1 OVERVIEW

The JDR Series is a J1939 diagnostic code reader designed to display the numeric value or the text translation of a trouble code being reported by an engine's electronic control unit (ECU). The unit can read both active and stored codes. The TSC1 model also provides speed control capabilities.

These proven units offer simple access to live events for real time reaction. Easy to install, the units display both active and stored codes. The base model supports Diagnostic Trouble Codes (DTCs) and 6 live engine parameters.

The TSC1 model adds the ability to increase and decreases engine speed in pre-determined increments to alter speed for a predetermined period of time.

The IV models add a regeneration cycle option that can be preset or completed manually allowing the user to support Tier IV Diesel Particulate Filter (DPF) operations.

There are 5 JDR models:

The **JDR050** is a 4-mode basic unit with 2 buttons that display 6 dig-DTC codes and 4 alpha numeric characters such as DTC field identifier (DTC, FMI, OC, SRC), or, in text mode, the description of the field.

JDR100 builds on the JDR050, displaying 6 live engine parameters by default: RPM, Oil Pressure, Coolant Temperature, Fuel Level, Battery Voltage, Engine Run Hours, as well as J1939 stop, warning, malfunction, and protection status messages.

The **JDR100-TSC1** includes all the JDR100 abilities and adds the ability to control engine speed from the unit with J1939 TSC1, Torque Speed Control. With a push of a button you can increase or decrease engine speed in preset increments that produce a ramp-like response and immediate speed update.

JDR050-IV and **JDR100-IV** add Tier IV Diesel Particulate Filter (DPF) operations include their base unit capabilities and the added Tier-IV support. The DPF regeneration cycle can be enabled or disabled or manually forced directly from the -IV unit.

JDR100

JDR100-TSC1

JDR050-IV

JDR100-IV

JDR050
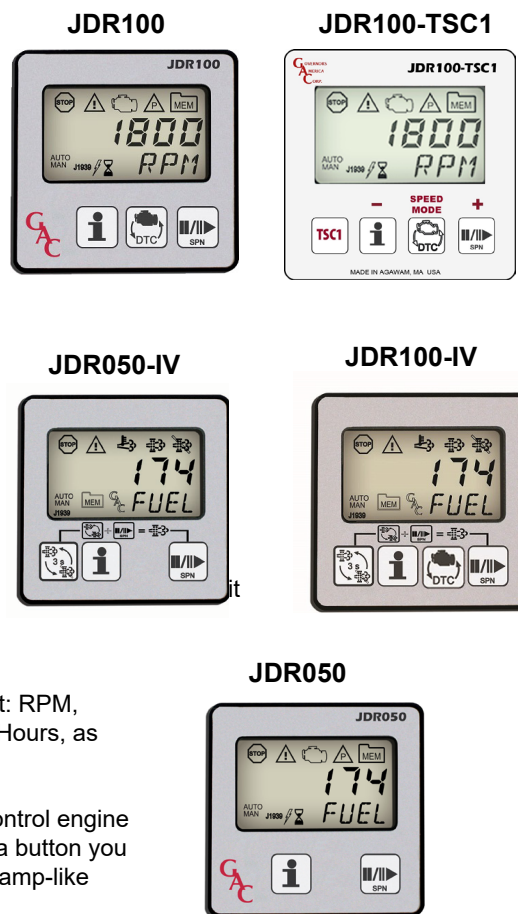
2 SPECIFICATIONS

| POWER INPUT		ENVIRONMENTAL	
Operating Voltage	8-32 V DC (0 V 50 ms transient condition)	Ambient Temperature Range	-40° to +85°C [-40° to +185°F]
Current Draw	0.25 A @ 12 V, Reverse polarity protected	Relative Humidity	Up to 100 %
CAN BUS		IP65	Resistant Direct Spray
J1939 SAE Compliment	V1 when CM = 1, V4 when CM = 0 120 CANbus termination resistor included	Shock	20 g Peak
PHYSICAL		Vibration	10 g, 200 - 2000 Hz
Overall	2.75 x 2.75 x 2.123 in [70 x 70 x 54 mm]		
Front to Back	2.75 x 2.75 x 0.7 in [70 x 70 x 18 mm]		
Panel Opening	2 in round [51 mm]		

3 | INSTALLATION

All JDR units use the same footprint. The JDR can be mounted using the integral retaining ring and gasket or your own in-house developed installation. For optimal viewing and access to keypad,the JDR was designed to be mounted using a hole drilled in a selected location.

MOUNTING JDR IN A PANEL

1. Ensure power is turned off.
2. Cut mounting hole, per Panel Cutout diagram above.
3. Note the orientation of the retaining ring. The releases on the retaining ring are on the top and bottom.
4. With retaining ring off, slide JDR into mounting hole. Make sure the JDR is facing upward and outward.
5. While holding the front of the JDR, slide the retaining ring on back until snug. Do not over tighten.
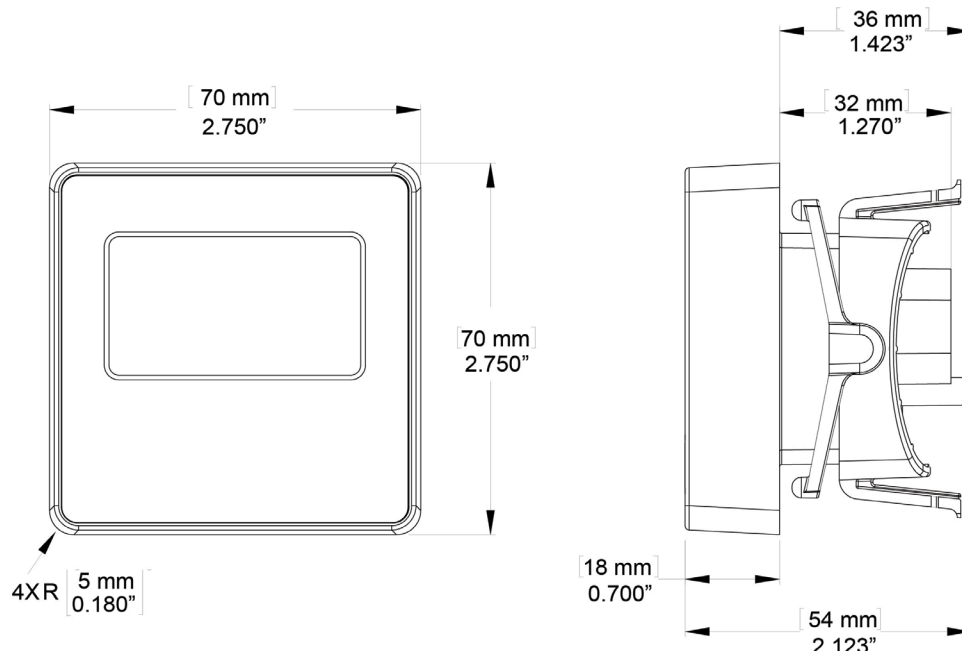
### PANEL CUT-OUT (DIAGRAM IS NOT TO SCALE)

4   BASIC WIRING

PIN 1	V+	PIN 4	V-
PIN 2	CAN H	PIN 5	CAN H TERMINATED
PIN 3	CAN L	PIN 6	V-
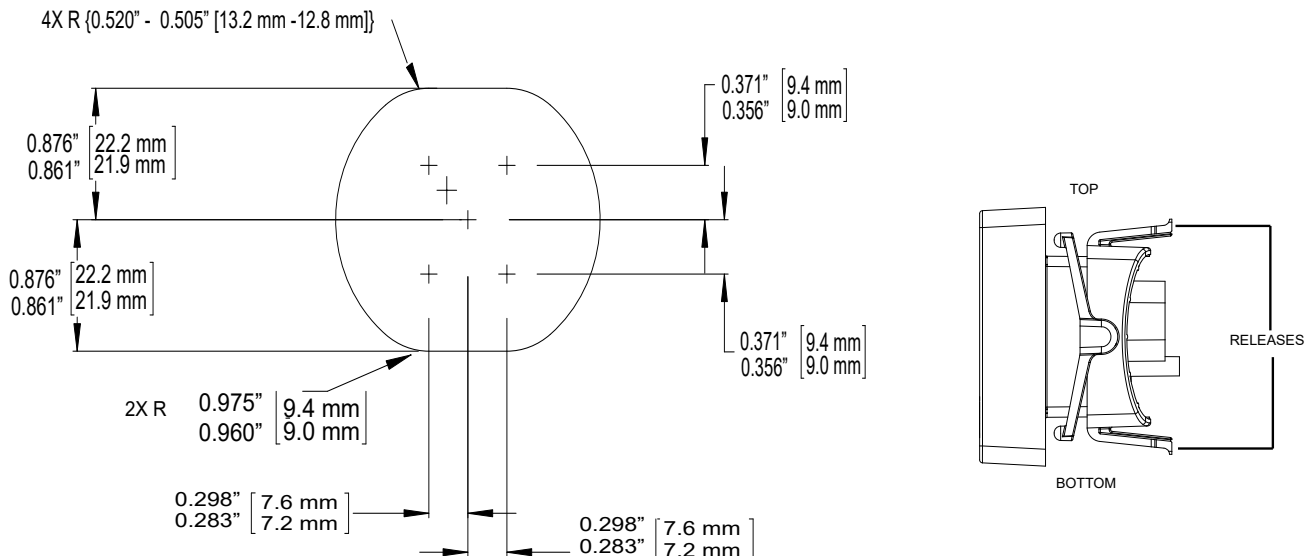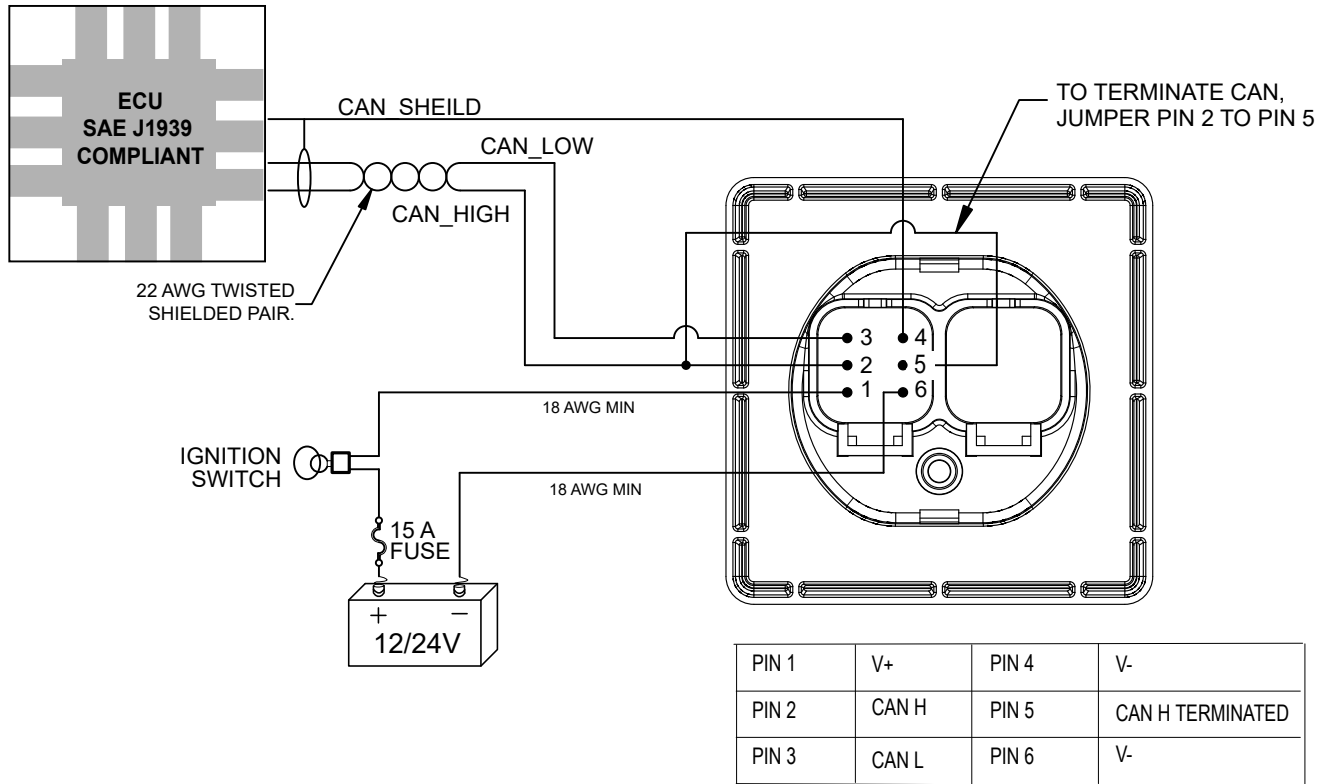
WIRING JDR TO PANEL

1. Remove power from engine.
2. Note the orientation of the connector to the engine. The JDR release is on the bottom.
3. Plug the engine connector (connection with male pins outs) into the left connection on the rear of the JDR.
4. To terminate CAN, jumper Pin 2 to Pin 5.

PIN	DEFINITION
1	V+
2	CAN H
3	CAN L
4	CAN SHIELD
5	CAN H TERMINATION
6	V-
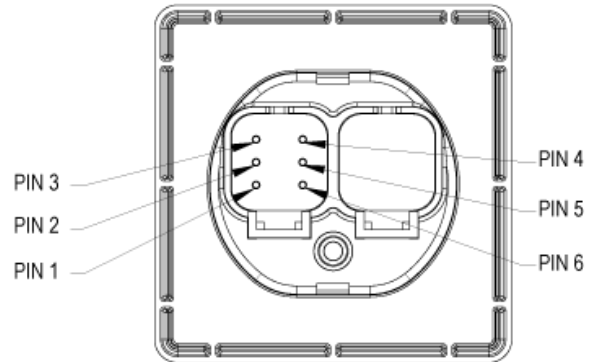
REQUIRED CONNECTORS

JDRs require a cable harness or mating connector to the ECU.

GAC PART NUMBER	DESCRIPTION
CH417-4572	JDR Series - 15 ft. [4.6m] Harness / Built-in CANbus Termination Resistor 120Ω / 6-Terminal
EC1331	JDR Series - Mating Connector Kit / 6-Terminal

5 | OVERVIEW

The JDR unit displays DTCs and J1939 engine parameters relayed by the engine ECU. Auto mode displays information in a preset order. The LCD display shows warning indicators and live engine parameters; DTCs including descriptive text such as the RPM, OIL, and DTC field identifiers (DTC, FMI, OC, SRC), or, if text mode is enabled, the long description of these fields.

Use Manual mode to move through and view more detailed information or change configurations (dependent on the JDR model).

6 | START- UP DISPLAY

When initially powered on, the JDR displays all LCD indicators and the current version of the firmware in the JDR. The JDR then downloads data from the ECU and enters Auto mode, cycling through all active DTCs on the display.

The JDR displays the following live engine parameters : RPM, Oil Pressure, Coolant Temperature, Fuel Level, and Battery Voltage messages from the engine ECU. The Tier IV JDR models also display the fuel rate. All JDR models have their own internal memory to maintain engine run hours.

7 | VIEWING IN AUTO MODE

Each JDR unit operates in Auto mode at startup, and when running untouched for at least 30 s. The JDR displays a continuous cycle of the default display parameters (below). Depending on the model, the JDR displays parameter information as it is received from the ECU. Auto mode is indicated by the **AUTO** icon on the JDR display. For example, the JDR100 will cycle through engine parameters as follows.

1. Active DTCs.
2. Stored DTCs (if any); indicated by MEM on the display.
3. Returns to displaying the active DTCs from the beginning of the list.

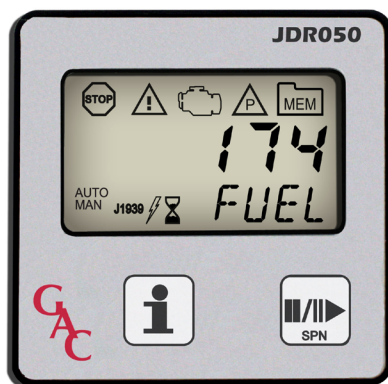**Default display parameters** include:
- **RPM** : EEC1 SPN 190 (Engine Speed)
- **KPA** : EFL/P1 SPN 100 (Engine Oil Pressure)
- **C** : ET1 SPN 110 (Engine Coolant Temperature)
- **V** : DD1 SPN 96 (Fuel Level 1)
- **%** : VEP1 SPN 158 (Key Switch Battery Potential)
- **RATE** : Tier IV (-IV) models include fuel rate
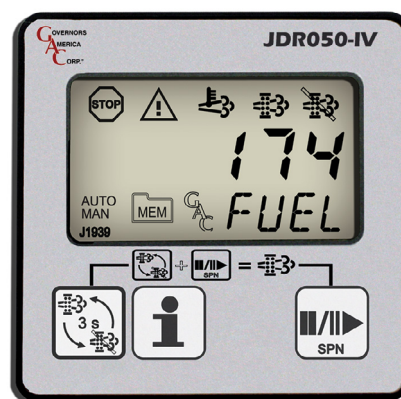- **HRS** : Engine Hours
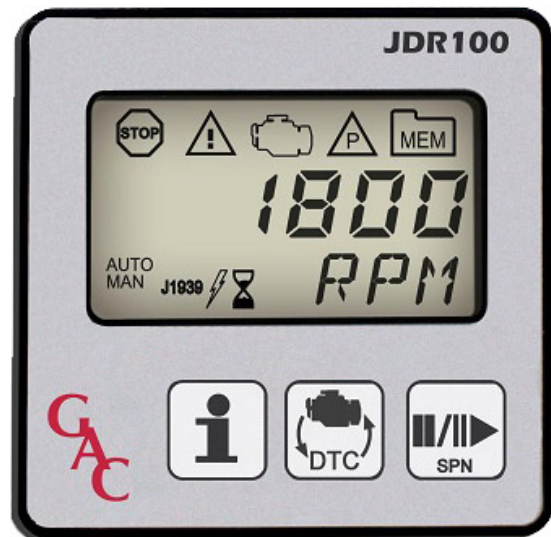
NOTES

- Detailed descriptions for active and stored DTCs are available for view in Manual mode.
- Available Buttons and LCD icons are dependent on the JDR model you are using.
- Not all engine ECUs supply Fuel Level and Battery Voltage.

JDR050

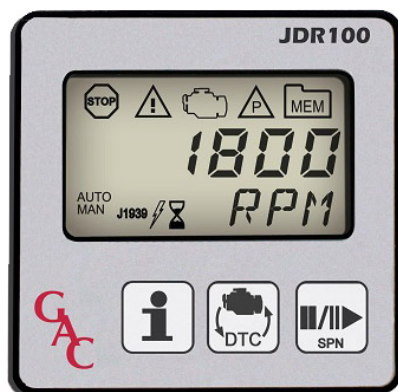**JDR050-IV**

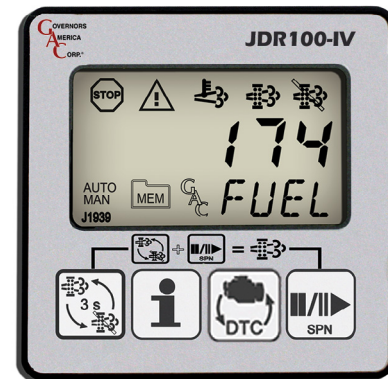| BUTTON	DEFINITION	JDR100			JDR050		DESCRIPTION
		Std	IV	TSC1	Std	IV	
ℹ	Retrieve detailed information	●	●	●	●	●	Extracts the next part of the DTC. Cycles through DTC, FMI, OC, and SRC. Also use to switch the JDR into MAN mode and to clear stored values.
⏸/⏵ SPN	Pause / Resume / Next SPN	●	●	●	●	●	Use to switch JDR into MAN mode. Press and hold to return to AUTO MODE, and to examine the next DTC in the list (from Manual Mode).
DTC	Change Function of Reader	●	●	●			Alternates view between live engine parameters and diagnostic trouble codes.
TSC1	Engine Speed Control			●			**JDR100-TSC1 only**. Press TSC1 to enter TSC1 mode display. Press and hold to access speed change mode. Use **−(ℹ)** to decrease or **+** (**SPN ⏸/⏵**) to increase engine speed. Press **TSC1** to exit.
DPF Regen (3s)	DPF Regen Control		●			●	**-IV models Only**. Diesel particulate filter control button. Used to enable and disable regeneration. When used with **SPN ⏸/⏵** button forces manual regeneration.

JDR100

JDR100-TSC1

JDR100-IV

MADE IN AGAWAM, MA USA

9 JDR NAVIGATION

LCD INDICATORS

INDICATOR	DEFINITION	JDR100			JDR050		DESCRIPTION
		Std	IV	TSC1	Std	IV	
AUTO	Auto Mode	●	●	●	●	●	Unit is in Auto Mode.
MAN	Manual Mode	●	●	●	●	●	Unit is in Manual Mode.
⚡	CANbus traffic detected	●	●	●	●	●	Valid CAN traffic received. If indicator is not lit, JDR is not properly connected to a CAN network, or is not detecting the engine ECU.
J1939	J1939 traffic detected	●		●	●	●	CAN traffic detected which qualifies as J1939. If CAN traffic indicator is lit but J1939 indicator is not lit confirm your engine supports SAE J1939.
⌛	JDR Busy	●		●	●		Unit is performing a time consuming operation, typically ECU update.
🛑	J1939 Engine Stop	●	●	●	●	●	Lit and/or flashed by engine ECU. See your specific engine manual for definition.
⚠	J1939 Warning	●	●	●	●	●	Lit and/or flashed by engine ECU. See your specific engine manual for definition.
🔧	J1939 Malfunction	●		●	●		Lit and/or flashed by engine ECU. See your specific engine manual for definition.
P	J1939 Protection	●		●	●		Lit and/or flashed by engine ECU. See your specific engine manual for definition.
MEM	Stored DTC	●	●	●	●	●	In Auto Mode indicates stored codes are present. In Manual Mode indicates information displayed is a stored code.
🌡	High Exhaust Temperature		●			●	Indicates high exhaust temperature – typically HEST indicates regeneration in process.
	Diesel Particulate Filter		●			●	Diesel particulate filter requires regeneration
	Regeneration Inhibit		●			●	Regeneration is disabled (automatic / manual)
- SPEED MODE +	Speed Mode			●			Increase or decrease speed in previously (manual mode) set increments.

10 J1939 DEFINITIONS

J1939 DEFINITIONS

ACRONYM	DEFINITION
DTC	Diagnostic Trouble Code – ECU reported failure. DTC's consists of several parts, an SPN, FMI, OC, SCR. J1939 DTC's are divided into two categories, active and stored (also referred to as *previously active codes*). Active codes are present when a condition is present. Stored codes are a record that the condition occurred.
SPN	Suspect Parameter Number – Parameter being affected.
FMI	Failure Mode Indicator – Description of the failure.
OC	Occurrence Count – The number of times the failure has occurred.
SRC	Source – CAN Address of ECU reporting DTC.
DM1	Active DTCs.
DM2	Stored DTCs (also referred to as *previously active codes*).
DM3	J1939 message transmitted to clear stored codes.

11   VIEWING DETAILS IN MANUAL MODE

Manual mode allows you to see additional details, at your own pace, moving to the next available item with each button press.

SWITCHING BETWEEN AUTO MODE AND MANUAL MODE

To view in Manual mode, press and hold the information **i** or next ◼/▶ button. The JDR will display the current active SPN.

To return to Auto mode, press and hold the SPN ◼/▶ button for 3 seconds, or, the unit will automatically return to Auto Mode when the unit detects no user activity for the amount of time specified by the IDLE user configurable parameter.

DISPLAYING TEXT OF PARAMETERS

While looking at LIVE engine parameters, press the **i** button to display the text for the parameter being displayed. Press **i** again to move to next parameter.

VIEWING DETAILED INFORMATION

From Auto mode (these examples use a JDR100):

1. Press **i** twice to view long description: For example RPM would now scroll as ENGINE SPEED.
2. Press **DTC** to request updated information from the ECU.
3. Press **SPN** ◼/▶ once to enter Manual (MAN) mode and again to manually move through each J1939 message available for this JDR unit.

While looking at DTCs, each time you press the **i** button the JDR displays additional information for that DTC. The information is displayed in the following order:

1. SPN
2. FMI
3. OC
4. SRC

When displaying DTCs, the JDR first displays the current active DTCs. Press ◼/▶ to display the next active DTC.
When the JDR reaches the end of the active DTCs, the JDR will display the stored DTCs and show MEM on the screen. When all stored DTCs are displayed, the current DTCs will again display and MEM icon is no longer displayed.

J1939 DTC's are divided into two categories, active and stored. Active codes are present when a condition is present. Stored codes are a condition that occurred in the past and noted by MEM on the LCD. The JDR can display up to 240 DTCs from up to 10 different CAN devices.

Within each DTC, both active and stored, are 4 data components:

•   Suspect Parameter Number (SPN) is the engine parameter that is out of range (e.g., Oil Pressure, Coolant Temperature).
•   Failure Mode Indicator (FMI) provides information about the failure (e.g., OUT OF CALIBRATION).
•   Occurrence Count (OC) indicates the number of times the failure has occurred
•   Source Address (SRC) tells the user the CAN address of the error-ed device.

The messages displayed on the JDR conforms to the SAE J1939 Standard. In AUTO mode, the unit displays standard short text. If an engine manufacturer implements a proprietary SPN (not defined in the standard), the JDR will display the SPN number without a text translation; consult your engine manufacture documentation for details.

ABOUT FMI TEXT

The JDR displays 4 text characters at any one time, using a shortened version of the text standard FMI text. For detailed information regarding the FMI definitions please consult the SAE J1939 specification.

NOTE   Not all engine ECUs supply Fuel Level and Battery Voltage.
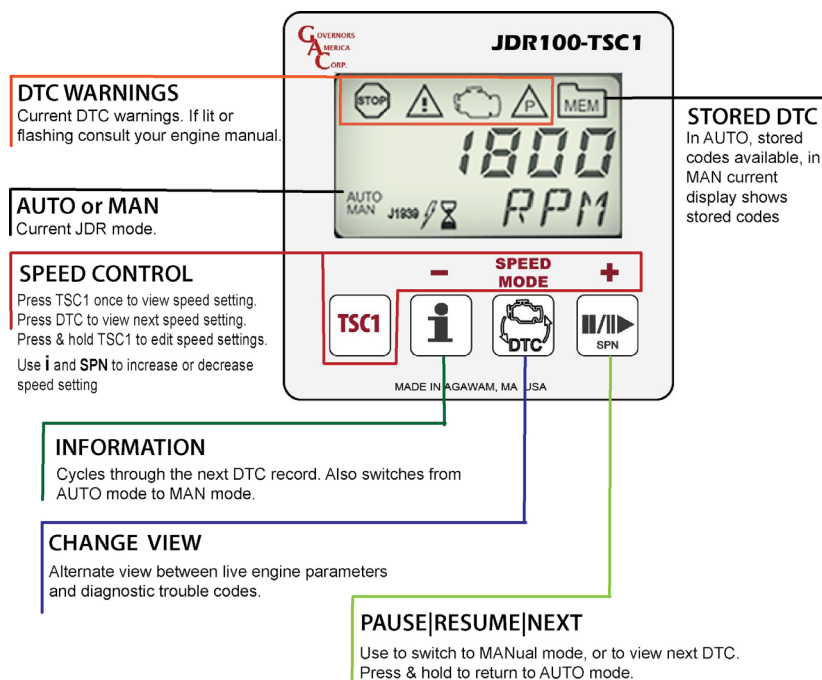
12   CHANGING SPEED ON A JDR100-TSC1

The JDR100-TSC1 allows you to see more detailed information, skip to the information you want, and access configuration settings and depending on the model, other settings and controls. JDR units will return to AUTO mode when the unit is left untouched for more than 30 s.

CHANGING SPEED ON JSDR100-TSC1

The JDR100-TSC1 model allows for real time speed changes from the JDR unit. The JDR100-TSC1 uses an additional screen to set speed control information using the Configurator tool. Both units use the JDR100 handset to make final settings. To change the default steps and settings see the "CHANGING STEP AND SPEED SETTINGS ON JSDR100-TSC1" on page 9.

To change the speed to the preset increments on a JDR100-TSC1 unit :

1. Press the **TSC1** button. TSC1 displays.
2. Press the **i** to decrease speed or press the SPN ◼/▮▶ to increase speed.
3. Press **TSC1** button to exit the setting screen.
4. The increase and decrease to RPM are temporary.

DTC WARNINGS
Current DTC warnings. If lit or flashing consult your engine manual.

STORED DTC
In AUTO, stored codes available, in MAN current display shows stored codes

AUTO or MAN
Current JDR mode.

SPEED CONTROL
Press TSC1 once to view speed setting. Press DTC to view next speed setting. Press & hold TSC1 to edit speed settings.
Use **i** and **SPN** to increase or decrease speed setting

INFORMATION
Cycles through the next DTC record. Also switches from AUTO mode to MAN mode.

CHANGE VIEW
Alternate view between live engine parameters and diagnostic trouble codes.

PAUSE|RESUME|NEXT
Use to switch to MANual mode, or to view next DTC. Press & hold to return to AUTO mode.

13   PERFORMING PARTICULATE REGENERATION WITH TIER -IV JDR

The Tier-IV JDR's are specifically designed to support Tier IV engine particulate filter regeneration functions. The DPF regeneration cycle can be enabled or disabled. The operator can use the JDR to manually force a regeneration cycle.

TO ENABLE OR DISABLE DPF REGENERATION CYCLES:

1. Press and hold the TIER IV 🔄 button for 3 seconds.
2. The JDR will respond by displaying the word SENT.
3. The engine will command the JDR to turn on or off the regeneration inhibit indicator to confirm whether regeneration is enabled or disabled.

NOTE   When DPF regeneration is disabled, both automatic and manual regenerations are disabled.

TO PERFORM A REGENERATION CYCLE:

1. Press and the TIER IV 🔄 button while simultaneously pressing SPN ◼/▮▶ .
2. The JDR will respond by displaying the word SENT.

NOTE   If the DPF regeneration is disabled, the engine will not respond to this command.

14   MANUALLY CONFIGURING JDR UNIT SETTINGS

Users can choose the display order of the DTC codes, change scroll rate, change units of measure, and other items as defined in the JDR SETTINGS table. These setting changes can be made for all units manually from the actual unit.
The JDR100-TSC1 units also let you set idle and 2 other speeds directly from the JDR unit.

⚠️ Take care when changing the engine ECU and JDR CAN bus addresses. If not properly set, the JDR may not appear to be functioning.

ACCESSING THE USER CONFIGURATION MODE

To enter User Configuration mode, press and hold the 𝐢 and the ■/I▶ buttons simultaneously for 3 seconds.

CHANGING CONFIGURABLE SETTINGS

Configurable settings can be changed from the JDR unit while in manual mode. cycle through all the configurable parameters (listed in Section 15) shows default settings as well as min-max and notes on use.

1. Press the ■/I▶ button to enter manual mode.
2. Simultaneously hold the 𝐢 and ■/I▶ for 3 seconds. The first parameter displays.
3. To cycle to the next parameter:
    a. On a JDR100 unit, cycle to the next parameter by pressing DTC (on the JDR100) to cycle to the next parameter
    b. On the JDR050 unit press ■/I▶ to cycle to the next desired parameter.
3. To change a value of a configurable parameter, press the ■/I▶ button to go to the next available value.
   Press 𝐢 to move to the previous value.
4. When you reach the end of the list, the JDR will go back to the top of the list.

CHANGING AUTO DISPLAY ORDER

The JDR unit displays parameters in a defined order. To change the order of display change the P setting:

1. Simultaneously press the 𝐢 and **SPN** ■/I▶ buttons for 3 S.
2. The unit will display the base parameter, ECU.
3. Press the **DTC** button to move to the next parameter. Best practice scroll through all the settings before making changes.
4. Note the P parameters - these equate to the order of the parameters displayed in auto mode.
   • P1 - set to 1 - means display 1st
   • P2 - set to 4 means display it 4th
   • Any P# set to zero will not be displayed.

CHANGING SPEED SETTINGS AND INCREMENTS ON JSDR100-TSC1

The JDR100-TSC1 model allows for real time speed changes from the JDR unit. From the unit you can manually set the ramp step size, transmission rate, and preset speed mode RPM. See your GAC representative for information on adding additional controls to the TSC1 units and file sharing capabilities.

To configure a JDR100-TSC1 unit set the base speed parameters.

1. Press the TSC1 button to open the TSC1 Control Configuration window and set the JDR and ECU CAN Addresses if required. Default settings are usually best.
2. Select Enable TSC1 Speed Control to allow TSC1 settings with your JDR100-TSC1 unit.
3. Set the ramp speed settings (Step Size) and the transmission rate (seconds).
4. Set the TSC1 Speed Modes (1, 2, 3) in RPM.

CLEARING STORED DTCS

If the ECU allows clearing of stored DTCs:

1. Set the JDR to view DTCs.
2. Access Manual Mode by pressing either the 𝐢 or the SPN ■/I▶ button.
3. Press and hold 𝐢 for 3 seconds - unit will display DM3.
4. Press and hold 𝐢 for another 3 seconds, unit displays SENT.
5. To return to Manual Mode, press and hold the SPN ■/I▶ button for 3 seconds.

RESETTING ENGINE RUN HOURS

The JDR is equipped with a counter to record the number of hours an engine has run. If the engine ECU provides the hours, the JDR will record the value from the ECU. If hours are not provided by the ECU, the JDR will increment the counter, when it sees engine speed. To reset the hour counter:

1. Set the JDR to view live engine parameters.
2. Select Manual Mode by pressing either the 𝐢 or the SPN ■/I▶ button.
3. Press and hold 𝐢 for 3 seconds - unit will then display HRS.
4. Press and hold 𝐢 for another 3 seconds, unit will displays DONE.
5. To return to Manual Mode, press and hold the SPN ■/I▶ button for 3 seconds.

JDR units can have both the unit setup and J1939 PGN settings configured. The following settings control how the JDR interacts with the ECU and the end user. These settings can be altered on the JDR or using the JDR software.

ID	TEXT	DEFINITION	VALID RANGE	DEFAULT
1	DM3	DM3 flag allows users to clear stored codes. 0 = deny capability. (1)	0-1	1
10	ECU	CAN Address of ECU (255 accepts any address)	0-255	255
11	JDR	CAN Address for JDR	0-254	201
12	RATE	Length of time JDR will display DTC (in seconds)	1-10 s (1 second intervals)	2 s
13	IDLE	Amount of idle time before JDR returns to previous state JDR100-x JDR050/JDRxx-IV	0-60s 5-60s (5s intervals)	30 s 10 s
14	DTCS	Maximum number of DTCs the JDR will accept	10, 25, 50,100, 200, 240	240
15	TEXT	Scroll rate for text display of SPNs and FMIs	0-5 (0=no text, 1=fast, 5=slow)	2
16	CONV	J1939 Conversion Method (for engines that do not support conversion method 4)	1, 2, 3	1
17	DISP	Set the display mode on power to either engine parameters or DTCs.	0 = Engine Parameters 1 = DTCs	0
18	EDRT	Number of seconds before displaying next engine parameter.	0-10 S (1 sec increments; 0 stays on current parameter)	5
19	UNIT	Configures display engine parameters in standard or metric units.	0 = Standard (F° / PSI) 1=Metric (C° / Bars)	0
20	P:RPM	Order of display on unit of engine speed parameter.	0-10 (0 = do not display)	1
21	P:KPA	Order of display on unit of oil pressure parameter. **EFL/P1 SPN 100** (Engine Oil Pressure)	0-10 (0 = do not display)	2
22	P:C	Order of display on unit of coolant temperature parameter. **ET1 SPN 110** (Engine Coolant Temperature)	0-10 (0 = do not display)	3
23	P:HRS	Order of display on unit of engine hours parameter. HOURS **SPN 247** (Engine Total Hours of Operation	0-10 (0 = do not display)	4
24	P:V	Order of display on unit of key switch battery potential.	0-10 (0 = do not display)	5
25	P:	Order of display on unit of fuel rate.	0-10 (0 = do not display)	6
26	P:%	Order of display on unit of fuel level. DD1 **SPN 96** (Fuel Level 1)	0-10 (0 = do not display)	0
30 [1]	TSC	TSC1 Speed Control	0 = OFF, 1 = ON	0
31 [1]	TTR	TSC1 Transmission Rate (ms)	10, 20, 50, 100, 250, 500, 750, 1000	10
32 [1]	TRSS	TSC1 RPM Step Size	1-1000, 1, 5, 10, 25, 50, 100, 250, 500, 1000	10
33 [1]	TSM1	TSC1 Speed Mode 1	1-8000 RPM, 0 = disabled	1500
34 [1]	TSM2	TSC1 Speed Mode 2	1-8000 RPM	0
35 [1]	TSM3	TSC1 Speed Mode 3	1-8000 RPM	0

1. **TSC100-TSC1 models only.**
2. Some engines will not accept the DM3 message to clear stored codes, or only clear some codes.
3. Error messages may occur if changes made to the ECU or JDR address to not match the ECU you are attached to. The default address, 255, accepts any address.
4. End users by default can access the manual configuration area.
5. The unit will automatically return to Manual mode when it detects no user activity for the time specified by the IDLE parameter.