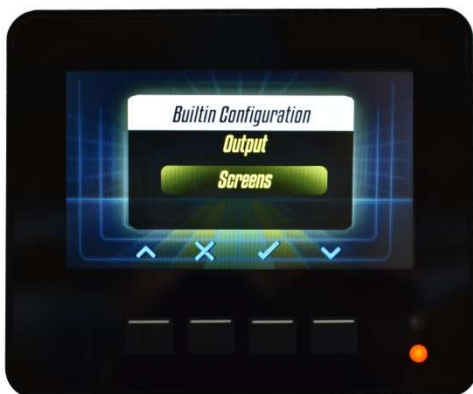
Select **Screens**

Use the **Arrow Keys** [↑] [↓] to scroll through the five available screens. To turn the screen ON/OFF press the **Select Key** [✓] while on the highlighted screen.

If screen is turned on, the **Arrow Keys** [↑] [↓] will allow you to scroll throught the

Layouts.

NOTE: If a screen is already turned on, but you wish to adjust further details of that screen, you must first turn screen off and then back on before proceeding.

Once the desired screen layout is highlighted, press the **Select Key** [✓] to set the screen layout, then once **Edit** is highlighted, press the **Select Key** [✓] to set the parameters for each instrument on the new screen.

The instrument to be configured will be highlighted. To adjust the highlighted instrument press the **Select Key** or use the **Arrow Keys** to scroll to a diferent instrument.

Once the instrument to be configured is selected, use the **Arrow Keys** to select the type of signal.

After selecting the signal type, you will need to select the signal source. Use the **Arrow Keys** to scroll between **CAN** or **Analog.** Once the desired source is selescted, press the **Select Key** to set the source.

NOTE: Signal Settings in config may show metric as the selected units, but this will automatically adjust based on the units selected in instrument set up.

When selecting an analog signal source, the analog input and type must be selected. After selecting Analog, the input screen will appear. Use the **Arrow Keys** ⌃ ⌄ to scroll to the desired input then press the **Select Key** ✓ to turn the input on.

Once the input is selected, select the signal type. Use the **Arrow Keys** ⌃ ⌄ to scroll to the desired signal type. Available types include **Resistance**, **Voltage**, and **Frequency**. Once the desired signal type is highlighted, press the **Select Key** ✓ to select the type.

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Once the type is selected, the screen will highlight the settings for the input and type. These settings cannot be changed in **Built-In Configuration**. To adjust these settings please refer to the **maxAI PC Configuration Tool.** In order to return to the gauge configuration screen press the **Cancel Key** to step backwards.

Repeat this for each instrument being configured as well as selecting the odometer/hourmeter.

When finished with each parameter, press the **Cancel Key** to return to the previous **Screens** sub menu.

Once all **Screens** changes are made, press the **Cancel Key** to save and return to the **Built-In Configuration** sub menu.

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Before finalizing changes and returning to the **Built-In Configuration** sub menu, you will be prompted to confirm saving changes. Press the **Select Key** to save the changes or press the **Cancel Key** to discard the changes.

Setting up **Output**

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Select **Output**

Use the **Arrow Keys** ⌃ ⌄ to scroll through the **Output Types**. To select the output, press the **Select Key** ✓ while on the highlighted output type. Only one output can be selected, so selecting an ouput will automatically deselect any output option already selected.

Once the **Output Type** has been selected, continue using the **Arrow Keys** ⌃ ⌄ to scroll to the **Activated By** options. To select the activation source, press the **Select Key** ✓ while on the highlighted activation selection. Like with the **Output Type**, only one activation source can be selected, so selecting an activation source will automatically deselect any activation option already selected.

Note: If no Output Type changes are desired, but you wish to change the activation type, simply scroll past the output selections and go straight to the activation selections.

Once all **Output** changes are made, press the **Cancel Key** ✕ to save and return to the **Built-In Configuration** sub menu.

3.5.2.3 DPF Regeneration

Selecting DPF Regeneration

Select **DPF Regeneration**
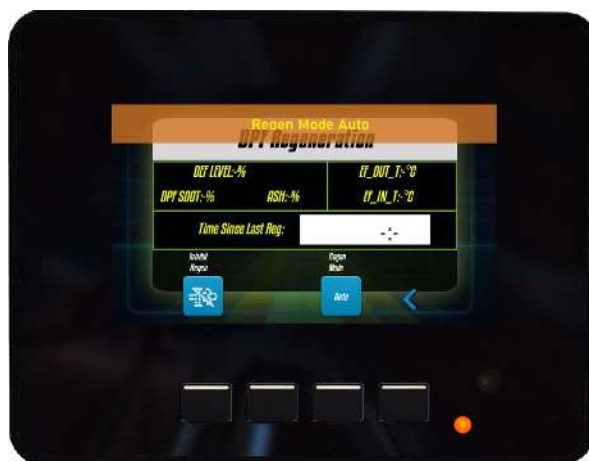
DPF Regeneration information will be displayed. The default state when entering DPF Regeneration screen will be **Regen Mode Auto**, the banner in the top of the screen in indicate the current state.

Inhibit Regen Key.

Inhibit Regen OFF   Inhibit Regen ON

The **Inhibit Regen Key** will work as a toggle switch that will allow the operator to postpone the regen cycle. Default status will be OFF, once the Inhibit Regen is confirmed ON the cluster will send to ECM the **SPN 3695** as **active**. To toggle the switch back to OFF press the **Inhibit Regen Key** to send to ECM the **SPN 3695** as **not active**. Every change of the Status of **Inhibit Regen** will be reported momentarily in the banner on the top of the screen. The status of the **Inhibit Regen Key** will be maintained through power cycles.

Regen Mode Key.

Regen Mode AUTO   Regen Mode MANUAL

The **Regen Mode Key** will work as a toggle switch that will allow the operator to change between Automatic or Manual Def regeneration. Default status will be AUTO, once the Inhibit Regen is confirmed MANUAL the cluster will send to ECM the **SPN 3718** as **not enabled**. To toggle the switch back to AUTO, press the **Regen Mode Key** to send to ECM the **SPN 3718** as **enabled**. Every change of the Status of **Regen Mode** will be reported momentarily in the banner on the top of the screen. The status of the **Regen Mode Key** will be reset when exiting the **DPF Regeneration** screen.

Force Regen Key.

 Force Regen OFF   Force Regen ON

Once the **Regen Mode Manual** is active then the Force Regen key will be available.

The **Force Regen Key** will work as a push button that will allow the operator to perform the regen cycle. Default status will be OFF, once the Force Regen is pressed the cluster will send to ECM the **SPN 3696** as **active** for one second and then the cluster will automatically switch the **SPN 3696** as **not active** and changing the switch state back to default status OFF. Every time the **Force Regen Key** is pressed the message "Initiate Regen" momentarily in the banner on the top of the screen

Back Key.

Press the **Back Key** to return to the **Instrument Setup** sub menu.

3.5.3 Fault Codes

Select fault codes from main menu by scrolling to **Fault Codes** and pressing the **Select Key** ✔

3.5.3.1 Active Fault Codes

Viewing Active Fault Codes
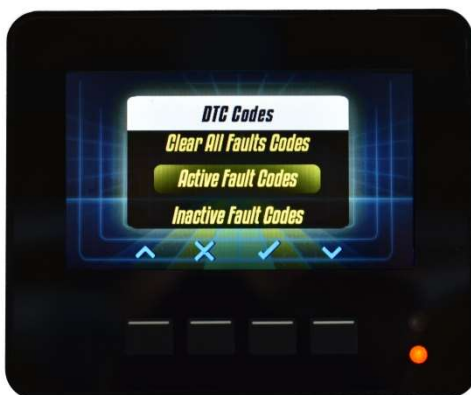
Select **Active Fault Codes**

Active fault codes will be displayed. Use the **Arrow Keys** ∧ ∨ to select Engine, Transmission, or

Retarder faults to be viewed. To exit the active fault codes screen, press the **Back Key** ‹ to return to the **Fault Codes** sub menu.

NOTE: Fault codes are displayed according to J1939-71 error definition. Diagnostic Trouble Codes (DTC) is made up of 4 independent fields, including Suspected Parameter Number (SPN), Failure Mode Identifier (FMI), Occurrence Count (OC), and SPN Conversion Method (CM.) Please refer to J1939-71 for DTC definitions.

3.5.3.2 Inactive Fault Codes

Viewing Inactive Fault Codes

Select **Inactive Fault Codes**

Inactive fault codes will be displayed. Use the **Arrow Keys** to select Engine, Transmission, or Retarder faults to be viewed. To exit the inactive fault codes screen, press the **Back Key** to return to the **Fault Codes** sub menu.

3.5.3.3 Clear All Fault Codes

Clearing Fault Codes
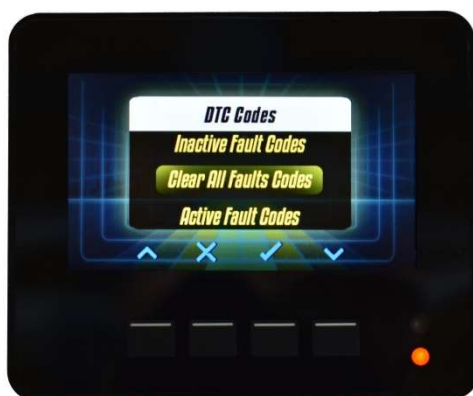
Select **Clear All Fault Codes**
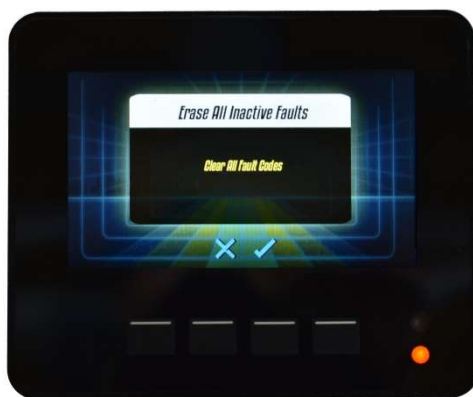
Press the **Select Key** to clear all fault codes or **Cancel Key** to back out without clearing the codes. At this point the screen will confirm clear completed. Press the **Select Key** to return to the **Fault Codes** sub menu.

3.5.3.4 LCD Warning Lights

LCD Warning Lights

Select **LCD Warning Lights**
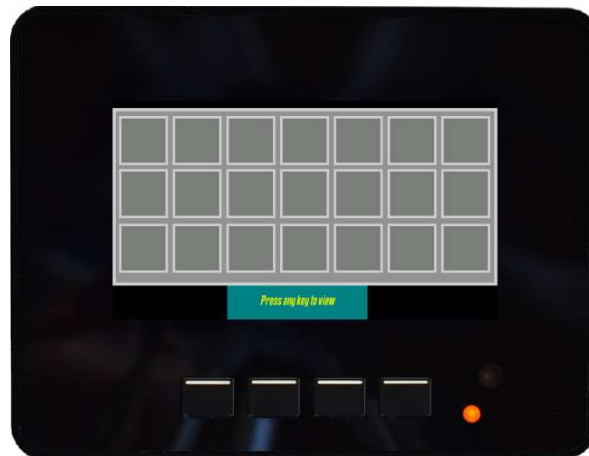
This screen will display the status of the LCD Warning Lights that can be configured in **PC Configuration Tool.** When the LCD Warning light is off the background of the icon will be gray, once the LCD Warning Light is turn on the background will change to the configurable background color.

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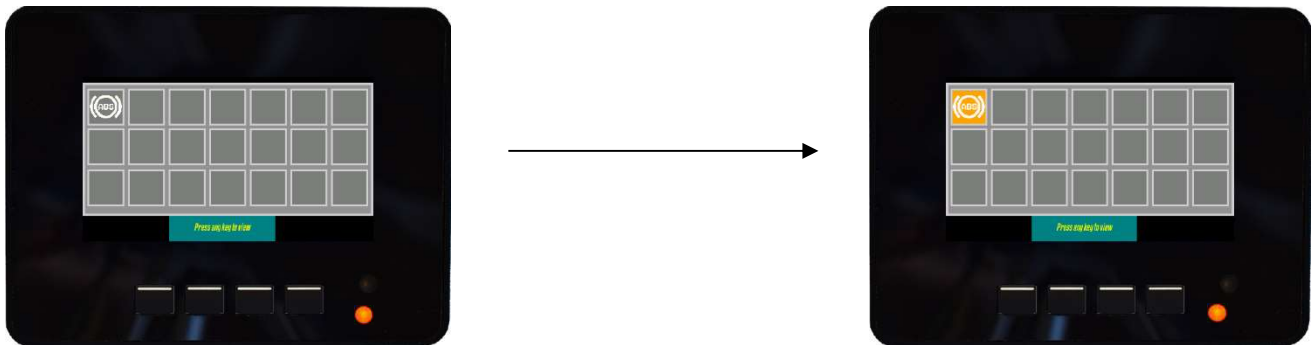
To exit this screen just click any keypad.

Also, the LCD Warning lights will be displayed on any of the main screens as a pop-up icon whenever the LCD Warning Light is turned on.

Click any keypad
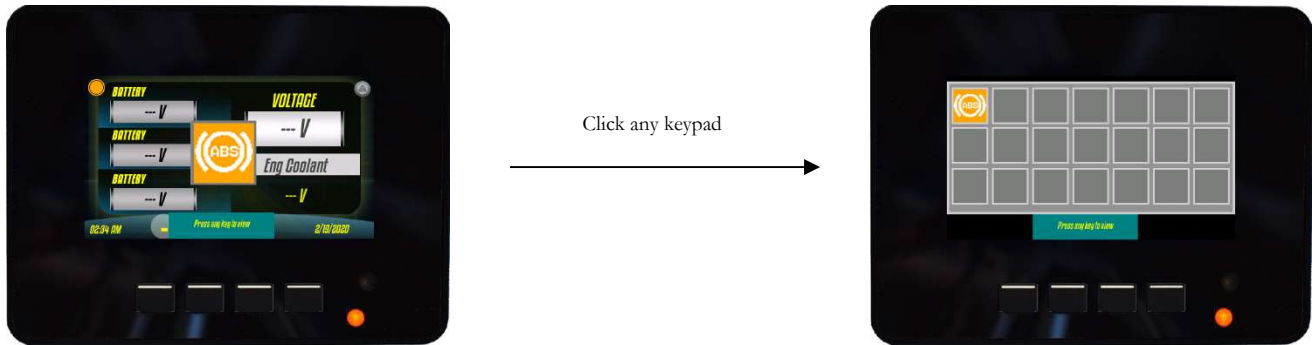
Notice that LCD Warning Light indicator at the top left corner of the screen will turn on with the color of the active LCD warning Light. In case that more than one LCD Warning Lights are active at the same time the color of LCD Warning Light indicator will be with the color of highest priority:

1. Red
2. Amber
3. Blue
4. Green

By clicking any keypad will display LCD Warning lights to check all the active LCD Warning Lights status, and to exit click again any key

3.5.4 System Information

Select system information from main menu by scrolling to **System Information** and pressing the **Select Key**

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maxAI 430v system information will be displayed. To exit the system information screen, press the **Back Key** to return to the main menu.

3.6 Navigating Display Screens

The maxAI 430v can display up to 5 screens of instrumentation. To navigate these screens, scroll left and right using the **Arrow Keys**

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Screen 2   Screen 1
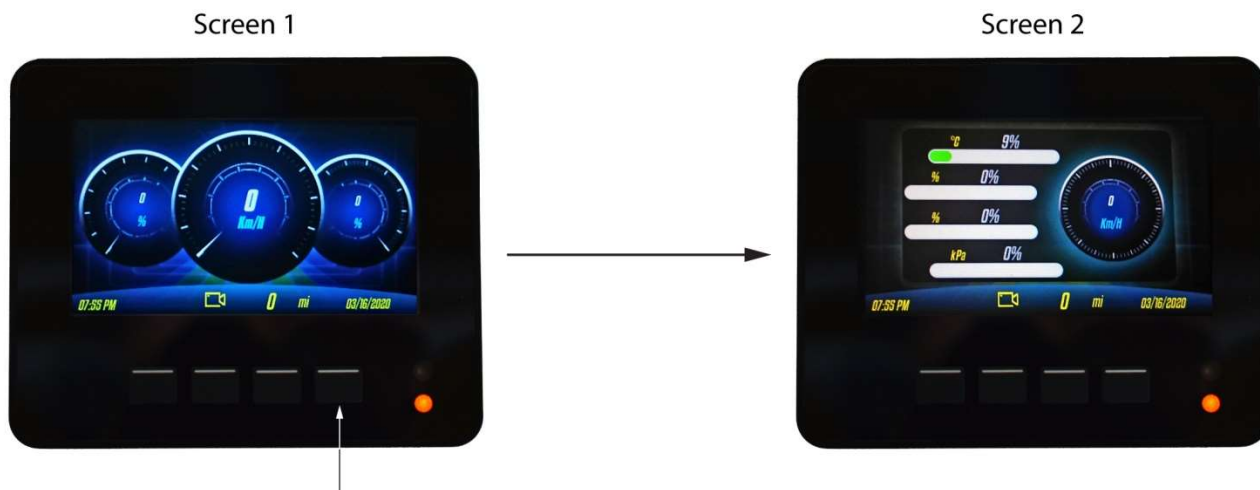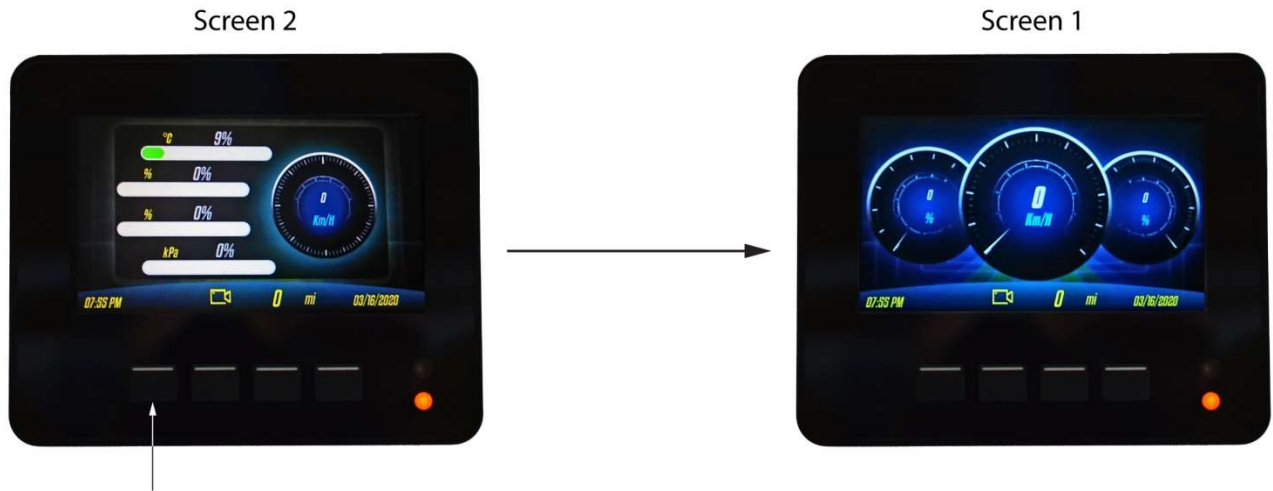
3.7 Pop-ups

Pop-up messages will appear as a banner in the top of the screen, any DM1 fault from Engine, Transmission or retarder also both CAN channels communication errors and Service interval will be displayed in the banner.

Only the first message received will be displayed in the banner until the pop-up is dismissed by pressing any Keypad.

Once the pop-up is dismissed a screen listing all active faults will be displayed. Navigate through all listed Faults using the **Arrow Keys** , exit this screen to return to previous screen by **Cancel Key** and in case that an LCD warning light is active at the same time as the pop-up message use the ⬤ **Key** to view the LCD Warning Lights status screen.

Once the list of active faults screen is closed the icon will illuminate on the top right corner of the screen to indicate that an active fault is present.

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4. Understanding Data-Bus Operation

… data-bus is like an information super-highway in the vehicle…

4.1 Data-Bus Basics

While this information applies to many types of data-busses, the maxAI 430i operates exclusively over the SAE J1939 data-bus.

The data-bus is like an information super-highway in the vehicle. A data-bus allows various controllers, such as the engine controller, transmission controller, chassis controller, etc. to communicate with each other and any other components connected to the data-bus.

Most new diesel engines are controlled by an Engine Control Module (ECM) that uses information from various sensors to adjust operating parameters, such as fuel injection, to optimize power, increase fuel economy, and lower emissions. The data-bus enables the ECM to send/receive vast amounts of information to/from the transmission computer or any other computer connected to the data-bus, greatly simplifying the vehicle's electrical system.

The data-bus contains most operating information about the vehicle, such as engine and vehicle speed, coolant and oil temperatures, oil and fuel pressures, as well as error codes from the various controllers.

4.2 Data-Bus Hardware

The physical aspects of the data-bus are quite simple. It's nothing more than a pair of wires twisted together, commonly referred to as a twisted pair, running from one controller to another.

SAMPLE DATA-BUS ILLUSTRATION

TWISTED PAIR

SHIELDING (OPTIONAL)

CHASSIS CONTROLLER

ENGINE CONTROLLER

TRANSMISSION CONTROLLER

TO OTHER DEVICES ON THE DATA-BUS
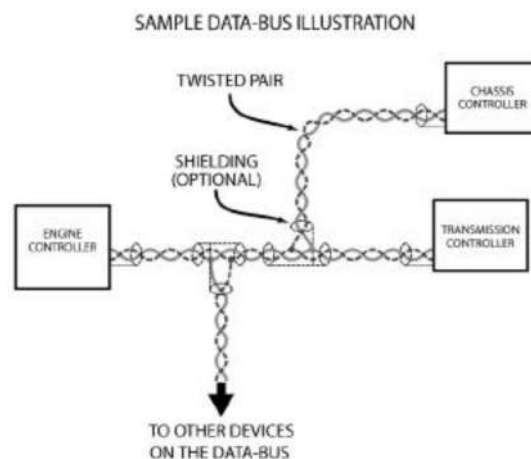
4.3 Data-Bus Communication Protocol Basics

SAE J1939 data-bus devices transmit data to and/or receive data from the bus. Data is broken down into a structured format, designated specifically by the SAE standard, containing a Source Address (SA), a Parameter Group Number (PGN), and parameter data.

The source address is the number at the beginning of the data packet that identifies where the data was transmitted from. For example, SA 0 indicates that the data packet was transmitted from the primary engine controller.

The parameter group number is the identification label for the group of data that follows the PGN. This defines what type of information the parameter data will be (e.g. engine oil pressure values).

The parameter data is a group of data bytes that contain the specific values of the particular PGNs parameters (e.g. engine oil pressure). When a device *listening* to the data-bus *hears* the appropriate SA and PGN, it then reads the desired data to complete the data transmission.

TRANSMITTED DATA PACKET
Specifies from where the information originated

| pgn | SA | parameter data |

Defines what this data means
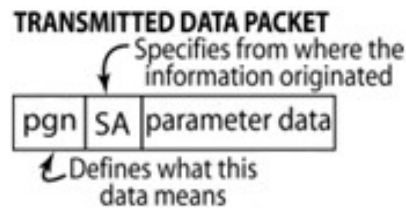
4.4 Data-Bus Termination

The SAE specification for the J1939 data-bus requires data-bus termination. The J1708/1587 data-bus does not require termination. Termination is required to attenuate any electrical noise developed by the high-speed data transfer. If the termination resistors are not present, loss of data-bus communication may occur.

Termination simply means installing two 120Ω ½-Watt resistors between positive bus wire and negative bus wire at each end of the data-bus backbone. If the installation involves connecting to an existing data-bus, termination should already exist and no additional termination is required. The SAE specification forbids the use of internal data-bus termination, because the data-bus must remain intact if any device is removed. If a specific module terminated the data-bus and that module was removed, then the data-bus could cease to operate.

The data-bus shield must also be terminated properly. Using a wire, the shield should be connected to ground as close as possible to the battery ground. This termination connection to ground can be anywhere along the data-bus, but it must only be connected at **ONE** point. The shield should also connect to the shield pin of all data-bus devices (**NOT GROUND**).

Per the SAE J1939 specification, bus shielding is optional and may not be found on all systems.

SAMPLE DATA-BUS ILLUSTRATION

ENGINE CONTROLLER

DATA-BUS DEVICE DATA-BUS DEVICE

DATA-BUS TAILS
MAXIMUM LENGTH = 1 METER

DATA-BUS DEVICE DATA-BUS DEVICE

TERMINATION RESISTOR 120 OHM 1/2 WATT
ONE RESISTOR AT EACH END OF THE DATA-BUS BACKBONE

+ BATTERY -

CHASSIS CONTROLLER

TRANSMISSION CONTROLLER

DATA-BUS DEVICE

SHIELD TERMINATED AT A SINGLE POINT ONLY GROUND AS CLOSE AS PRACTICAL TO THE BATTERY GROUND

DATA-BUS BACKBONE
MAXIMUM LENGTH = 40 METERS
USUALLY A SHIELDED TWISTED PAIR OF WIRES

TERMINATION RESISTOR 120 OHM 1/2 WATT
ONE RESISTOR AT EACH END OF THE DATA-BUS BACKBONE

5. Appendices

5.1 Appendix A: Transmission Parameters

maxAI 430i J1939 Engine and Transmission Parameters:

Message	PGN	SPN	Signal
CCVS	65265	84	Wheelbase Vehicle Speed
EEC1	61444	190	Engine Speed RPM
EEC2	61443	92	Eng. Percent Load at Current Speed
EF1_P1	65263	100	Engine Oil Pressure
ET1	65262	110	Engine Coolant Temp
HOURS	65253	247	Engine Total Hours Of Operation (Dedicated to Digital Gauge Central Down)
IC1	65270	105	Engine Intake Manifold Temp
LFE1	65266	183	Engine Fuel Rate
LFE1	65266	51	Throttle Position
LFE1	65266	185	Fuel Economy
TRF1	65272	127	Transmission Oil Pressure
TRF1	65272	177	Transmission Oil Temperature
VD	65248	244	Trip Distance (Dedicated to Digital Gauge Central Down)
VEP1	65271	168	Battery Voltage
LFC	65257	182	Current Fuel Consumption
ETC2	61445	523	Transmission Current Gear
AT1T1I1	65110	1761	DEF Level, Aftertreatment 1 SCR Catalyst Tank Level

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5.2 Appendix B: Fault Codes

All fault codes come from "Source Address 0" which is the engine ECM, or "Source Address 3" which is the Transmission ECM.

SPN	FMI	Signal
91	0-31*	Accelerator pedal os
100	0-31*	EngOilPress
105	0-31*	EngIntakeManifold1Temp
110	0-31*	EngCoolantTemp
157	0-31*	EngInjectormeteringRail1Press
158	0-31*	Keyswitch battery power
168	0-31*	Battery / power input
190	0-31*	EngSpeed
106	0-31*	Engine Intake Air Pressure
558	0-31*	Accelerator Pedal 1 Low Idle Switch
630	0-31*	Calibration Memory
631	0-31*	Calibration Module
639	0-31*	J1939 Network #1, Primary Vehicle Network
646	0-31*	Engine Turbocharger 1 Wastegate Drive
1188	0-31*	Engine Turbocharger Wastegate Actuator 1 Position
651	0-31*	Engine fuel 1 Injector Cylinder 1
652	0-31*	Engine fuel 1 Injector Cylinder 2
653	0-31*	Engine fuel 1 Injector Cylinder 3
654	0-31*	Engine fuel 1 Injector Cylinder 4
655	0-31*	Engine fuel 1 Injector Cylinder 5
656	0-31*	Engine fuel 1 Injector Cylinder 6
678	0-31*	ECU 8 Volts DC Supply
723	0-31*	Engine Speed 2
1079	0-31*	Sensor Supply Voltage 1 (+5V DC)
637	0-31*	Engine Timing Sensor
1347	0-31*	Engine Fuel Pump Pressurizing Assembly #1
676	0-31*	Engine Glow Plug Relay
2789	0-31*	Engine Turbocharger 1 Calculated Turbine Intake

5.3 Appendix C: Analog Inputs

Current maxAI 430i analog inputs supported:

Analog input	Type	Signal
1-5	Voltage	0-32V
1-5	Resistance	0-5,000 Ω

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5.4 Appendix D: Gauge abbreviations

Gauge abbreviations:

Abbreviation	Gauge Type
Fuel1	Fuel Level
DEF Level	DEF Level
IntakeMan	Engine Intake Manifold Temperature
EngOil	Engine Oil Pressure
BrakeSec	Secondary Brake Pressure
BrakePri	Primary Brake Pressure
TransOil	Transmission Oil Pressure
EngCoolant	Engine Coolant Temperature
EngOil1	Engine Oil Temperature
AuxTemp1	
TransOil1	Transmission Oil Temperature
BatteryP1	Battery Voltage
VehSpeed	Vehicle Speed
EngSpeed	Engine Speed (RPM)
Ammeter	Ammeter
EnTripFuel	Trip Fuel Consumption
EngFRate	Current Fuel Economy

6. Troubleshooting Guide

- Cluster is not counting service hours or odometer traveled distance:

  Cluster is reading hour counter from J1939 Network, check command availability on vehicle and network communication.

- Cluster is displaying dashes on gauges:

  Check network communication and monitoring signal availability

- During Flashing process Tool is displaying a popup message "Cluster does not respond command to enter bootloader":

1. Cluster is ready and waiting to receive firmware update, from previous suspended update task.
2. Cluster is not processing "Enter Bootloader Command" reset Cluster to then retry.

  Or

3. Check USB Drivers properly installed and detected

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7. Revision History

Date	Revision	Description	Approved

8/24/2021	A	Based on maxAI430v Manual rev E
		- Updated general format
		- Updated section 3.3 Accessing the Video Input
		      Video can be activated with CAN0, CAN1 or Keypad
		- Updated section 3.5.1.5 Communications
		      CAN0 & CAN1 baud rate can be configured independently
		      Pin protected implementation
		- Added section 3.5.1.7 Change Pin Code
		      New feature
		- Updated section 3.5.2.2 Built-In Configuration
		      Pin protected implementation
		- Updated section 3.5.2.3 DPF Regeneration
		      Tier 4 implementation
		- Added section 3.5.3.4 LCD Warning Lights
		      New Feature
		- Added section 3.7 Pop-ups
		      New Feature
		- Added notes to differentiate features available in maxAI430v only and merge documentation for models maxAI430 & maxAI430v
			MG