User Guide,
Spartan Light Bar
Message Center System

072-80871A

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AMETEK®
VEHICULAR INSTRUMENTATION SYSTEMS

072-80871A Revision Table

REVISION	DATE	DESCRIPTION OF CHANGE
A	03/31/10	Initial Release

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1 Introduction

The Spartan Instrumentation System (i.e., the *System*) consists of a speedometer, a tachometer, a number of smaller gauges, and a light bar. The light bar contains 18 telltales, a Message Center, a "buzzer", and two pushbutton switches.

Appendix A contains specific information about your application.

1.1 Message Center

The two-line Message Center displays odometer, fuel economy, trip, and other information and also helps you check the operation of the System.

1.2 Pushbutton Switches

The light bar contains two pushbutton switches ("Right" and "Down") that let you select what is displayed, configure various display options, and help you check various parts the operation of the entire System. Chapter 2 contains details of how to use the pushbuttons.

1.3 Audible Warning

The light bar contains an audible device that sounds when the system detects a potentially hazardous condition (for example, low air pressure).

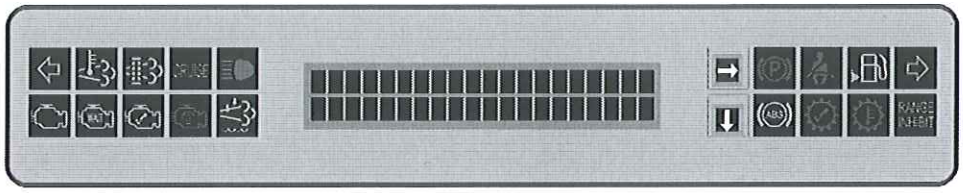
1.4 Activating the System

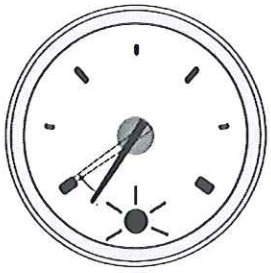
When the ignition is off, the System is "asleep"; however, you can view the odometer and hourmeter without an ignition key by pressing either pushbutton.

Turning the ignition on "awakens" the System which then becomes fully operational.

1.4.1 Initialization Sequence

Each time you turn the ignition on, the System lets you verify it is working by performing the initialization sequence shown in Figure 1-2. The System should be serviced if it does not function as shown.





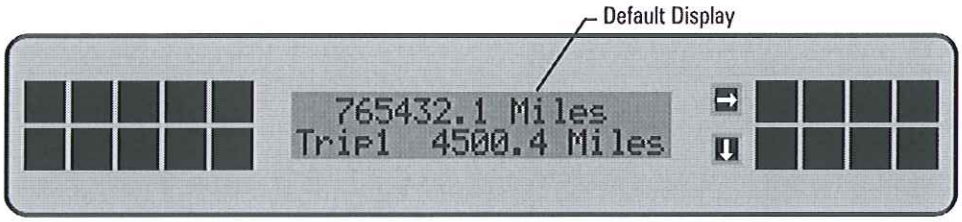
Before the Initialization:

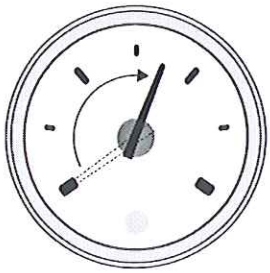
All gauge pointers move together to just below minimum scale for 1/2 second, then clockwise to minimum scale.

All gauge warning LEDs turn on for one second.

All light bar telltales turn on for three seconds.

All pixels in the Message Center turn on for at least three seconds.





Actual Readings

After the Initialization:

All gauge pointers, gauge warning LEDs, and telltales indicate actual conditions.

The Seatbelt telltale will remain on for 60 seconds or until the driver's seatbelt is fastened, whichever occurs first.

The Message Center displays the default display.

If an active warning condition exists, the Message Center will display the warning message for that condition.

NOTE: *If the battery voltage drops low enough (for example, during extremely cold conditions) when the starter is engaged, the System may repeat the sequence when the power returns to normal.*

Figure 1-2 System Initialization Sequence

1.5 Telltales

See Appendix A for specific information about the telltales in your instrumentation system.

1.6 Gauge Warning LEDs

Each small gauge contains a red warning LED (light-emitting diode) and turns on when the item the gauge monitors is too high (in the case of temperature gauges) or too low (in the case of air pressure gauges). In some cases, this will be accompanied by the appropriate telltale in the light bar, and/or a warning message in the Message Center.

1.7 Additional Faults

If you see one of the indications in Table 1-1, the vehicle requires service.

INDICATION	TYPE OF PROBLEM
A gauge's pointer goes to zero or full scale and its warning LED* flashes rapidly.	This is an out-of-range indication. The gauge is good, but its input to the System is too high or too low.
A gauge's pointer goes to zero and its warning LED flashes slowly.	The gauge is not receiving any data at all.
** The speedometer and tachometer do not have warning LEDs.*	

Table 1-1 *Additional Faults*

2 Using the Message Center

The Message Center provides several useful and informative functions grouped into three modes. For safety, some functions are only available to you when the park brake is applied. Table 2-1 shows you the functions you can access in each mode.

MODE	WHAT YOU CAN DO	FOR DETAILS, SEE SECTION
Ignition Off	View odometer/hourmeter screens	2.2 on page 2-2
Ignition On	Display the initialization pattern	2.3 on page 2-3
	Display warning messages if received	2.3.1 on page 2-4
	Choose which of the four customizable displays you want for your default screen	2.3.2 on page 2-4
	Display and reset Trip Information screens	2.3.3 on page 2-6
	Display and reset Fuel Economy screens	2.3.4 on page 2-7
*Parked	Display Engine Hour screen	2.4.1 on page 2-9
	Configure, display, and reset the Service Reminder	2.4.2 on page 2-10
	Run System diagnostics	2.4.3 on page 2-13
	Display stored messages	2.4.3.1 on page 2-14
	Test gauges and telltales	2.4.4 on page 2-17
	Change from English to metric units and vice versa	2.4.5.1 on page 2-21
	Change bottom line of the Primary Information Display	2.4.5.2 on page 2-21
	Change both lines of the second, third, and fourth information displays	2.4.5.3 on page 2-22
	Calibrate the optional compass and set its declination	2.4.5.4 on page 2-22
* This mode is only available when the ignition is on and the park brake is set.		

Table 2-1 *Message Center Modes and Functions*

2.1 Ignition-Off Mode

If you do not have an ignition key, you can still view the odometer and hourmeter screens (Screen B) for 15 seconds by pressing ⇓ or ⇒ . You can restart the 15-second period at any time by pressing either pushbutton.

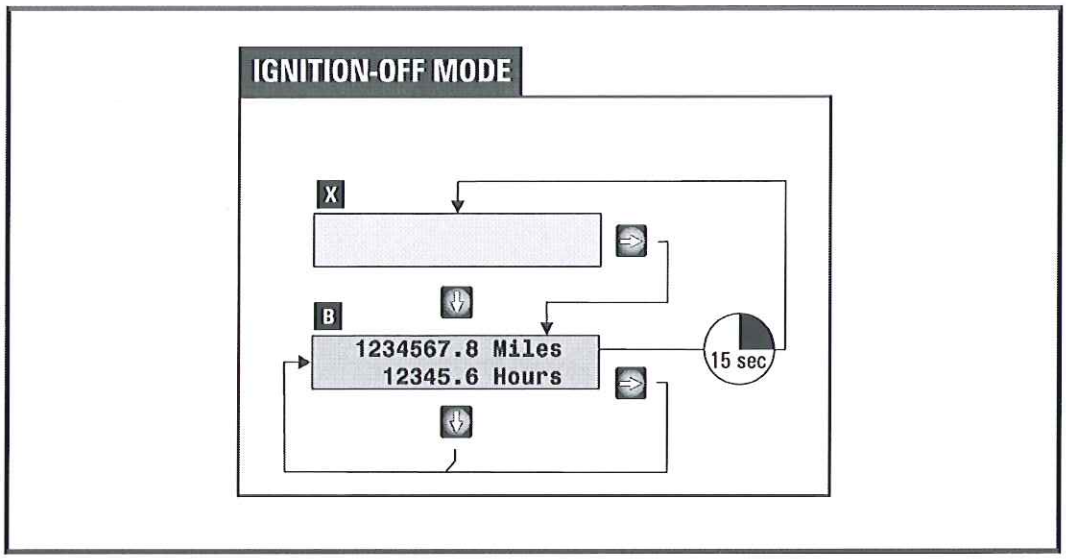


Figure 2-1 *Ignition-Off Mode*

2.2 Odometer

The odometer can display up to 9,999,999.9 units (miles or kilometers) and does not roll over to zero. The odometer cannot be reset. You can display miles or kilometers; the choice is made in the Set-Up function (Section 2.4.5 on page 2-19).

2.3 Ignition-On Mode

Whenever the ignition is on, you can do the following:

- Display the initialization pattern (Screen A in Figure 2-2)
- Display active warning messages (see Section 2.3.1)
- Display the default screen (Section 2.3.2)
- Select a different default screen (Section 2.3.2)
- Display and reset Trip Information screens (Section 2.3.3)
- Display and reset Fuel Economy screens (Section 2.3.4)

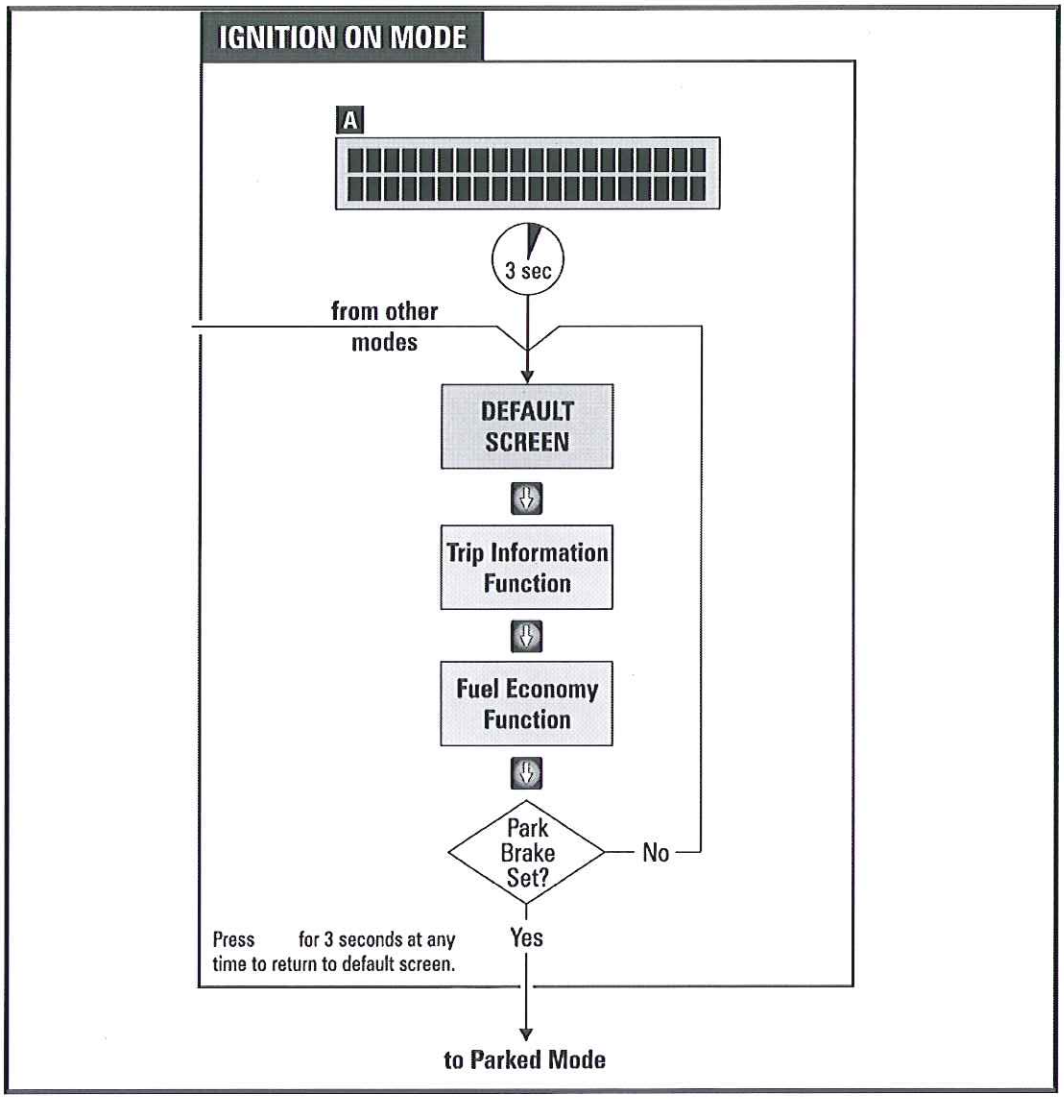


Figure 2-2 *Ignition-On Mode*

2.3.1 Real-Time Warning Messages (Pop-Ups)

When the System detects a condition that requires your attention, it displays a warning message. These messages are also called "pop-ups" because they replace whatever is currently being displayed. Some pop-ups are accompanied by the buzzer. Table 2-2 on page 2-14 shows the warning messages the System can display.

- The System will display a pop-up for as long as the condition that triggered it is active. If the triggering condition goes away for 30 consecutive seconds, the System will store the pop-up for later recall and will return to the previous display.
- The System stores a list of the 30 most recent pop-ups that occurred during the current ignition cycle. If more than 30 message are displayed, the System drops the oldest one off the list.
- The System clears the list whenever you turn off the ignition.

2.3.1.1 What You Can Do When a Warning Message Appears

When a warning message first appears, you can:

- **Acknowledge the message** - by pressing either pushbutton while the message is displayed. This is the normal course of action. By acknowledging the message, you are telling the System that you have seen the message and you want the default screen to reappear. The System will store the message for later recall and will also turn off the buzzer if it is sounding. If another unacknowledged warning message exists, it will then appear; otherwise, the default screen will reappear.
- **Do nothing** - If you do nothing, the System will continue to display the message will remain until the condition that caused it goes away. When that happens, the System will store the message for later recall. It will not reappear during the current ignition cycle unless the condition that caused it returns.
- **Press and hold ⇓ for three seconds** - The System will display the default screen; however, any messages you did not acknowledge will then reappear as a reminder and to give you a chance to acknowledge it.
- **Turn the ignition off** - The System will erase *all* messages.

2.3.2 Customizable Information Displays

When you turn the ignition on, the screen you see after the self-test is called the *Default Screen*. The System lets you choose a default screen from among four customizable information displays, and remembers your choice when you turn the ignition off and back on again. The default screen you choose remains until you select a different one.

One of the four information displays (Screen C) is called the *Primary Information Display*. See Figure 2-3 for example. Appendix A contains the displays specific to your application. The Primary Information Display becomes the default screen if no other information displays have been selected, or if the battery has been

disconnected and reconnected. The top line of the Primary Information Display always displays the odometer, and cannot be changed; however, you can choose what you want to display in the bottom line.

Upon exiting the Parked and Setup modes, the light bar returns the Message Center to the default screen. Instructions for changing the contents of the Primary, Second, Third and Fourth Information Displays begin in Section 2.4.5.2 on page 2-21.

When a default screen is displayed, you can:

- Cycle through the four information displays by pressing ⇒.
- Proceed to the Trip Information function by pressing ⇓.

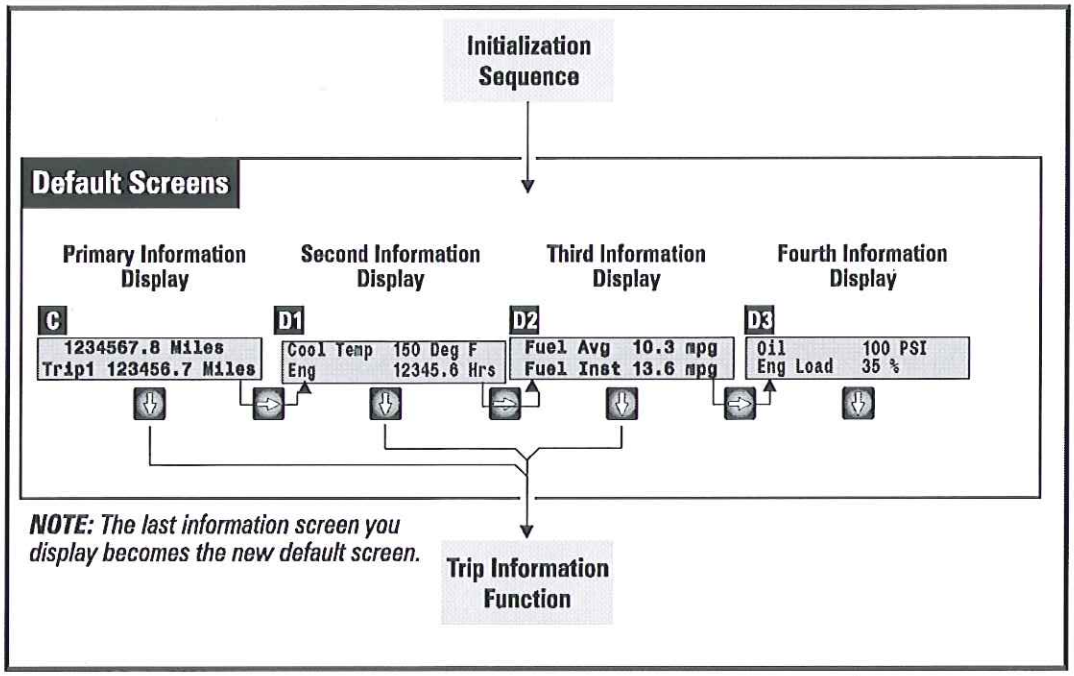


Figure 2-3 *Default Screen and Information Display*

Note: *You can change which information screen becomes the default screen when the park brake is off; however, you* cannot *change what is displayed in the information displays until you are in the Parked mode.*

2.3.3 Trip Information Function

The Trip Information function contains two independently resettable trip odometers and hourmeters. Each trip odometer and hourmeter can display up to 99,999.9 units. They do not roll over, but will freeze when 99,999.9 is reached. Their values will *not* be lost when the ignition switch is turned off or when the battery is disconnected.

When this function is displayed, you can:

- Switch between Trip 1 (Screen E) and Trip 2 (Screen F) by pressing ⇒.
- Reset the distance and time of the current display to zero by pressing ⇒ for three seconds.
- Advance to the Fuel Economy function by pressing ⇓.
- Exit the Trip Information function and return to the default screen by pressing ⇓ for three seconds.

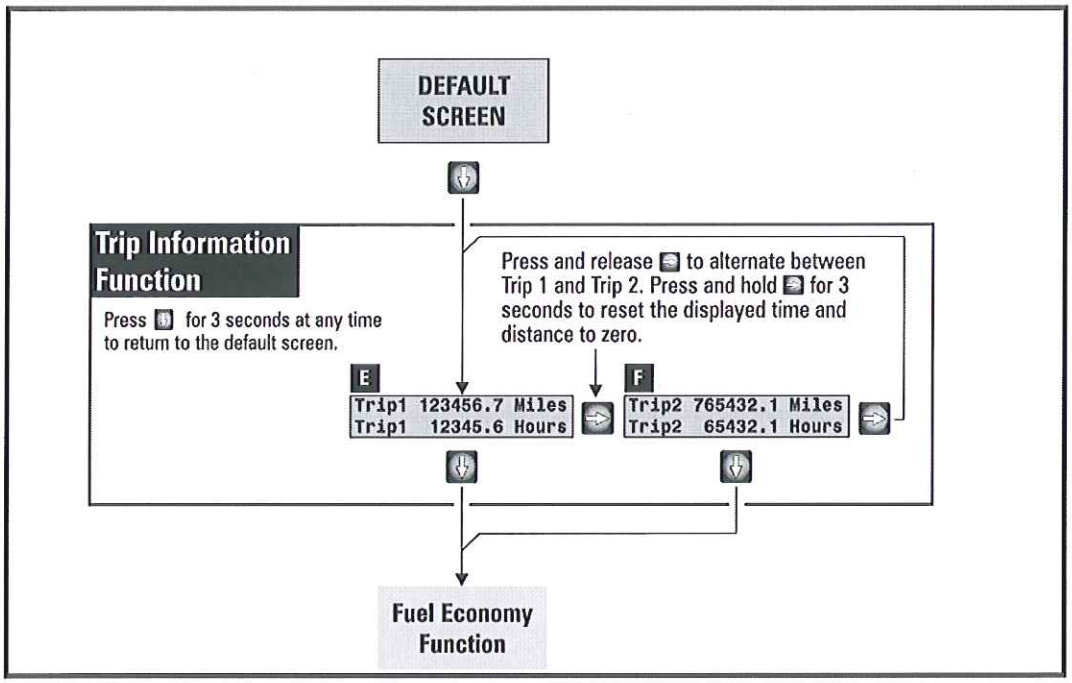


Figure 2-4 *Trip Information Function*

2.3.4 Fuel Economy Function

The Fuel Economy function lets you display the distance you can travel on the remaining amount of fuel, or your current fuel consumption rate. If you are displaying English units, these values will be in miles and miles per gallon. If you are displaying metric units, these values will be in kilometers, and liters per 100 kilometers. When this function is displayed, you can:

- Display either Fuel Remaining data (Screen G) or Fuel Economy data (Screen H) by pressing ⇒ .
- Reset the data used to calculate Fuel Remaining and Fuel Economy display by pressing ⇒ for three seconds. The System will display dashes until you have used enough fuel and have driven far enough to allow it to calculate a reasonable value.
- Exit the function and return to the default screen by pressing ⇒ when the park brake is off.
- Access additional modes and functions by pressing ⇒ when the park brake is on.
- Exit the Fuel Economy function and return to the default screen by pressing ⇓ for three seconds.

The System calculates fuel economy from the time you last reset the data.

- If you never reset the Fuel Economy Function, it will display the average fuel economy over the entire distance the vehicle has been driven.
- To check fuel economy from one refill to the next, you must reset the data after refilling.
- To check fuel economy over a particular stretch of highway, reset the data at the start of that stretch. See Figure 2-5 on page 2-8.

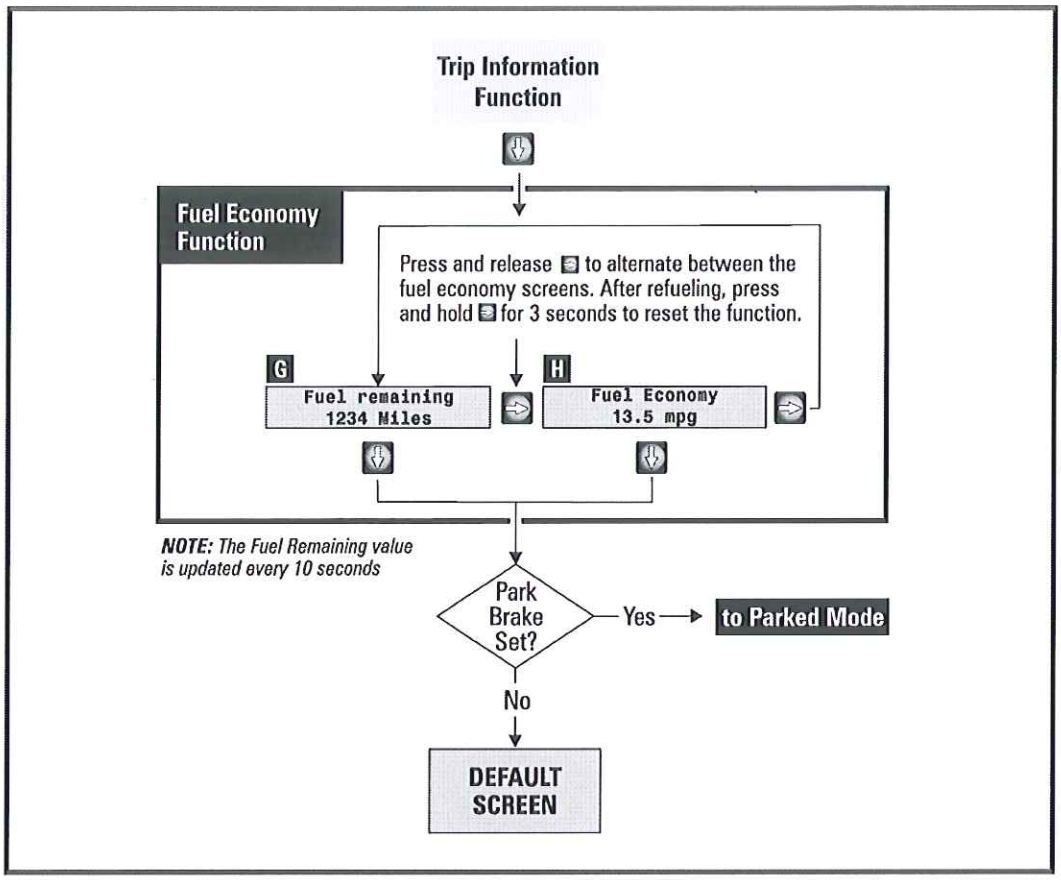


Figure 2-5 *Fuel Economy Function*

2.4 Parked Mode

Whenever the ignition is on and the park brake is set, the System is in the Parked mode. In the Parked mode, you can access the functions shown in Figure 2-6.

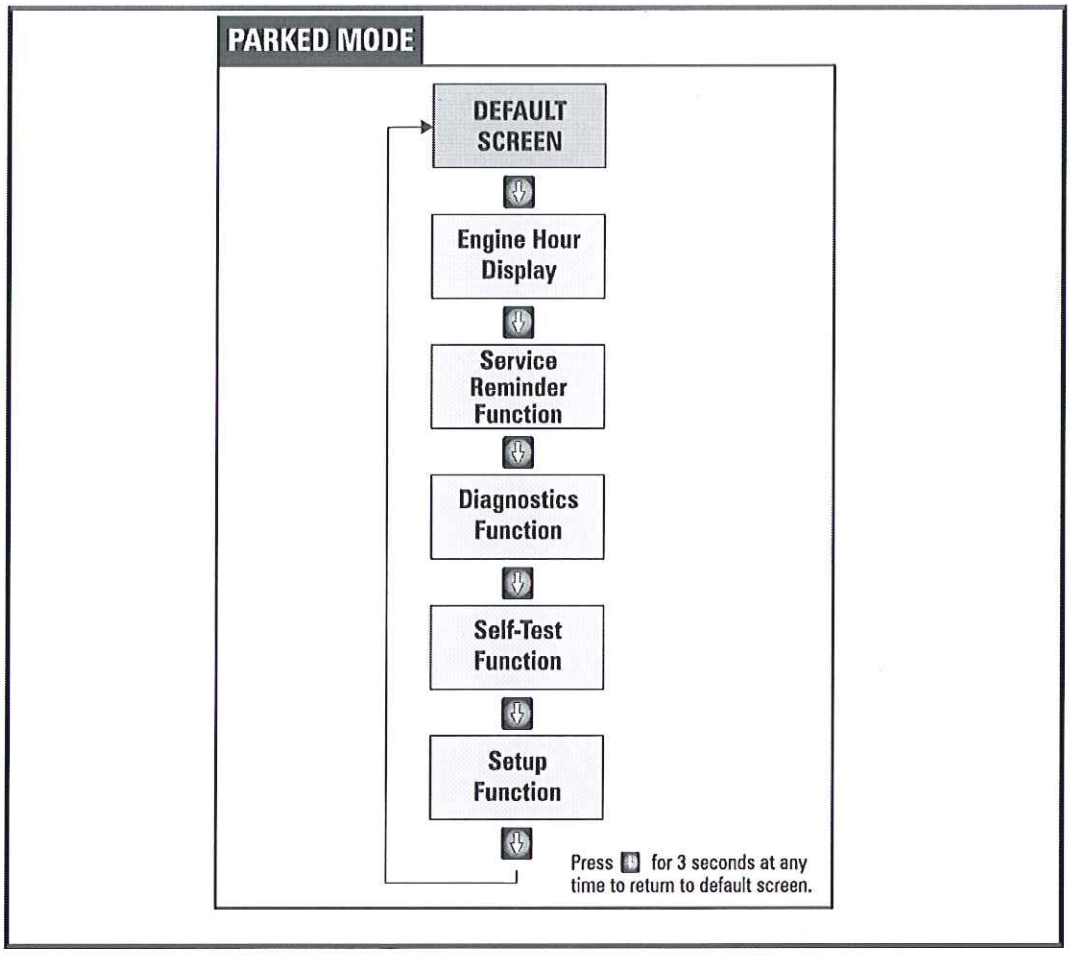


Figure 2-6 *Parked Mode*

If you release the park brake while in the Parked mode, the System will save any changes you may have made in these functions and then return to the Ignition-On mode. Likewise, if you turn the ignition off while in the Parked mode, the System will save any changes you make and then return to the Ignition-Off mode.

2.4.1 Engine Hours Display

The Engine Hours display (Screen I) shows the total number of hours the engine has been running since it was installed. It can display up to 999,999.9 hours and does not roll over to zero. You can only access this display when the park brake is applied, and you cannot reset it.

When Engine Hours are displayed, you can:

- Exit the Engine Hours display and proceed to the Service Reminder function by pressing ⇓ .
- Press ⇒ , but nothing will happen.
- Exit the Engine Hours display and return to the default screen by pressing ⇓ for three seconds.

2.4.2 Service Reminder Function

The Service Reminder function reminds you when the next service is due, or, how far the vehicle has traveled since the last time the Service Reminder value was reset. It is up to you to determine the service interval and to reset the counter after the vehicle has been serviced. The following paragraphs refer to Figure 2-7 on page 2-11.

2.4.2.1 How the Service Reminder Function Works

You choose which of 18 preset distances you want your next service interval to be. The values range from 3,000 to 20,000 miles in 1,000-mile increments. You can also disable the function if you wish. If you have configured your system to display metric values, the System converts the values to, and displays, kilometers. The Service Reminder function is disabled from the factory.

As an example, suppose you want to be reminded every 10,000 miles to service your vehicle. You would then access the Service Reminder function and set it to 10,000. After you drive 10,000 miles, the System will display the Overdue For Service pop-up. You can acknowledge and dismiss the message by pressing ⇒ or ⇓ ; however, each time you turn the ignition on, the System will re-display that message at the end of the initialization sequence.

To see how far you can drive before reaching the service point (Screen JA), or to see how far beyond the service point the vehicle has been driven (Screen JB), you must access the Service Reminder function. If you have disabled the Service Reminder, the System will display `Service Alarm Is Turned Off` (Screen JE).

2.4.2.1.1 How To View the Current Service Alarm Interval

To see which service alarm setting is in effect:

1. Navigate to the Miles to Service (Screen JA) or the Overdue for Service screen (Screen JB).
2. Press ⇒ once. The System will display the current service alarm period (Screen JF).
3. Press and release ⇓ once to exit the function and proceed to the Diagnostic function or press and hold ⇓ for three seconds to exit the function and return to the default screen.

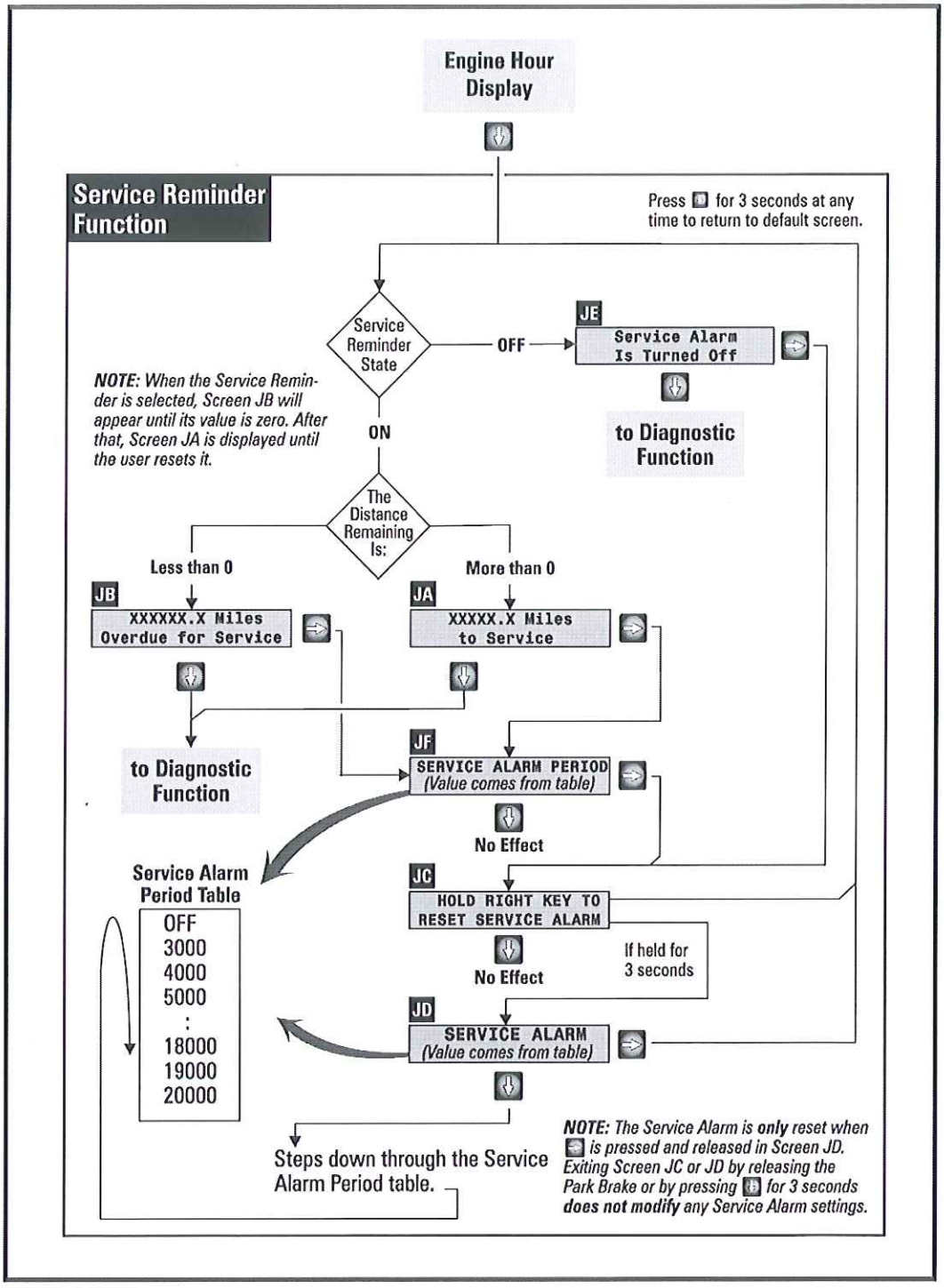


Figure 2-7 *Service Reminder Function*

2.4.2.1.2 How to Disable or Set a Different Service Alarm Interval

1. Navigate to the Miles to Service (Screen JA) or the Overdue for Service screen (Screen JB).
2. Press ⇒ once. The System will display the current service alarm period (Screen JF).
3. Press ⇒ a second time. The System will display **`Hold RIGHT Key To Reset Service Alarm`** (Screen JC).
4. Press and hold ⇒ for three seconds. The System will flash the current service alarm value (Screen JD Line 2).
5. To select the next service alarm value in the Service Alarm Period Table (shown in Figure 2-7), press and release ⇓ .
   a. Repeat until the desired service alarm value is displayed, or
   b. If you want to disable the Service Reminder function, repeat until OFF appears.
6. While the desired service alarm value (or OFF) is displayed:
   a. Press and release ⇒ to accept the displayed value and return to Screen JA (or JE), or
   b. Release the park brake, or press and hold ⇓ for three seconds to exit the sequence and keep the original service alarm value.

2.4.2.1.3 How To Reset the Service Reminder

It is up to you to reset the service reminder after the vehicle has been serviced. To reset the service reminder:

1. Navigate to the Miles to Service screen (Screen JA) or the Overdue for Service screen (Screen JB).
2. Press ⇒ once. The System will display the current service alarm period (Screen JF).
3. Press ⇒ a second time. The System will display **`Hold RIGHT Key To Reset Service Alarm`** (Screen JC).
4. Press ⇒ a third time and hold it for three seconds. The System will flash the current service alarm value (Screen JD).
5. Press ⇒ a fourth time. The System will reset the distance counter and will display the current service alarm value in the Miles (or Kilometers) to Service screen (Screen JA).

2.4.3 Diagnostic Function

The Diagnostic function lets you view the last 30 warning messages and the last 16 fault codes that were stored since the last time you turned the ignition on. If you turn the ignition off, the System will clear all stored messages and fault codes. See Figure 2-8.

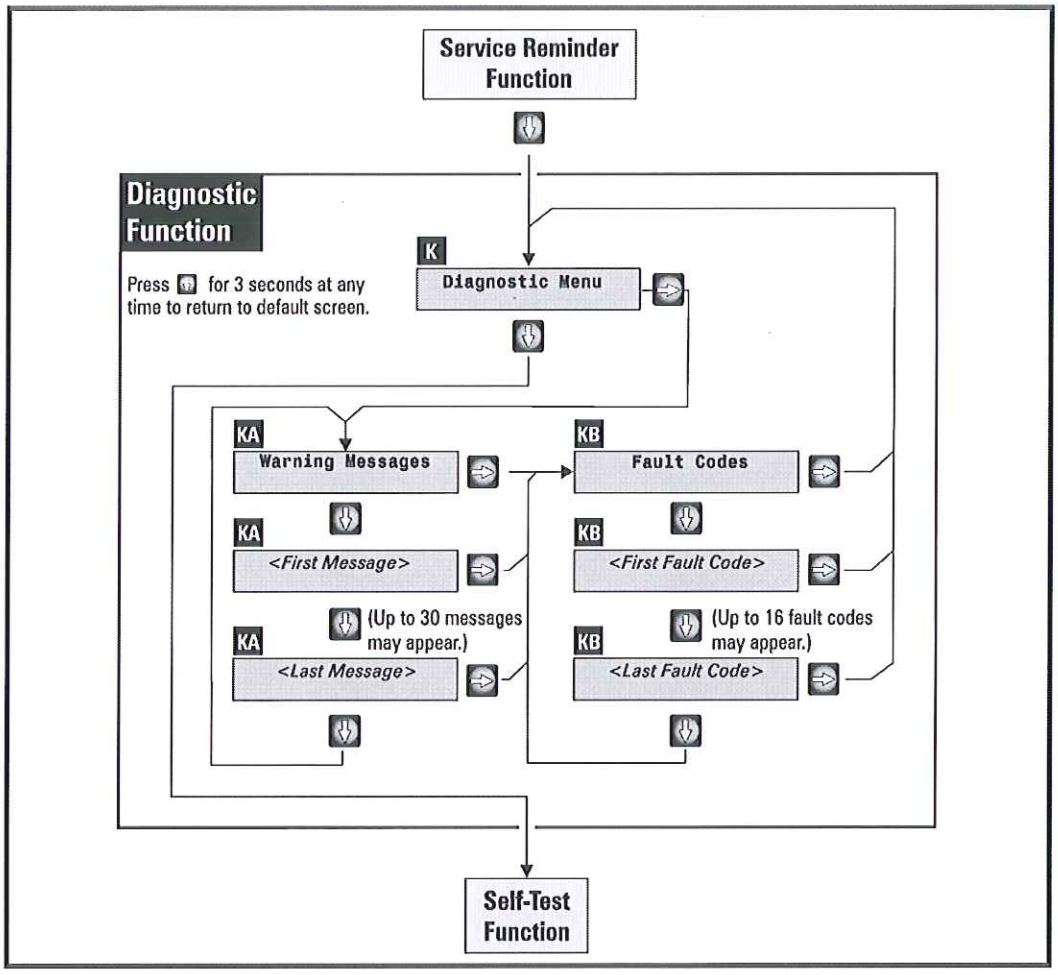


Figure 2-8 *Diagnostic Function*

2.4.3.1 Warning Messages

The System maintains a warning message list that can contain up to 30 pop-up warning messages. The list of typical messages is shown in Table 2-2. Appendix A contains the warning messages in your application.

WARNING MESSAGE (POP-UPS)	MEANING	INACTIVE WHEN	BUZZER
AUTOMATIC TRACTION CONTROL ACTIVE	Automatic traction control is engaged.	Traction control not engaged.	Yes Chime
LOW AIR	Front or rear air pressure is 65 PSI or less.	Front and rear air PSI are above 70.	Yes
ABS FAULT	A problem exists with the ABS Controller.	ABS system is okay.	Yes
STOP ENGINE	Stop the engine. The engine requires immediate attention.	Fault condition goes away.	Yes
HIGH COOLANT TEMP	Engine coolant is too hot to continue driving.	Fault condition goes away.	Yes
T-CASE OVER TEMP	The T-case is too hot to continue driving.	T-case has cooled down.	Yes
LOW OIL PRESSURE	Engine oil pressure is too low to continue driving.	Oil pressure is okay.	Yes
CHECK ENGINE	The engine requires service.	Fault condition goes away.	Yes
LOW COOLANT LEVEL	The engine coolant level is low.	Fault condition goes away.	Yes
LOW VOLTAGE	Voltage is less than 10.6 volts.	Voltage is above 10.6	Yes
TURBO BOOST	Turbo boost pressure too high.	Condition goes away.	No
AIR RESTRICTION	Air restriction too high.	Air restriction is okay.	Yes
NO J1939 DATA BUS COMMUNICATION	No J1939 messages have been received for 5 seconds.	Messages received.	Yes
NO J1708 DATA BUS COMMUNICATION	No J1708 messages have been received for 5 seconds.	Messages received.	Yes
PARK BRAKE NOT ON TRANS IN NEUTRAL	The Park Brake is not applied, the transmission is in neutral, and seatbelt not set.	Park Brake is on, transmission is not in neutral, or seatbelt set.	Yes
ENGINE OIL TEMPERATURE	Engine oil temperature too high.	Engine oil temperature OK	No
LOW FUEL	1/8 tank or less of fuel remains.	Tank is more than 25% full.	No
SERVICE DUE	Reminder to service vehicle.	Service time reset.	No

Table 2-2 Pop-Up Warning Messages

The System continuously maintains the Warning Message list as follows:

- The System will display and store a warning message when the condition that causes it first occurs.
- If more than 30 message-producing events occur, the System drops the oldest message from its list.
- If the list is empty, the System will display `No Warning Messages`.
- If a warning condition goes inactive while it is being displayed, the System drops it from the list as soon as anything else is displayed.
- If a new warning occurs while the list is being viewed, it is immediately added to the list, but it may not be displayed until the list is scrolled through a second time.
- The display order may change each time the list is viewed if warnings have been added or dropped.
- The System clears the list when you turn the ignition off.

2.4.3.1.1 Viewing Warning Messages

To view the list of saved warning messages (see also Figure 2-8 on page 2-13):

1. Navigate to the Diagnostic Function.
2. When `Diagnostic Menu` appears, press ⇒.
3. When `Warning Messages` appears, press ⇓ to cycle through the list of saved warning messages.
4. Press and hold ⇓ for three seconds to exit the function and return to the default screen.

2.4.3.2 Fault Codes

Sometimes faults occur outside the System. These faults may indicate a problem with the engine, transmission, or other vehicle systems, and are represented by a *fault code*. The fault code identifies which device detected the fault along and what kind of failure that device detected (for example, Engine Control Unit detecting low oil pressure).

If and when a fault occurs, the System will store the fault code for later viewing. When you turn the ignition off, any fault codes that may have been stored are erased.

Note: *Fault codes benefit the service technician. Should a fault code appear, it would be a good idea to write it down for later reference.*

The System handles fault codes similar to the way it handles warning messages. It maintains a list of up to 16 fault codes, and you can cycle through the list by pressing ⇓ when `Fault Codes` is displayed. If the list is empty when viewing fault

codes, the System will display `No Fault Codes` . If more than 16 fault codes have been detected, the System will flash `Fault Codes` .

The System continuously maintains the fault code list as follows:

- The System will store a fault code when the condition that causes it first occurs; however, it will not display the code at that time.
- When more than 16 fault codes are active, the System will flash `Fault Codes` once per second to indicate the overflow condition.
- If a fault code condition goes inactive while it is being displayed, the System drops it from the list as soon as anything else is displayed.
- If a new fault code condition occurs while the fault code list is being viewed, it is immediately added to the list, but it may not be displayed until the list is scrolled through a second time.
- The display order may change each time the list is viewed if fault codes have been added or dropped.

2.4.3.2.1 Viewing Fault Codes

To view the list of stored fault codes (see also Figure 2-8 on page 2-13):

1. Navigate to the Diagnostic Function.
2. When `Diagnostic Menu` appears, press ⇒ .
3. When `Warning Messages` appears, press ⇒ .
4. When `Fault Codes` appears, press ⇓ to cycle through the list of stored fault codes.
5. Press and hold ⇓ for three seconds to exit the function and return to the default screen.

2.4.4 Self-Test Function

The Self-Test function lets you:

- Test the instrumentation in an automatic mode that continuously activates all pointers, LEDs, and telltales until you stop the test
- Select and test each gauge and telltale manually
- Display the version and configuration numbers of the firmware that controls the instrumentation. See Figure 2-9 on page 2-18.

2.4.4.1 Auto Self-Test

The Auto-Test operation lets you quickly check the operation of the light bar and gauges all at once. When you active the Auto-Test, the System moves all gauge pointers to their minimum, middle, and maximum scales for one second each, then returns them to normal indications. During these three seconds, the System also turns on all telltales.

Once started, all pointers, gauge LEDs, and telltales operate simultaneously and without your intervention. The System displays what the pointers and telltales should be doing and gives you three seconds to verify correct operation. This continues until you terminate it by turning the ignition off or by pressing ⇒, which will also proceed to the Manual Test operation.

2.4.4.2 Manual Test

The Manual Test operation helps a service technician troubleshoot the System by allowing him to select and test individual telltales and gauges at his own pace. The technician selects which module to test and manually steps through the test by using ⇒ and ⇓ while observing the telltale or gauge.

The Manual Test operation begins with the speedometer. Each time you press ⇓, the operation steps through the test sequence for that module. When the test sequence is complete, you can press ⇓ to continue testing that module, or you can press ⇒ to display the name of the next module in the list. You can bypass the module at any time and proceed to the next module by pressing ⇒.

Once you have displayed all gauge names, the function then proceeds to the light bar. Each time you press ⇓, the System displays the name of the first telltale and turns that telltale on until you select the next telltale by pressing ⇓.

A Module Test List in shows the sequence in which the modules are tested. To exit the test and proceed to the Software Version Display, press ⇒.

2.4.4.3 Software Version Display

This part of the Diagnostic function displays the version and configuration numbers of the installed software until you terminate it by pressing ⇒.

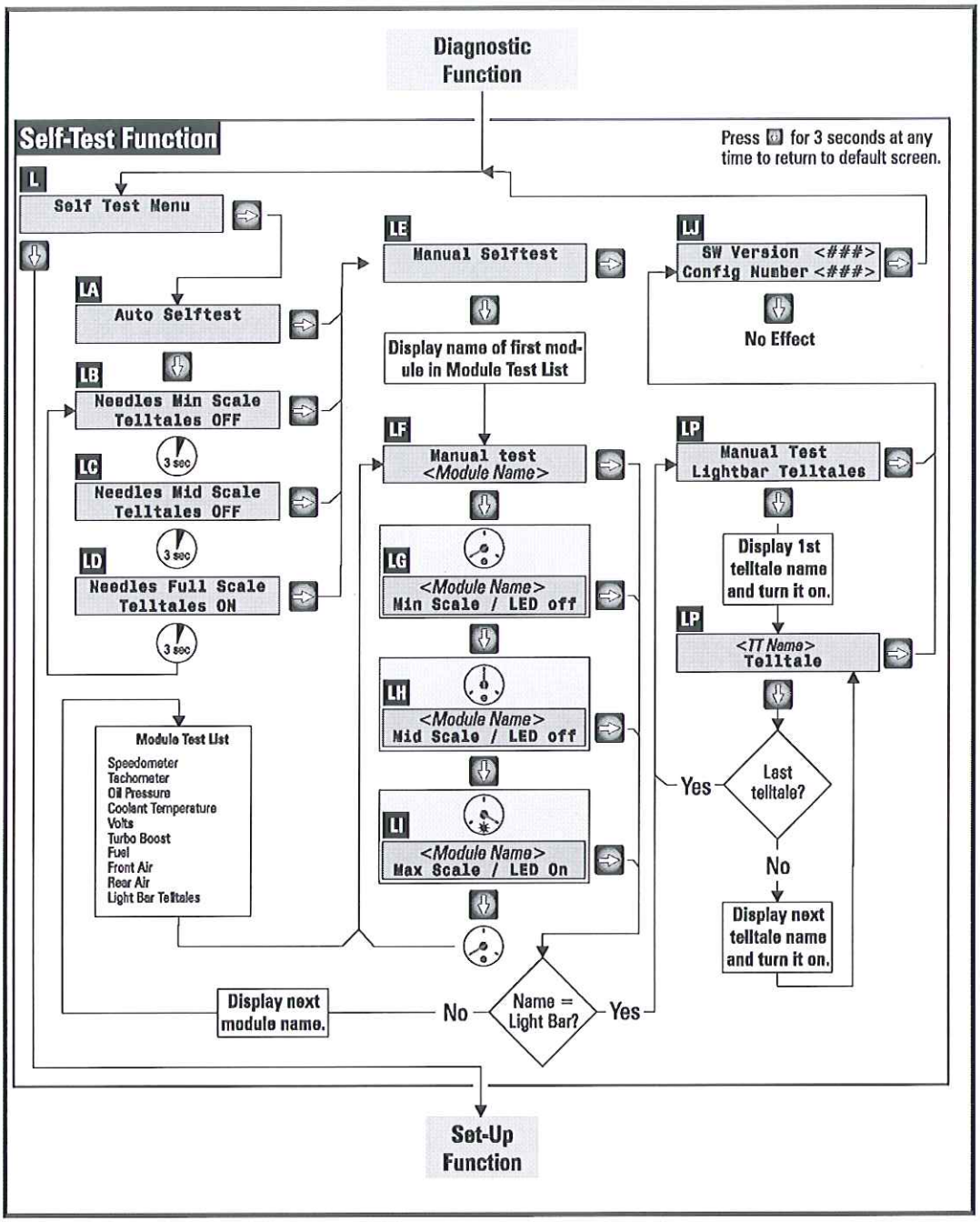


Figure 2-9 Self-Test Function

2.4.5 Set-Up Function

The Set-Up function lets you change the displays from English units to metric units and back, choose what to display in Line 2 of the primary default screen and in both lines of the other three customizable screens. See Figure 2-10. The parameter items available in your application are included in Appendix A.

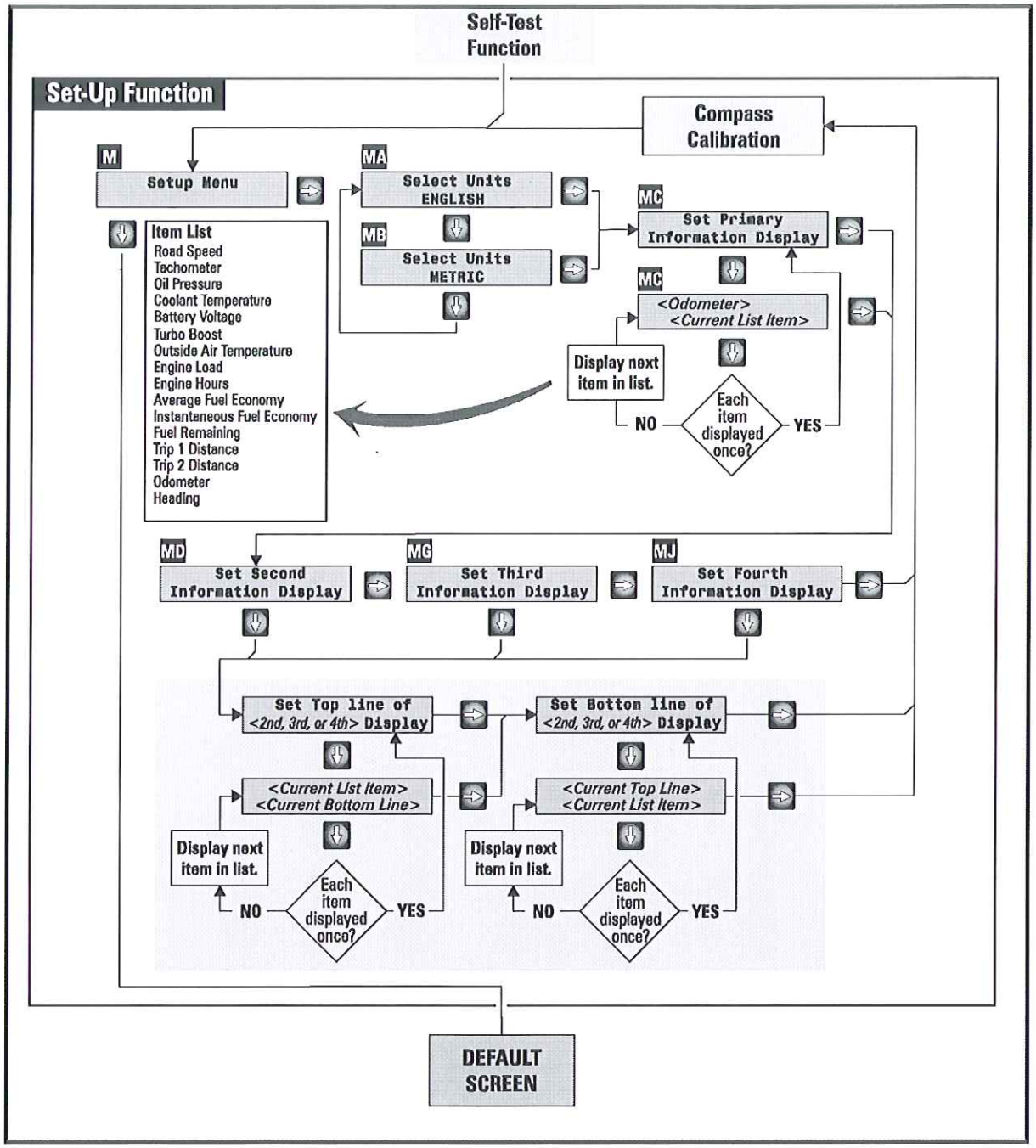


Figure 2-10 *Set-Up Function*

Typical items that can be assigned any information display are stated below. See Appendix A for specific items to your application.

Vehicle Speed	Engine Hours
Engine RPM	Average Fuel Economy
Oil Pressure	Instantaneous Fuel Economy
Engine Coolant Temperature	Fuel Remaining
Voltage	Outside Air Temperature
Turbo Boost Pressure	Trip 1 Distance
Percent Engine Load	Trip 2 Distance
Odometer	Heading (Optional Equipment)

2.4.5.1 How To Change Units from English and Metric or Vice Versa

1. From the default screen, press ⇓ repeatedly until the Setup Menu screen appears.
2. When `Setup Menu` appears, press ⇒.
3. The currently selected units (ENGLISH or METRIC) will flash. To display the alternative, press ⇓.
4. To accept the displayed units, press ⇒.
5. To return to the default screen, press ⇓ until the default screen appears. A short beep indicates the change was accepted.

2.4.5.2 How To Change the Bottom Line of the Primary Information Display

1. From the default screen, press ⇓ repeatedly until `Setup Menu` appears.
2.

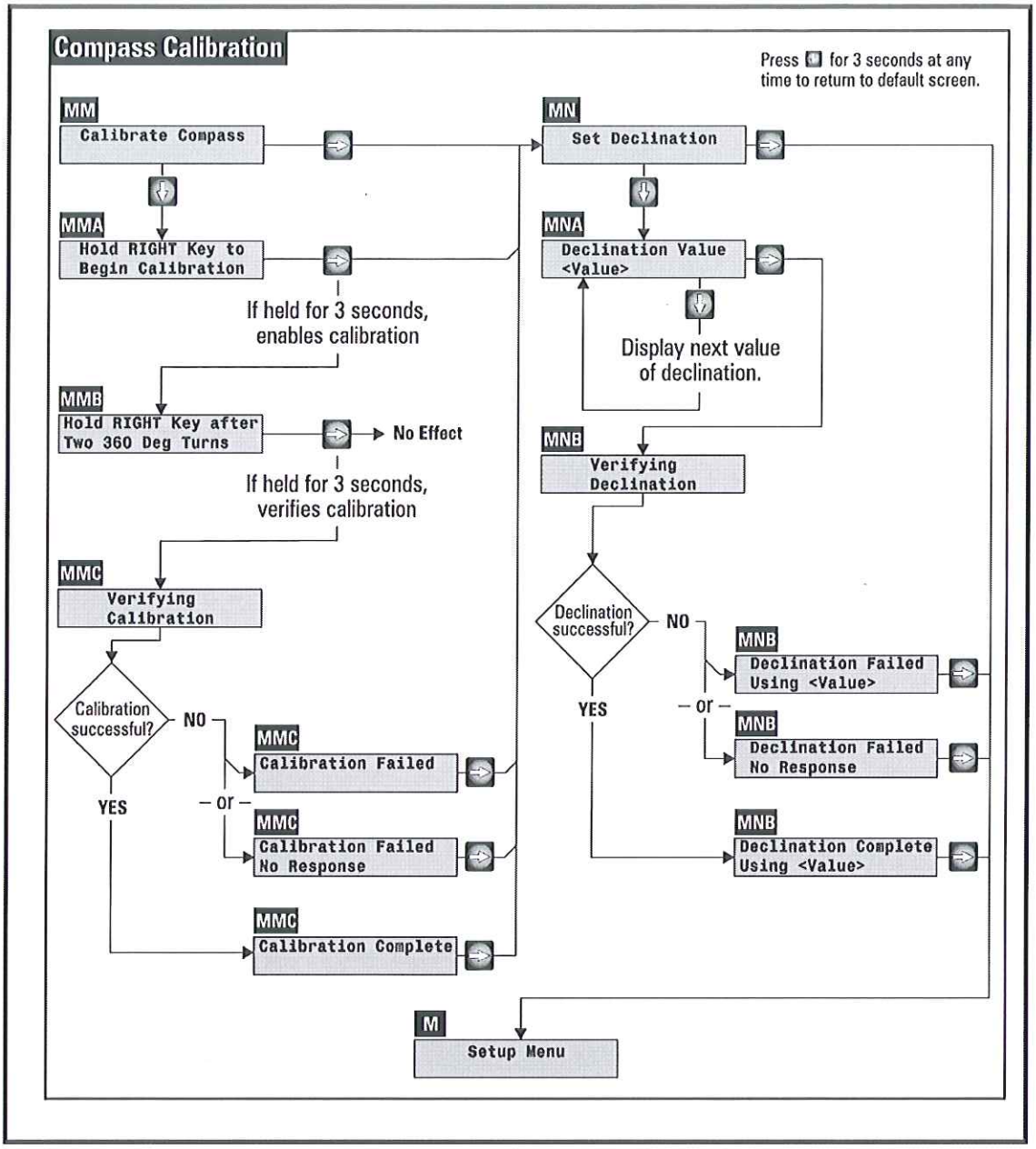


Figure 2-11 *Compass Calibration (Optional Equipment)*

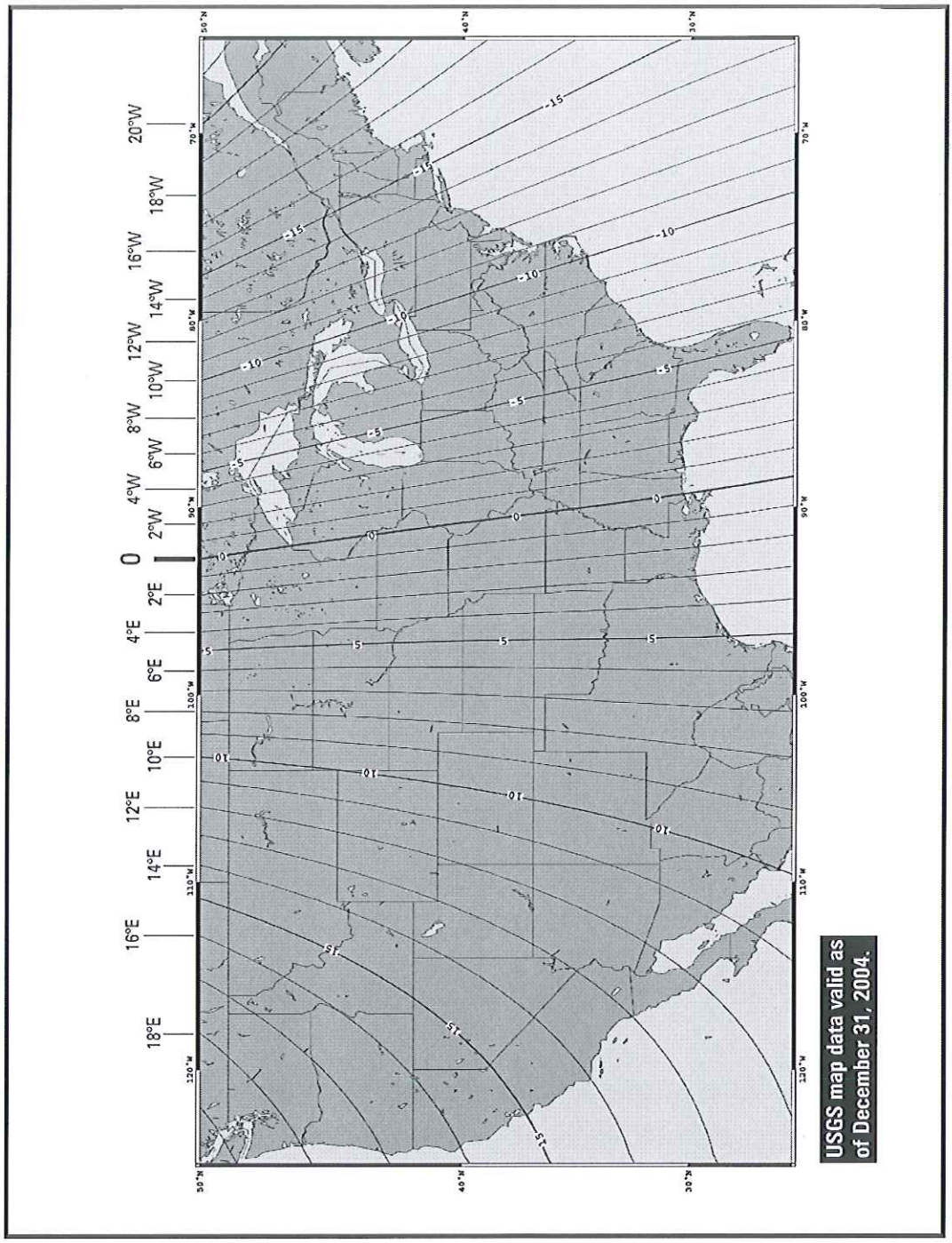


Figure 2-12 *Declination Map*

User Guide
Spartan Light Bar
Message Center System
072-80872

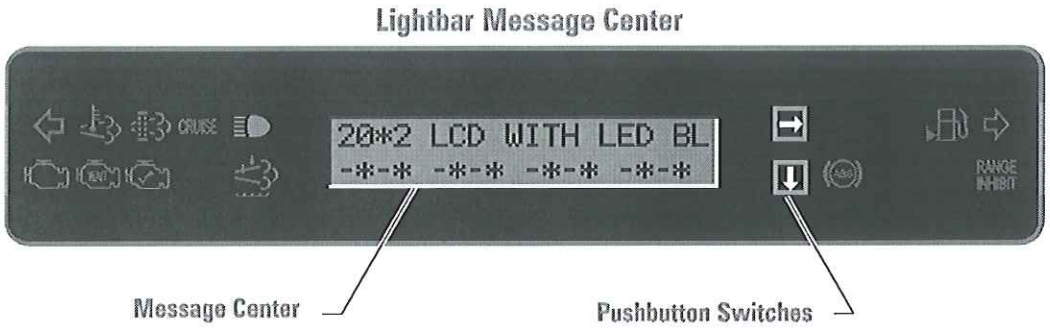
Appendix A
To 072-80871

AMETEK®
VEHICULAR INSTRUMENTATION SYSTEMS

072-80872 Revision Table

Revision	Date	Description of Change
A	3/31/10	New Release

LIGHTBAR, TELLTALES AND MESSAGE CENTER

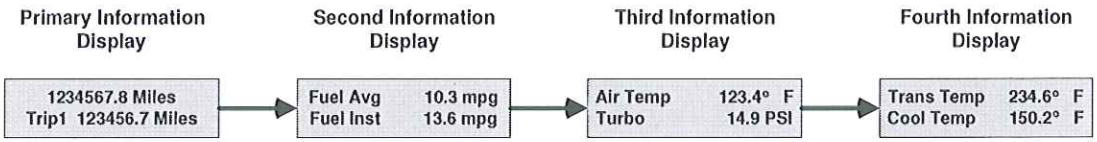


AMETEK®
VEHICULAR INSTRUMENTATION SYSTEMS

TELLTALES

SYMBOL	NAME	MEANING	SYMBOL	NAME	MEANING
	Left Turn	Left turn signal on		MIL	Engine malfunction
	HEST	Active regeneration has been initiated and exhaust system temperatures will be elevated above normal levels for the vehicle operating conditions		Wait to Start	Wait to start engine
	DPF	Filter has not been able to regenerate and is in need of assistance in order to perform an active regeneration		Check Engine	Problem with engine
	Cruise On	Cruise control is on		Stop Engine	Stop engine immediately
	High Beam	High beam on		DEF	Diesel Exhaust Fluid low
	Park Brake	Park brake engaged		ABS System	ABS malfunctioning
	Seat Belt	Seat belt reminder		Check Trans	Problem with transmission
	Low Fuel	On= Less than 1/8 tank Off= More than 1/4 tank		Trans over Temp	Transmission over heating
	Right Turn	Right turn signal on	RANGE INHIBIT	Range Inhibit	Inhibits shifts from neutral

DEFAULT SCREENS



NOTE: The last information screen you display becomes the new default screen.

WARNING MESSAGES (POP UPS)

WARNING MESSAGE (POP UPS)	MEANING	INACTIVE WHEN	BUZZER
LOW AIR	Front or rear air pressure is 65 PSI or less	Front and rear air PSI are above 70	Yes
STOP ENGINE	Stop the engine. The engine requires immediate attention	Fault condition goes away	Yes
CHECK ENGINE	The engine requires service	Fault condition goes away	Yes
CHECK TRANSMISSION	The transmission requires service	Fault condition goes away	Yes
HIGH COOLANT TEMP	Engine coolant is too hot to continue driving	Fault condition goes away.	Yes
TRANS OVER TEMP	The transmission is too hot to continue driving	Transmission has cooled down	Yes
LOW OIL PRESSURE	Engine oil pres sure is too low to continue driving	Oil pres sure is okay	Yes
ABS FAULT	A problem exists with the ABS Controller	ABS sys tem is okay	Yes
JACKS DOWN	Jacks are down and park brake is released	Jacks are up or park brake applied	No
ANTENNA UP	Antenna is up and park brake is released	Antenna up and park brake set or antenna down	Yes
PARK BRAKE NOT ON TRANS IN NEUTRAL	The Park Brake is not applied, the transmission is in neutral, and seatbelt not set	Park Brake is on, transmission is not in neutral, or seatbelt set	Yes
AUTOMATIC TRACTION CONTROL ACTIVE	Automatic traction control is engaged	Traction control not engaged	3 Chimes On

WARNING MESSAGE (POP UPS)	MEANING	INACTIVE WHEN	BUZZER
NO J1939 OR TRANS COMMUNCATION	No J1939 messages have been received for 5 seconds	Messages received	No
NO J1708 DATA BUS COMMUNICATION	No J1708 messages have been received for 5 seconds	Messages received	No
LOW FUEL	1/8 tank or less of fuel re mains..	Tank is more than 25% full	No
WATER IN FUEL	Water is in the fuel	No water is in fuel	No
AUXILIARY BRAKE	Auxiliary brake is on	Auxiliary Brake is off	No
SERVICE DUE	Reminder to service vehicle	Service time re set	No
REGENERATION NEEDED	Engine regeneration is needed, Diesel particulate filter	Engine regeneration	No
REGENERATION REQUIRED	Engine regeneration is required, Diesel particulate filter	Engine regeneration	No
HIGH EXHAUST SYSTEM TEMPERATURE	Regeneration has been initiated and exhaust system temperatures will be elevated above nor mal levels	Exhaust system temperatures have returned to normal operating levels	No
TRANS IN NEUTRAL AND PARK BRAKE NOT SET	The Park Brake is not applied, the transmission is in neutral, and seatbelt not set	Park Brake is on, transmission is not in neutral, or seatbelt set	Yes
TURN SIGNAL ON	Right or left turn signal on	Right or left turn signals off	Chime On
LOW DEF	Diesel Exhaust Fluid level at or below 10%	Diesel Exhaust Fluid level above 10%	Yes
ENG PERFORM DERATE IMMINENT LOW DEF	Diesel Exhaust Fluid level at or below 5%	Diesel Exhaust Fluid level above 5%	Yes
ENG PERFORM DERATE ACTIVATED LOW DEF	Diesel Exhaust Fluid level at or below 2.5%	Diesel Exhaust Fluid level above 2.5%	Yes
ENG PERFORM DERATE ACTIVATED DEF REQ	Diesel Exhaust Fluid level is empty and required	Diesel Exhaust Fluid above 0%	Yes
SPEED RESTRICT ON DEF REQUIRED	Diesel Exhaust Fluid is empty and required. Vehicle speed is restricted	Diesel Exhaust Fluid above 0%	Yes
GENERATOR ON	Generator in use	Generator off	No
GENERATOR ON GEN 123456.7 Hours	Generator in use. Hours displayed and ignition off	Generator off or ignition on	No

SETUP FUNCTIONS

Below is list of items available to select for the default screens.

ITEM
Speedometer
Tachometer
Oil Pressure
Coolant Temperature
Voltage
Turbo Boost
Transmission Temperature
Engine Load
Engine Hours
Trip 1 Odo
Trip 2 Odo
Outside Air Temp
Compass Heading
Odometer
Average Fuel Economy
Instantaneous Fuel Economy
Distance to Empty
Generator Hours

Proprietary & Confidential

INCOMPLETE VEHICLE DOCUMENT
FOR CABLESS BUS CHASSIS MANUFACTURED IN TWO (2) OR MORE STAGES

This Document is Required by Federal and Canadian Law and Shall Not Be Removed from This Incomplete Vehicle Except By the Final Stage Manufacturer. The Final Stage Manufacturer Shall Be Responsible For Final Certification Of The Completed Vehicle.

Install Completed Label
Part No. 0664-NN2
In This Area

Table of Contents

Introduction

Information in this manual is being supplied by Spartan Motors Chassis, Inc. in accordance with Federal and Canadian Regulations. The purpose of this incomplete vehicle document is to give the applicable statement of conformity to each Federal Motor Vehicle Safety Standard (FMVSS)/Canadian Technical Standards Documents (TSD) that applies to this incomplete vehicle intended to be completed as a bus.

Alterations to this incomplete vehicle by someone other than Spartan Motors Chassis, Inc. may affect the conformance to standards listed in this incomplete vehicle document. Therefore, statements contained in this document are considered to be accurate at the time this incomplete vehicle is manufactured which is identified on the label attached to the front of this document.

Further pursuant to the above statement, should this incomplete vehicle be altered by someone other than Spartan Motors Chassis, Inc. they are responsible to supply an alteration label in addition to labels applied by Spartan Motors Chassis, Inc. and further required to ensure compliance to the affected standard.

The final stage manufacturer is required for final certification of the completed vehicle.

Definitions

Alterer –

Means a person who alters by addition, substitution, or removal of components (other than readily attachable components) a certified vehicle before the first purchase of the vehicle other than for resale.

Bus –

A motor vehicle with motive power, except a trailer, designed to carry more than 10 persons.

Completed Vehicle -

Means a vehicle that requires no further manufacturing operations to perform its intended function.

Final Stage Manufacturer -

Means a person who performs such manufacturing operations on an incomplete vehicle that it becomes a completed vehicle.

FMVSS -

Federal Motor Vehicle Safety Standard

GAWR -

Gross Axle Weight Rating

GCWR –

Gross Combination Weight Rating

GVWR -

Gross Vehicle Weight Rating

Incomplete Vehicle -

Means assemblage consisting, at a minimum, of chassis (including the frame) structure, power train, steering system, suspension system, and braking system, in the state that those systems are to be part of the completed vehicle, but requires further manufacturing operations to become a complete vehicle.

Incomplete Vehicle Manufacturer –

Means a person, who manufacturers an incomplete vehicle by assembling components none of which, taken separately, constitute an incomplete vehicle.

TSD –

Technical Standards Document (formerly CMVSS)

Truck Tractor -

A truck designed primarily for drawing other motor vehicles and not so constructed as to carry a load other than a part of the weight of the vehicle and the load so drawn.

Statements of Conformity

The following Federal Motor Vehicle Safety Standards/Canadian Technical Standards Documents and statements apply to the incomplete vehicle.

FMVSS/TSD

101. CONTROLS AND DISPLAYS

This incomplete vehicle will conform to this standard, **IF** the final stage manufacturer installs components supplied by Spartan Motors Chassis, Inc. which are affected by this standard.

102. TRANSMISSION SHIFT LEVER SEQUENCE, STARTER INTERLOCK AND TRANSMISSION BRAKING EFFECT

This vehicle when completed will conform to this standard if no alterations are made to the transmission, transmission controls or cables, neutral safety switch, starter - starter switch and associated wiring.

103. WINDSHIELD DEFROSTING AND DEFOGGING SYSTEM

Spartan Motors Chassis, Inc. does not install components affected by this standard therefore makes no representation to conformity to this standard.

104. WINDSHIELD WIPING AND WASHING SYSTEM

Spartan Motors Chassis, Inc. does not supply or install components affected by this standard therefore makes no representation to conformity to this standard.

105. HYDRAULIC ANC ELECTRIC BRAKE SYSTEMS

If equipped with a hydraulic brake system, this vehicle when completed will conform to Standard 105 if no alterations are made to the brake system.

106. BRAKE HOSES

This vehicle when completed will conform to Standard 106 if no alterations are made to the brake system plumbing.

108. LAMPS, REFLECTIVE DEVICES, AND ASSOCIATED EQUIPMENT

Spartan Motors Chassis, Inc. does not supply or install components affected by this standard, and makes no representation to conformity to this standard.

111. REARVIEW MIRRORS

Spartan Motors Chassis, Inc. does not supply or install components affected by this standard therefore makes no representation to conformity to this standard.

113. HOOD LATCH SYSTEM

Spartan Motors Chassis, Inc. does not supply or install components affected by this standard therefore makes no representation to conformity to this standard.

116. MOTOR VEHICLE BRAKE FLUIDS

If equipped with a hydraulic brake system, this vehicle when completed will conform to Standard 116 if no alterations are made to the brake system.

119. NEW PNEUMATIC TIRES FOR MOTOR VEHICLE WITH A GVWR OR MORE THAN 4,536 KILOGRAMS (10,000 POUNDS) AND MOTORCYCLES

This vehicle, when completed, will conform to Standard 119 if the GAWR for each axle does not exceed the stated rating as stamped on the side wall of the tire.

120. TIRE SELECTION & RIMS FOR MOTOR VEHICLES OTHER THAN PASSENGER CARS

This vehicle when completed will conform to Standard 120 if the GAWR for each axle does not exceed the stated rating (see tire-rim and tire inflation chart).

121. AIR BRAKES

If this vehicle is equipped with an Air Brake System, the following statements shall apply.

Vehicles with all GAWR's less than 29,000 pounds:
This incomplete vehicle as produced by Spartan Motors Chassis Inc., conforms to this standard and will continue to conform **IF**:

No alterations are made to the following systems or components:

1. Service reservoir sizes and locations.
2. Brake plumbing and line sizes
3. Air valves and controls within the brake system
4. Brake drums
5. Brake assemblies including lining, and brake chambers
6. Parking brake spring chambers (Increased GVWR may effect parking brake requirements)
7. Axle suspension components, including tires, rims, springs or suspensions which affect the GAWR.

II. Extreme caution must be exercised by any subsequent manufacturer adding any air-operated device to this vehicle using chassis air system. Air supply for any added devices shall be plumbed only from the supply reservoir (reservoir which is plumbed directly from air compressor), and with a pressure protection valve set at a minimum of 95psi between the chassis air supply and the device(s).

III. After determining the proper wheelbase for axle loading considerations, an additional check must be made to insure that the overall vehicle center of gravity is within the limitations as specified below:

The formula for determining this is: $\frac{CG}{WB} = .45 \text{ MAX.}$

EXAMPLE: A completed vehicle with a vertical CG of 80 inches on a 178-inch wheelbase would comply to the limits established.

$$\frac{80}{178} = .45$$

124. ACCELERATOR CONTROL SYSTEMS

This vehicle, when completed, will conform to this standard if no alterations or additions are made to components of the accelerator control system, which may include, but are not limited to, throttle position sensor and/or the throttle assembly.

125. WARNING DEVICES

Spartan Motors Chassis, Inc. does not install components affected by this standard therefore makes no representation to conformity to this standard.

131. SCHOOL BUS PEDESTRIAN SAFETY DEVICES

Spartan Motors Chassis, Inc. does not install components affected by this standard therefore makes no representation to conformity to this standard.

205. GLAZING MATERIALS

Spartan Motors Chassis, Inc. does not supply or install components affected by this standard therefore makes no representation to conformity to this standard.

207. SEATING SYSTEMS

Spartan Motors Chassis, Inc. does not install components affected by this standard therefore makes no representation to conformity to this standard.

208. OCCUPANT CRASH PROTECTION

Spartan Motors Chassis, Inc. does not supply or install components affected by this standard therefore makes no representation to conformity to this standard.

209. SEAT BELT ASSEMBLIES

Spartan Motors Chassis, Inc. does not supply or install components affected by this standard therefore makes no representation to conformity to this standard.

210. SEAT BELT ASSEMBLY ANCHORAGES

Spartan Motors Chassis, Inc. does not supply or install components affected by this standard therefore makes no representation to conformity to this standard.

213. CHILD RESTRAINT SYSTEMS

Spartan Motors Chassis, Inc. does not supply or install components affected by this standard therefore makes no representation to conformity to this standard.

217. BUS EMERGENCY EXITS AND WINDOW RETENTION AND RELEASE

Spartan Motors Chassis, Inc. does not supply or install components affected by this standard therefore makes no representation to conformity to this standard.

220. SCHOOL BUS ROLLOVER PROTECTION

Spartan Motors Chassis, Inc. does not supply or install components affected by this standard therefore makes no representation to conformity to this standard.

221. SCHOOL BUS BODY JOINT STRENGTH

Spartan Motors Chassis, Inc. does not supply or install components affected by this standard therefore makes no representation to conformity to this standard.

222. SCHOOL BUS PASSENGER SEATING AND CRASH PROTECTION

Spartan Motors Chassis, Inc. does not supply or install components affected by this standard therefore makes no representation to conformity to this standard.

301. FUEL SYSTEM INTEGRITY

This vehicle when completed will conform to this standard if no alterations are made to the fuel system.

302. FLAMMABILITY OF INTERIOR MATERIALS

Components installed by Spartan Motors Chassis, Inc. which are affected by this standard shall conform to the standard if no alterations are made.

303. FUEL SYSTEM INTEGRITY OF COMPRESSED NATURAL GAS VEHICLES

Spartan Motors Chassis, Inc. does not supply or install components affected by this standard therefore makes no representation to conformity to this standard.

304. COMPRESSED NATURAL GAS FUEL CONTAINER INTEGRITY

Spartan Motors Chassis, Inc. does not supply or install components affected by this standard therefore makes no representation to conformity to this standard.

403. PLATFORM LIFT SYSTEMS FOR MOTOR VEHICLES

Spartan Motors Chassis, Inc. does not supply or install components affected by this standard therefore makes no representation to conformity to this standard.

404. PLATFORM LIFT INSTALLATIONS IN MOTOR VEHICLES

Spartan Motors Chassis, Inc. does not supply or install components affected by this standard therefore makes no representation to conformity to this standard.

THE BALANCE OF THIS BOOK LEFT INTENTIONALLY BLANK

GETTING STARTED

Warning – Do not engage starter for more than 30 seconds or damage to the starting motor can result. Wait 2 minutes between each attempt to start.

Use Ultra - Low Sulfur Diesel Fuel Only.

Usage of biodiesel or any other alternative fuel is subject to the standards and guidelines of the engine manufacturer. Before using, please contact your engine manufacturer for current information to determine if warranty is affected.

GENERAL START-UP AND PARKING PROCEDURES

It is critical that the driver has in-depth knowledge of all chassis controls before operating the vehicle. The following information is a general description of the procedures for starting and parking the vehicle. The remainder of the information in this manual should be read and understood prior to actually operating the vehicle.

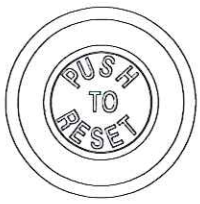
Refer to the engine operation manual for additional engine starting/operating instructions. Specific information may apply for particular engine models and/or if conditions other than normal exist.

Starting the Vehicle

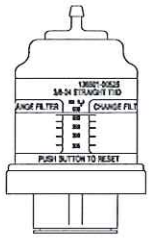
- Perform all pre-trip inspections as listed in the Appendix section of this manual.
- Perform any additional or pre-trip inspections as described by the Final Stage Manufacturer.
- Check around vehicle for any obstructions and for a clear driving area.
- Ensure park brake is applied and the transmission is in 'neutral' position.
- Adjust seat, mirrors, steering column and steering wheel so you can safely operate all controls.
- Turn the key to the 'ON' position and check to see that all warning lights and audible alarms are functioning. Do not depress the accelerator pedal.
- Wait for the 'WAIT TO START' lamp to go out.
- Turn the key to the 'START' position and release when engine starts. Do not engage starter for more than 30 seconds. Do not depress accelerator pedal until after the engine starts.
- Check that engine and transmission gauges are within the proper operating range by ensuring all warning indicator lamps/buzzers are off.
- Check air gauges to ensure air pressure has built up to at least 100 psi.
- Check that brake pedal operation feels normal.
- Select the 'drive' position for the transmission.
- Check that the parking brake operates by ensuring the vehicle is prevented from moving under light throttle while the parking brakes are applied.
- With the brake pedal depressed, release the parking brake.

AIRFLOW RESTRICTION GAUGE

The airflow restriction gauge indicates that the air filter needs servicing and can be reset after it has been serviced. The gauge measures the vacuum at the air cleaner, and is located on the engine side of the air cleaner system. As the air filter gathers dirt, the vacuum increases due to a larger pressure drop across the air cleaner. Refer to the manufacturer's literature for further details. A typical airflow restriction gauge is shown below with an example of a reset button.



Bottom View



Side View

FIG. 4-4

AIR PRESSURE GAUGE

A vehicle with full air brakes has two air pressure gauges. Each gauge is attached to an independent air system and has a warning indicator light, which is also referred to as the brake warning light.

The primary air system, also referred to as system #1 (Rear Air), operates the service brakes on the rear axle. The secondary air system, or system #2 (Front Air), operates the brakes on the front axle.

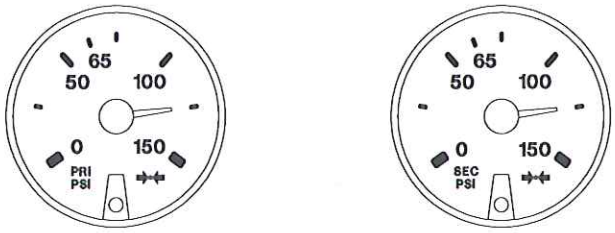


FIG. 4-5

The normal air operating pressure is 100 to 140 psi, which is pre-set at the factory. Before moving the vehicle, be sure both gauges are within the normal operating range. If the air system pressure cannot be maintained, and/or a malfunction occurs, the driver is alerted by the warning indicator lamps and audible alarms if present. If any warning indicator lamps and audible are active refer to applicable manufacturer's manual, and contact an authorized service facility or Spartan Motors Chassis Customer Service Group at 1-800-543-4277.