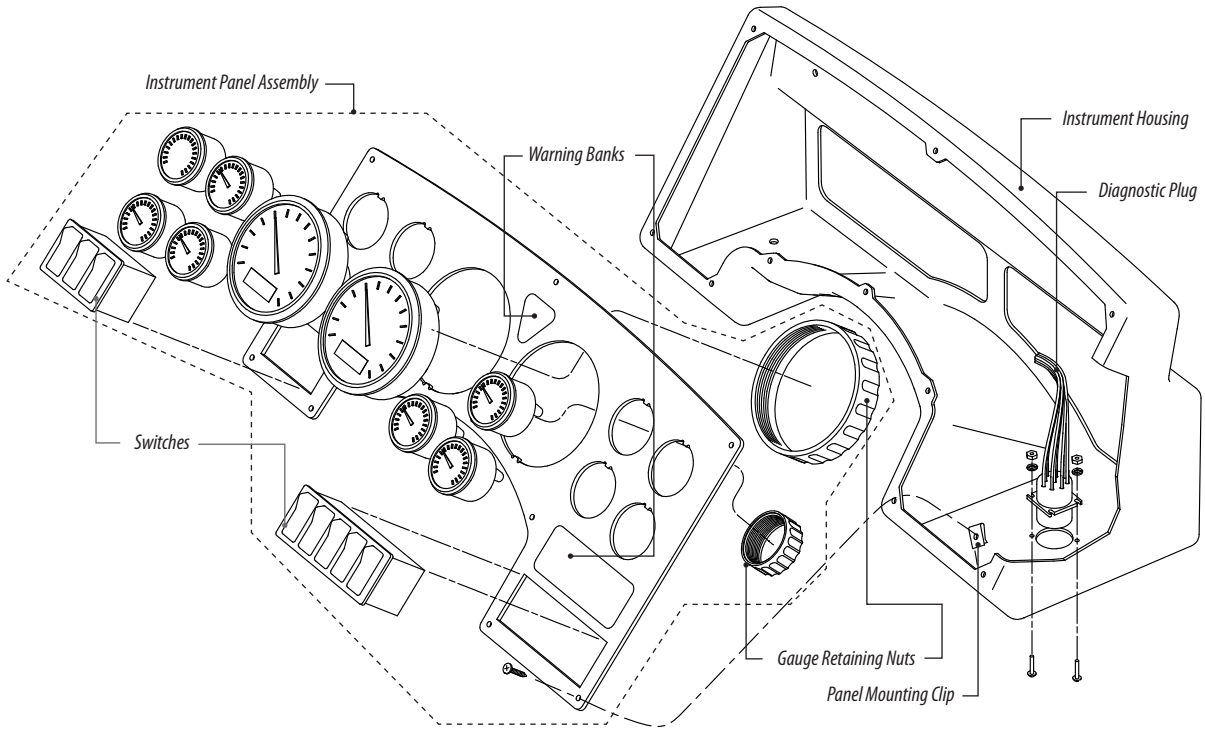
Overview

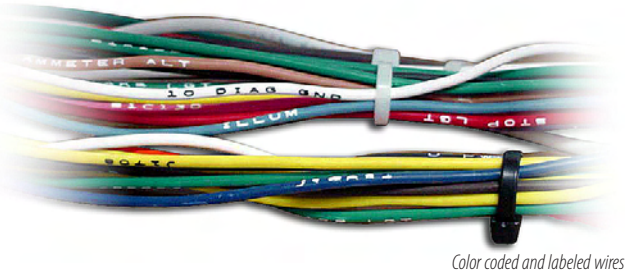
The Blue Bird Vision instrument panel uses all electronic guages manufactured by ACTIA®. In addition to gauges, the instrument panel includes two LED display panels which provide illuminated visual alerts to the Driver: the Warning Module which displays an array of vehicle-related alerts and warnings; and the centrally-located triangular panel which displays turn signal and high beam indicators.

The instrument assembly receives both analog inputs from such components as the fuel tank sender and instrument panel dimmer switch; and digital signals from components such as the engine and transmission control modules, via the J1939 and J1708 data buses. The Warning Module also has ports for primary and secondary air pressure signal lines on units equipped with air brakes.

The speedometer is the "master" gauge and serves as the central processor for the instruments' communication system. All of the other gauges are "slave" gauges connected to the speedometer on a common data bus. All gauges receive the same data stream. Each guage responds to its appropriate information within that data stream and "ignores" the rest. Therefore, data connectors on the backs of the various slave guages are interchangeable, and the proper operation of an individual guage is not dependent upon its being located in any particular position on the harness. The two four-pin connectors on the back of each slave gauge or panel are identical. This characteristic provides for a convenient and simple troubleshooting technique: Swapping the connector on a suspect guage with one on a properly performing guage, or jumpering between the connectors on the gauges, can help quickly determine whether a problem is in the gauge, harness, or in the data it is receiving.



The speedometer also incorporates a backlit LCD Message Display Center, which can be used by the Driver or Service Technician to view vehicle statistics and fault alerts, and to perform self-diagnostics on the instrument system. The data to be displayed is selected by navigating a menu system controlled by two buttons on the face of the speedometer. (The tachometer incorporates a clock display similar in appearance to the speedometer's Message Display Center.)



Color coded and labeled wires

For troubleshooting convenience, the wires of the instrument panel harness are both color-coded and labeled.

The instrument panel's communication bus should not be confused with the Vision's Multiplex system. Although the instrument panel receives some Multiplex system outputs (such as those for turn signal indicators), the instrument cluster is not part of the Multiplex system.

Appendixes In This Chapter

Appendix 1. BBCV Instrument Panel Service Manual. This ACTIA publication was created especially for Blue Bird and details the operation of the instrument system including a detailed explanation of the Message Display Center's diagnostic mode.

Instrument Panel Removal

The instrument panel is designed for easily removed from its housing by means of ten screws around the perimeter of its face plate. Individual gauges are fastened to the panel by a hand-tightened threaded ring around the back side of the meter's body.

1. Ensure the engine is not running and the ignition switch is in the "OFF" position.

2. Remove the ten machine screws from around instrument panel's perimeter.

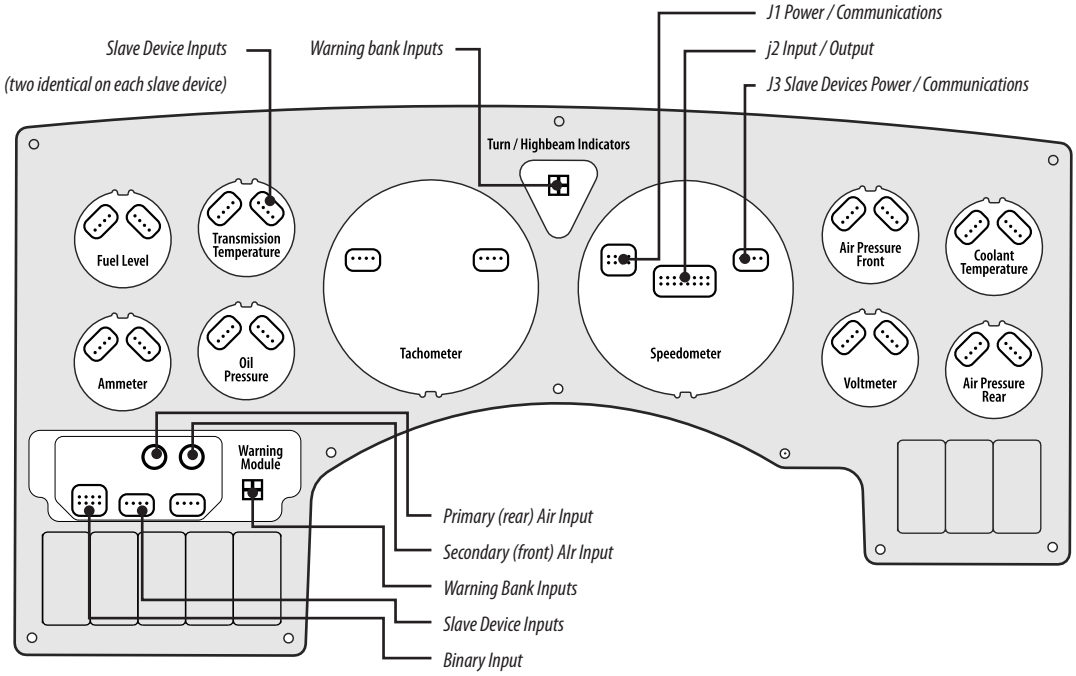
3. Carefully pull the top edge of the instrument cluster away from the housing.

4. To remove a gauge, unplug its harness connector(s) and unscrew the threaded ring around its body.

Testing a Gauge By Substitution

To help quickly determine if a suspected gauge is faulty, the harness connnector from an adjacent gauge can be temporarily substituted.

1. Label and remove the wiring harness from the gauge in question.
2. Label and remove the wiring harness from an adjacent gauge.
3. Plug the connector from the known "good" gauge into the suspect gauge.
4. Support the instrument cluster in a safe position.
5. Turn the ignition switch to the "ON" position. Start the engine if necessary.
6. Check whether the suspect gauge now indicates a value. If it does not, the gauge is probably faulty. If the gauge indicator needle now indicates a reading, the original malfunction is probably not due to a faulty gauge. Troubleshoot and repair the affected circuit or system accordingly. Refer to the manufacturer's service manual for instructions regarding signals originating from the engine ECM or transmission TCU, and/or to the electrical and other chapters of this manual.



ACTIA®

52765 Bridger Court
Elkhart, IN 46514
USA

Phone: 574 264 2373

www.actia.com

BBCV Instrument Panel Service Manual

NOTICE OF PROPRIETARY INFORMATION

Classification
☐ No ☒ Confidential. ACTIA ☐ Confidential. client ☐

	By	Date		ACTIA Ref.	Revision
Written	Russell Parks	3/10/03	**BBCV Instrument Service Manual**	**1081-17**	**F**
Reviewed					
Approved					
			© 2004 Any reproduction of this document whether total or partial without the written consent of ACTIA is forbidden.	Page 1	Format US Letter

1081-17 rev F	Date: 11/22/04	*Page* 2 of 37

REVISION TRACKING SHEET

Rev	Modified	Date	Comment
A	R. Parks	03-10-2003	Original Release
B	R. Parks	04-01-03	Update to add Bluebird connector pin outs and wire marking
C	R. Parks	04-02-03	Removed Odo difference references
D	R. Parks	09-12-03	Updated for phase II requirements
E	R. Parks	11-20-03	Added applied air, transmission diagnostics, service gauge, and manual transmission features.
F	R. Parks	1-30-04	Added turn signal click and stop light inhibit options

1081-17 rev F	11/22/04	*Page* 3/37

Table of Content

1. PART NUMBERS AND FEATURES 6

2. ELEMENTS 7

3. INPUTS AND OUTPUTS 8

3.1. CONNECTORS: 8
3.1.1. J1 - Speedometer power/communication connector 8
3.1.2. J2 - Speedometer I/O connector (inputs & outputs) 8
3.1.3. J3 - Speedometer Slave connector (communication, power supply) 9
3.1.4. Warning Module Binary Input connector 9
3.1.5. Switch Harness Connections 9

OPERATION 10

3.2. DISPLAY ODOMETER & CLOCK 10
3.3. TURN SIGNAL/HAZARD WARNING LIGHTS 10
3.4. START-UP MODE 10
3.4.1. Gauges 10
3.4.2. LCD 10
3.4.3. Warning Lights 10
3.4.4. Communication 10
3.4.5. Audible Alarm 10
3.5. TURN-OFF 11
3.6. SELF-DIAGNOSTIC MODE 11

4. IGNITION MODE 11

4.1. GAUGES DISPLAY 11
4.1.1. Master Gauge – Speedometer 11
4.1.2. Tachometer / Clock 11
4.1.3. Coolant temperature 11
4.1.4. Oil Pressure 11
4.1.5. Fuel gauge 11
4.1.6. Voltmeter 12
4.1.7. Ammeter 12
4.1.8. Front Air Gauge 12
4.1.9. Rear Air Gauge 12
4.1.10. Transmission temperature 12
4.2. APPLIED AIR FEATURE 12
4.2.1. Applied Front Air Gauge 12
4.2.2. Applied rear Air Gauge 12
4.3. BACKLIGHTING 13
4.4. GAUGES INTERNAL WARNING INDICATORS 13
4.4.1. Low Oil Pressure 13
4.4.2. High Coolant Temperature 13
4.4.3. High Transmission Temperature 13
4.4.4. Low Fuel Level 13
4.4.5. Low Air Pressure - Front 13
4.4.6. Low Air Pressure - rear 13
4.4.7. Low/High Battery voltage 13
4.4.8. Low Applied Air Pressure - Front 14
4.4.9. Low Applied Air Pressure - rear 14

4.5. WARNING BANK INDICATORS 14
4.5.1. Left Turn *14*
4.5.2. Right Turn *14*
4.5.3. Park Brake *14*
4.5.4. High Beam *14*
4.5.5. Stop Engine *14*
4.5.6. Wait to Start *14*
4.5.7. Check Transmission *14*
4.5.8. Range Inhibit *14*
4.5.9. ABS *15*
4.5.10. High Hydraulic oil temperature *15*
4.5.11. Retarder *15*
4.5.12. Stop Light *16*
4.5.13. Hydraulic brake failure *17*
4.5.14. Low coolant level *17*
4.5.15. High Transmission Temperature *17*
4.6. AUDIBLE ALARM 17
4.7. BINARY OUTPUTS 18
4.7.1. Speed Detect *18*

5. COMMUNICATION 18

5.1. COMMUNICATION ERRORS 18
5.2. PLUG AND PLAY FUNCTION 19
5.3. MESSAGES SENT 19
5.3.1. Service Brake *19*
5.4. J1939 TABLE OF MESSAGES 19

588

6. MESSAGE DISPLAY CENTER 20

6.1. DRIVE MODE SCREEN 20
6.2. ODOMETER 21
6.2.1. Accuracy *21*
6.2.2. Normal Shutdown *21*
6.2.3. Abnormal shutdown *21*
6.2.4. Durability *22*
6.2.5. Error Recovery *22*
6.2.6. Maximum Reading *22*
6.2.7. Service Programming *22*
6.2.8. Service Gauges *22*
6.3. TRIP ODOMETER 22
6.4. PRIORITY MESSAGES 23
6.4.1. Engine Maintenance *23*
6.4.2. Eng Comm Failure *23*
6.4.3. Trans Comm Failure *23*
6.4.4. Alternator *23*
6.4.5. Service Engine Soon *23*
6.4.6. Sanders Refill *23*
6.4.7. ETC *23*
6.4.8. Battery Voltage Error *23*
6.4.9. Vehicle speed Error *23*
6.4.10. Turn signal ON *24*
6.5. SECOND LINE DISPLAY SELECTION 24
6.6. SETTINGS AND DIAGNOSTIC 25
6.6.1. Set Units *25*
6.6.2. Contrast *25*
6.6.3. Read Parameters *26*

6.6.4. Instrument Diagnostics *26*
6.6.4.1. Gauge Test *27*
6.6.4.2. Lamp Test *27*
6.6.4.3. LCD Test *27*
6.6.4.4. Binary Inputs *28*
6.6.4.5. Analog Inputs *28*
6.6.4.6. Data Link *29*
6.6.5. Ammeter Calibration *29*
6.6.5.1. Engine Diagnostic *30*
6.6.5.2. Trans Diagnostic *30*
6.7. SETUP MENU 30
6.7.1. Trip *30*
6.7.2. Default Parameter *30*
6.7.3. Self Test *31*
6.7.4. Brake Interlock *31*
6.7.5. Transmission Diagnostics *31*
6.7.6. Test Panel *32*
6.7.7. Manual Transmission *32*
6.7.8. Turn Signal Click *32*
6.7.9. Stop Light Inhibit *33*

7. GLOSSARY/ABBREVIATIONS **33**

8. TROUBLESHOOTING **34**

589

1081-17 rev F	11/22/04	*Page* 6/37

1. PART NUMBERS AND FEATURES

BBCV

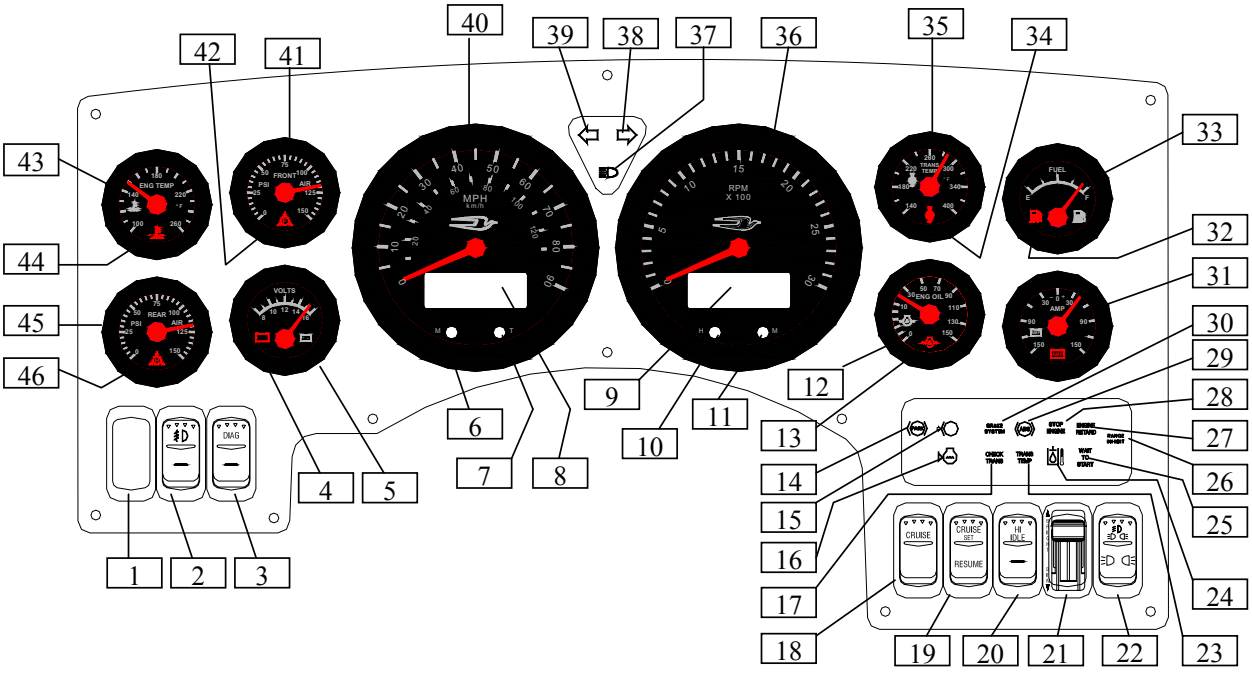
Assembly #	Panel #	BB Service Panel Only #	Description
0060622	102924	0057539	Inst Panel w / Actia Gauges
0063530	N/A	N/A	Applied Air Kit

Service Parts

Actia #	BBB #	Description
102806	0057498	Master Gauge Speedo 90 MPH (English)
102807	0057499	Master Gauge Speedo 140 KMH (Metric)
102060	0057505	Voltmeter Slave Gauge
102063	0057501	Fuel Level Slave Gauge
102066	0057506	Front Air Pressure Slave Gauge
102072	0057503	Oil Pressure Slave Gauge
102075	0057511	Ammeter Slave Gauge
102078	0057507	Rear Air Pressure Slave Gauge
102081	0057500	Tach / Clock Slave Gauge
102084	0057504	Coolant Temperature Slave Gauge
102087	0057509	Transmission Temperature Slave Gauge
103035	0060669	Front Applied Air Pressure Slave Gauge
103037	0060670	Rear Applied Air Pressure Slave Gauge
102099	0062485	Warning Bank Control Slave Module
102327	0062483	12 Position LED PWA
102328	0062484	3 Position LED PWA
102676	0062486	12 Position LED Overlay
102420	0062487	3 Position LED Overlay
102102	0062489	12 Position LED Foam Gasket
102675	0062491	3 Position LED Foam Gasket
102642	???????	LIN Harness
102640	???????	Warning Light Harness
102693	???????	Inst. Interface Harness
102758	???????	Switch Harness
103039	0062695	Warning Bank Control Slave Module (Applied Air)
103025	0062732	Prebundled LIN Harness (Appliued Air)

1081-17 rev F	11/22/04	*Page* 7/37

2. ELEMENTS



1	Sanders Refill Indicator Light	24	Hi Hydraulic Temp Warning Light
2	Fog Lights Switch	25	Wait to Start Warning Light
3	Diagnostic Mode Switch	26	Range Inhibit Warning Light
4	Low/High Voltage Warning Light	27	Engine Retarder Warning Light
5	Voltmeter Gauge	28	Stop Engine Warning Light
6	m (Mode) Button	29	ABS Warning Light
7	t (toggle) Button	30	Hydraulic Brake Failure
8	Message Display Center	31	Ammeter Gauge
9	Clock	32	Low Fuel Warning Light
10	H (Hour) Button	33	Fuel Gauge
11	M (Minute) Button	34	High Trans Temp WL (In Gauge)
12	Oil Pressure Gauge	35	Transmission Temp Gauge
13	Low Oil Pressure Warning Light	36	Tachometer Gauge
14	Park Brake Warning Light	37	Hi Beam Warning Light
15	Stop Light (Service Brake) Warning Light	38	Right Turn Signal
16	Low Coolant Level Warning Light	39	Left Turn Signal
17	Check Trans Warning Light	40	Speedometer
18	Cruise On/Off Switch	41	Front Air Gauge
19	Cruise Set/Resume Switch	42	Front Air Warning Light
20	Hi Idle Switch	43	Coolant Temperature Gauge
21	Panel Dimmer	44	High Coolant Temp Warning
22	Headlight Switch	45	Rear Air Gauge
23	High Trans Temp Warning Light	46	Rear Air Warning Light

1081-17 rev F	11/22/04	*Page* 8/37

3. INPUTS AND OUTPUTS

3.1. Connectors:

Mating connectors for the gauges and warning modules are TYCO GET .64 sealed connectors.

The speedometer has three connectors associated with it:

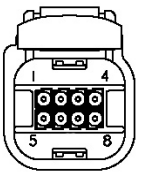
J1 – an eight (8) position for power/communication,
J2 – a 16 position for input and output connections, and
J3 for slave device power and communications

The figures below show the connector pin numbering from the wire entry side with the latch on top. This numbering can also be found on the connector housing.

The Mating Terminals (Sockets) used with the connector housings are Tyco P/N: 1393366-1 (Actia P/N 100952)

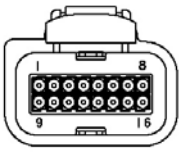
3.1.1. J1 - SPEEDOMETER POWER/COMMUNICATION CONNECTOR

8 positions (2 X 4) (Actia P/N 100950)
Tyco US Part Number: 1411001-1



Terminal	Designation	Description	Bluebird Harness Pin Out	Wire Mrkg
1	Battery	Unswitched positive (+) 14V	P1-A	D Pwr
2	Ground	Chassis ground	P1-B	D Chassis Gnd
3	CAN+	SAE J1939 Databus	P1-C	J1939 +
4	CAN-	SAE J1939 Databus	P1-D	J1939 -
5	J1708+	SAE J1708/J1587 Databus	P1-E	J1708 +
6	J1708-	SAE J1708/J1587 Databus	P1-F	J1708 -
7	Not used		N/A	N/A
8	CAN Res	CAN Termination Resistor	N/A	N/A

3.1.2. J2 - SPEEDOMETER I/O CONNECTOR (INPUTS & OUTPUTS)



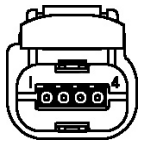
16 Positions (Actia P/N 100951)
Tyco US Part Number: 1438031-1

Terminal	Designation	Description	Bluebird Pin Out	Wire Mrkg
1	Fuel level sender	90 (full) to 0 (empty) see chart	P2-A	Fuel Tank Sig
2	Wait to Start	Active low – Wait To Start Engine	P2-G	Intake Lgt
3	Hyd. Brake Sys. Failure	Active low – Hydraulic Brake set	P2-H	Brake Warn
4	Dimmer	PWM voltage input from dimmer –Wake up input	P2-D	Illum
5	Not used		N/A	N/A
6	Not used		N/A	N/A
7	Ammeter +	Ammeter Alternator Side	P2-C	Ammeter Alt
8	Ammeter -	Ammeter Battery Side	P2-B	Ammeter Bat
9	Speed detect out	Vehicle speed ≥ 3 mph = output low	N/A	N/A
10	Not used		N/A	N/A
11	Ignition	Switched high for ignition on –Wake up input	P2-L	D Ign
12	Left Turn	Switched high (ign) parallel with turn signal –Wake up input	P2-R	B1A9D
13	Right Turn	Switched high (ign) parallel with turn signal – Wake up input	P2-S	B1A13D
14	Park brake switch	Switched high = Park Brake set and icon on	P2-P	B1C13D
15	Stop Light	Switched high = Service Brake engaged and icon on	P2-F	Stop Lgt
16	Hi Beam	Switched high = Headlight Hi Beam engaged and icon on	P2-K	B1A7B

Signal low = Chassis Ground (0.0V – 1.5V)
Signal high = 4.0V up to Ignition Voltage

1081-17 rev F	11/22/04	*Page* 9/37

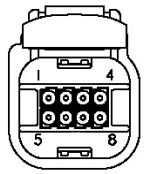
3.1.3. J3 - SPEEDOMETER SLAVE CONNECTOR (COMMUNICATION, POWER SUPPLY)



4 Positions (Actia P/N 100949)
Tyco US Part Number: 9-1419167-0

Terminal	Designation	Description	Bluebird Harness Pin Out
1	+7.6V Power	Slave device power output	N/A
2	Ground	Slave device ground	N/A
3	LIN	LIN Databus	N/A
4	Open		N/A

3.1.4. WARNING MODULE BINARY INPUT CONNECTOR



8 positions (2 X 4) (Actia P/N 100950)
Tyco US Part Number: 1411001-1

Terminal	Designation	Description	Bluebird Harness Pin Out	Wire Mrkg
1	High Hydraulic Oil Temp.	Active low – Hi Hydraulic Oil Temperature	N/A	N/A
2	Alternator	Active low – Alternator Failure	P1-H	Alt Lgt
3	Sanders Refill	Active low – Sanders Box Empty	P1-J	Sanders Lgt
4	ABS	Active low – ABS System Warning	P1-L	ABS Lgt
5	Brake Interlock Request	Active low – Brake Interlock System	P2-J	B3-009B
6	ETC	Active low – ETC Engaged	P1-M	ETC Lgt
7	Retarder	Active low – Engine Retarder Engaged	P1-N	Retard Lgt
8	Brake Interlock Alarm	Active low – Brake Interlock System	P2-E	Hyd Intlk Alm

Signal low = Chassis Ground (0.0V – 1.5V)
Signal high = 4.0V up to Ignition Voltage

3.1.5. SWITCH HARNESS CONNECTIONS

Description	Bluebird Harness Pin Out	Wire Mrkg	Description	Bluebird Harness Pin Out	Wire Mrkg
Diag Switch Input	P2-N	IO Diag Gnd	Cruise Switches Input	P3-N	Sens Com C
Diag Switch Output	P2-M	B-0B6	Cruise Set Output	P3-M	EJ135
Park Lights In	P3-G	Prk Lgt Gnd	Cruise Res Output	P3-L	EJ144
Park Lights Out	P3-H	B-0B8	Cruise On/Off Output	P3-K	EJ159
Head Lights In	P3-E	Prk Lgt Gnd	Fog Lights In	P3-C	Fog Lgt Gnd
Head Lights Out	P3-F	B-0C8	Fog Lights Out	P3-D	Fog Lgt
High Idle In	P3-B	High Idle Gnd	Fog Lights Active	P3-S	Fog Lgt On
High Idle Out	P3-A	B-A10	Illumination Power	P3-P	Illum Pwr
High Idle Active	P3-R	High Idle On	N/A	P3-J	N/A

1081-17 rev F	11/22/04	*Page* 10/37

OPERATION

3.2. Display Odometer & Clock

The odometer & clock value will be displayed with the ignition off when the vehicle lights are turned on as long as the panel dimmer level is greater than approximately 10%.

3.3. Turn signal/Hazard warning lights

The right and left turn icons are operational with the ignition off when their respective binary input becomes high. Hazard lights normally turn both the right and left turn binary inputs high.

3.4. Start-Up Mode

The Master enters start-up mode when the ignition is turned on. The ignition binary input is used to sense if the key switch is on or off.

The start up self-test is an option enabled through the setup menu. The factory setting for this option is enabled.

3.4.1. GAUGES

Gauge pointers will drive to zero position. The pointers will then drive up scale, pausing at ½ scale, before completing the sweep to full scale. The pointers will then return to zero position before moving to the commanded position.

3.4.2. LCD

During the up scale sweep of the pointers, the LCD will turn all its segments on for one second, off for one second and then display the opening message. The opening message is the Bluebird logo followed by the software ID, complete with revision level.

3.4.3. WARNING LIGHTS

Starting at the up scale pointer sweep, all warning lights will turn on for 5 seconds and then go out. Active warning lights will turn on when the gauges go to their commanded position.

3.4.4. COMMUNICATION

The speedometer will determine which data buses are connected and which devices are present. Error messages will display if a data bus is missing or a device that had been previously found is now missing.

3.4.5. AUDIBLE ALARM

The audible alarm will sound its three different tones for one second each during the up scale swing of the pointers.

3.5. Turn-off

When the ignition line goes low all gauges will zero, except the fuel gauge, and the odometer value will be stored to the EEPROM before the IP turns itself off. This will take up to 4 seconds. While off, the instrument panel will consume less than 1mA from the hot battery power input.

3.6. Self-Diagnostic Mode

The self-diagnostic mode is entered through a menu selection using the LCD. Diagnostics is only available when the Park Brake is set.

Detail specifications are found in the Message Display Center section.

The self-diagnostic includes the following tests:

- Gauges
- Warning Lights
- LCD
- Binary Inputs
- Analog Inputs
- Data Links

4. IGNITION MODE

4.1. Gauges Display

4.1.1. MASTER GAUGE – SPEEDOMETER

The speedometer is a standard gauge for the Instrument Panel and is the master gauge in the system. The speedometer data source will be J1939 (PGN65265)

4.1.2. TACHOMETER / CLOCK

The tachometer gauge is a standard slave gauge used to display engine RPM. The tachometer data source will be J1939 (PGN61444).

4.1.3. COOLANT TEMPERATURE

The coolant temperature gauge is a standard slave gauge used to display engine coolant temperature. The coolant temperature data source will be J1939 (PGN65262).

4.1.4. OIL PRESSURE

The oil pressure gauge is a standard slave gauge used to display engine oil pressure. The oil pressure data source will be J1939 (PGN65263).

4.1.5. FUEL GAUGE

The fuel gauge is a standard slave gauge used to display fuel tank level. The Fuel Level is driven by the fuel level sender analog input.

4.1.6. VOLTMETER

The voltmeter gauge is a standard slave gauge used to display chassis voltage. The voltmeter data source will be J1939 (PGN65271).

4.1.7. AMMETER

The ammeter gauge is an optional slave gauge used to display battery charging / discharging conditions. The ammeter is driven by the differential inputs of Ammeter + / - analog inputs.

4.1.8. FRONT AIR GAUGE

The front air gauge is an optional gauge used when air pressure is required. The gauge displays Front Air Pressure. The warning bank transducer drives the Front Air Pressure Gauge.

4.1.9. REAR AIR GAUGE

The rear air gauge is an optional gauge used when air pressure is required. The gauge displays Rear Air Pressure. The warning bank transducer drives the Rear Air Pressure Gauge.

4.1.10. TRANSMISSION TEMPERATURE

The transmission temperature gauge is an optional slave gauge used to display transmission oil temperature. The transmission temperature data source will be J1939 (PGN65272).

596

4.2. Applied Air Feature

The applied air feature is used to monitor front and rear brake line pressure. This feature is activated when the master gauge detects the presence of one or all of the applied air kit.

4.2.1. APPLIED FRONT AIR GAUGE

The applied front air gauge is an optional gauge used when applied air pressure is required. The gauge displays Applied Front Air Pressure. The warning bank transducer # 2 drives the Applied Front Air Pressure Gauge.

4.2.2. APPLIED REAR AIR GAUGE

The applied rear air gauge is an optional gauge used when applied air pressure is required. The gauge displays Applied Rear Air Pressure. The warning bank transducer # 2 drives the Applied Rear Air Pressure Gauge.

1081-17 rev F	11/22/04	*Page* 13/37

4.3. Backlighting

The PWM dimmer for panel illumination feeds into the speedometer so that the gauge components can match the dimming of other panel components. The speedometer interprets this input as indicated in the table below:

Dimmer Input	Speedometer LCD Backlight	Gauge Backlight
0%-9%	Maximum brightness	Off
10-100% Ignition V	Linearly go from min to max brightness	Linearly go from min to max brightness

4.4. Gauges Internal Warning Indicators

4.4.1. Low Oil Pressure

The data source of the Low Oil Pressure warning light indicator is J1939 (DM1SPN100).

4.4.2. High Coolant Temperature

The data source of the High Coolant Temperature indicator is J1939 (DM1SPN110).

4.4.3. High Transmission Temperature

The data source of the High Transmission Temperature indicator is J1939 (PGN65272) with a threshold of 250°F calculated by the master gauge. The alternate data source of the high transmission temperature is J1939 (DM1HighTransTempLamp). The logic is programmed to alarm on either conditions.

4.4.4. Low Fuel Level

Low Fuel Level icon turns on when the fuel level is less than 12.5% and turns off when the level is above 18%.

4.4.5. Low Air Pressure - Front

Low Air Pressure - Front indicator turns on when the front air pressure is less than or equal to 62 PSI. The indicator will turn off at 70 PSI.

4.4.6. Low Air Pressure - rear

Low Air Pressure - Rear indicator turns on when the rear air pressure is less than or equal to 62 PSI. The indicator will turn off at 70 PSI.

4.4.7. Low/High Battery voltage

Low/High battery voltage icon turns on when the battery voltage is less than 12v or is more than 15.4v.

4.4.8. LOW APPLIED AIR PRESSURE - FRONT

Low Air Pressure – Due to system operation parameters, this warning light does not turn on.

4.4.9. LOW APPLIED AIR PRESSURE - REAR

Low Air Pressure – Due to system operation parameters, this warning light does not turn on.

4.5. Warning Bank Indicators

4.5.1. LEFT TURN

Left Turn indicator turns on when the left turn binary input is switched high. If the left turn indicator is left on for a measured distance of 1 mile, then the alert tone will be activated and the message center will display "Left Turn".

4.5.2. RIGHT TURN

Right Turn indicator turns on when the right turn binary input is switched high. If the right turn indicator is left on for a measured distance of 1 mile, then the alert tone will be activated and the message center will display "Right Turn".

4.5.3. PARK BRAKE

Park Brake indicator is turned on when the park brake is set (park brake input is high). The Park Brake indicator will flash for a period of 2 minutes, or until the park brake is set, if the park brake is not set when the ignition is switched off. The park brake indicator will flash if the speed of the vehicle is > 3 MPH, or until the park brake is disengaged.

4.5.4. HIGH BEAM

High Beam indicator is turned on when the high beam binary input is switched high.

4.5.5. STOP ENGINE

Stop Engine indicator is J1939 driven (DM1RedStopLamp).

4.5.6. WAIT TO START

Wait to Start indicator is turned on when the wait to start binary input is switched low (analog input used as binary input).

4.5.7. CHECK TRANSMISSION

Check Transmission indicator is J1939 driven (Allison DM1 CheckTransLamp).

4.5.8. RANGE INHIBIT

The Range Inhibit indicator is J1939 driven by the Transmission (PGN65098).

4.5.9. ABS

The ABS indicator is turned on when the ABS binary input is either switched low or high depending on the application as listed below:

Bendix air ABS Systems: Active High
Wabco hydraulic ABS Systems: Active Low

The plug & play function will determine if Air gauges are present in the panel. This will determine that a Bendix air ABS system is present.

4.5.10. HIGH HYDRAULIC OIL TEMPERATURE

High hydraulic oil temperature indicator is turned on when the high hydraulic oil temperature binary input is switched low.

4.5.11. RETARDER

Retarder indicator is turned on when the retarder binary input is switched low.

1081-17 rev F	11/22/04	*Page* 16/37

4.5.12. STOP LIGHT

Stop light indicator is turned on depending on the features that are downloaded by body # from Bluebird or if the stop light inhibit feature is turned on. The stop light binary input follows the logic as listed below:

Air Brakes Systems w/ Brake interlock (40051-02)

Brake Interlock Alarm	Brake Interlock Request	Stop Light Status	Stop Light Inhibit Status	Action Requested
Active / Not Active	Active	Active	OFF	Stop light lamp lit
Active / Not Active	Active	Active	ON	Stop light lamp not lit
Active / Not Active	Not Active	Active	OFF	Stop light lamp lit
Active / Not Active	Not Active	Active	ON	Stop light lamp not lit
Active / Not Active	Active	Not Active	OFF / ON	Stop light lamp Flashing

Hydraulic Brakes Systems w/ Brake interlock (40051-01)

Brake Interlock Alarm	Brake Interlock Request	Stop Light Status	Stop Light Inhibit Status	Action Requested
Not Active	Active	Active	OFF	Stop light lamp lit
Not Active	Active	Active	ON	Stop light lamp not lit
Not Active	Not Active	Active	OFF	Stop light lamp lit
Not Active	Not Active	Active	ON	Stop light lamp not lit
Active	Active	Active / Not Active	OFF / ON	Stop light lamp Flashing

No Brake Interlock System (No feature downloaded)

Brake Interlock Alarm	Brake Interlock Request	Stop Light Status	Stop Light Inhibit Status	Action Requested
Active / Not Active	Active / Not Active	Active	OFF	Stop light lamp lit
Active / Not Active	Active / Not Active	Active	ON	Stop light lamp not lit
Active / Not Active	Active / Not Active	Not Active	OFF	Stop light lamp turns off
Active / Not Active	Active / Not Active	Not Active	ON	Stop light lamp not lit

4.5.13. HYDRAULIC BRAKE FAILURE

Hydraulic brake failure indicator is turned on when the hydraulic brake failure input is switched low (analog input used as binary input).

4.5.14. LOW COOLANT LEVEL

The data source of the Coolant Level is J1939 (PGN65263).
The indicator is turned ON steady for low coolant level (0% < received value <= 50%)and is blinking for very low coolant level (received value = 0%).

The alternate data source of the Coolant level is J1939 (DM1LowCoolantLamp). The logic is programmed to alarm on either conditions.

4.5.15. HIGH TRANSMISSION TEMPERATURE

The data source of the High Transmission Temperature indicator is J1939 (PGN65272) with a threshold of 250°F calculated by the master gauge. The alternate data source of the high transmission temperature is J1939 (DM1HighTransTempLamp). The logic is programmed to alarm on either conditions.

4.6. Audible Alarm

The audible alarm is used in the following conditions:

Audible Alarm	Designation	Criteria	Priority
Continuous 1	High Hydraulic Temperature	Binary input	1
Continuous 1	Stop engine	PGN 65226 DM1 Red Stop Lamp	1
Continuous 1	Very low coolant level	PGN 65263 See 5.4.14	1
Continuous 1	Low Oil Pressure	PGN 65,226 SPN 100 FMI 1 or 11	1
Continuous 1	High Coolant Temperature	PGN 65,226 SPN 110 FMI 0 or 11	1
Continuous 1	High Transmission Temp	PGN 65272 SPN 177	1
Continuous 1	Hydraulic Brake Failure	Analog input	1
Continuous 1	Low/High chassis voltage	PGN 65271 SPN 168When ≤ 11.9V or ≥ 30V	2
Continuous 1	Front low air pressure	Analog input - When ≤ 62 PSI (448 kPa)	2
Continuous 1	Rear low air pressure	Analog input - When ≤ 62 PSI (448 kPa)	2
Continuous 1	Alternator	Binary input	2
Beep 1	Engine Maintenance	PGN 65226 DM1 Check Engine Lamp	2
Beep 1	Wait to start	Analog input	2
Beep 1	ABS	Binary input	3
Beep 1	Range inhibit	PGN 65098 Byte 2 – Bits8-7	5
Beep 1	Service engine soon	PGN 65216 Bytes2-3	5
Beep 1	Sanders refill	Binary input	6
Beep 1	Low Fuel Level	When < 13%	6
Beep 1	Turn signal reminder	(1)	8
Beep 2	Park brake reminder	(2)	(3)
Beep 3	Turn signals		(4)

(1) Turn signal reminder is ON if the right or the left turn signal indicator is left ON for a distance of 1 mile.

(2) Park brake reminder is ON
- if park brake is not set when ignition is turned OFF (during 2 minutes or until park brake is set)
- if park brake is set when vehicle speed becomes more than 3 mph (until park brake is disengaged).

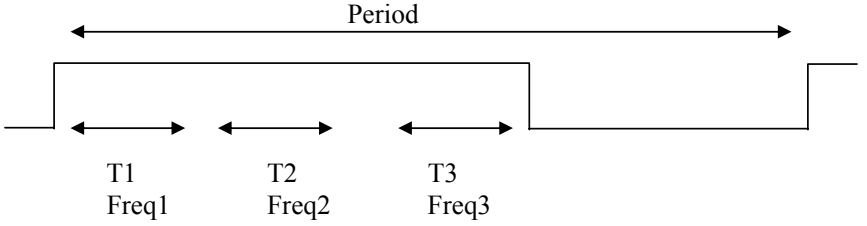
(3) Park brake reminder has a lower priority than a buzzer (continuous 1) but a higher priority than an alert (Beep 1).

(4) The click for the turn signals are always generated but might not be heard (for example if the buzzer is also ON)

The audible tone are defined in the table below:

Audible Alarm	Freq 1	T1	Freq 2	T2	Freq 3	T3	Period	Priority
Continuous 1	2900	160ms					Continuous	
Beep 1	2000	160ms	0	160ms			320ms	
Beep 2	2900	160ms	0	160ms			320ms	
Beep 3	2000	40ms	0	160ms			Once	

Example:



4.7. Binary Outputs

4.7.1. SPEED DETECT

This binary output is active (low side drive) when vehicle speed ≥ 3 MPH is detected.

5. COMMUNICATION

There are two communication channels for data transfer between the vehicle and the speedometer. One channel for SAE J1708/J1587 and a second channel for CAN 2.0B/SAE J1939 (Controller Area Network).

All frames transmitted by the speedometer on J1939 are continuously sent at the standard broadcast rate for the frame using source address (SA) 23dec (17h).

The speedometer communicates via the LIN bus to slave devices. The slave gauges are updated every 400mSec except for the tachometer which is updated every 80mSec.

5.1. Communication Errors

If a parameter is not received by J1939 for 5 seconds it will be flagged as missing. Missing LCD information will display a "-" and missing gauge information will be signaled by wagging the pointer from dial end to dial end. A missing J1939 data bus will be announced in the LCD.
If a LIN parameter is missing for 5 seconds the gauge will wag the pointer from dial end to dial end and flash the warning LED.

1081-17 rev F	11/22/04	*Page* 19/37

5.2. Plug and Play Function

The master keeps a "roll call" list and verifies that all devices are present during start up. The master listens for devices on each communication bus and remembers which devices are present during initialization. When a new device is found it is added to the roll call list. If a device is found missing, a message will be sent to the LCD but the roll call list is not updated. Devices can only be removed from the list through the diagnostic menu.

5.3. Messages Sent

5.3.1. SERVICE BRAKE

The service brake message is sent to the engine via J1939 (PGN65265SB) when the brake pedal is depressed.

5.4. J1939 Table of Messages

Applies to: CAT 3126E and Allison WT / 2000						
Frame	**PGN**	**Name**	**Byte**	**TX/RX**	**English Units**	**Metric Units**
Engine Hours	65,253 (00FEE5)	Total engine hours	1,2,3,4	RQ	H	H
Cruise Control/Vehicle Speed	65,265 (00FEF1)	Wheel-based vehicle speed	2,3	RX	MPH	km/H
Cruise Control/Vehicle Speed	65,265 (00FEF1)	Cruise Control state	7 b 8to6	RX		
Cruise Control/Vehicle Speed	65,265 (00FEF1)	Service Brake	4 b 6&5	TX		
DM1	65,226 (00FECA)	Active DTC	3-6	RX		
DM1	65,226 (00FECA)	Engine maintenance	1 b 2&1	RX		
DM1	65,226 (00FECA)	Amber warning lamp	1 b 4&3	RX		
DM1	65,226 (00FECA)	Red Stop lamp	1 b 6&5	RX		
DM1	65,226 (00FECA)	Malfunction lamp	1 b 8&7	RX		
EEC1	61,444 (00F004)	Engine speed	4,5	RX	RPM	RPM
EEC2	61,443 (00F003)	Percent load	3	RX	%	%
Engine Fluid Level/Pressure	65,263 (00FEEF)	Engine oil pressure	4	RX	PSI	KPa
Engine Fluid Level/Pressure	65,263 (00FEEF)	Engine coolant level	8	RX	%	%
Engine Fluid Level/Pressure#2	65,243(00FEDB)	Injection control pressure	1,2	RX	PSI	Kpa
Engine Temperature	65,262 (00FEEE)	Engine coolant temp.	1	RX	°F	°C
ETC1	61,442 (00F002)	Electronic Trans. Controller	N/A	RX		
ETC2	61,445 (00F005)	Transmission Current Range	7	RX	ASCII	ASCII
ETC7	65,098 (00FE4A)	Shift inhibit	2 b 8&7	RX		
Fuel Economy	65,266 (00FEF2)	Instantaneous fuel econ	3,4	RX	MPG	L/100Km
Fuel Economy	65,266 (00FEF2)	Average fuel economy	5,6	RX	MPG	L/100Km
Inlet/Exhaust Conditions	65,270 (00FEF6)	Boost pressure	2	RX	PSI	KPa
Inlet/Exhaust Conditions	65,270 (00FEF6)	Intake manifold temperature	3	RX	°F	°C
Transmission Fluids	65,272 (00FEF8)	Transmission oil temp.	5,6	RX	°F	°C
Vehicle Electrical Power	65,271 (00FEF7)	Electrical potential (volts)	5,6	RX	V	V
Service	65216 (00FEC0)	Service distance	2,3	RX	M	Km
Service	65216 (00FEC0)	Service delay	7,8	RX	H	H
Defined Faults	**PGN**	**Name**	**Byte**	**SPN**	**FMI**	**Source Address**
DM1	65,226 (00FECA)	High Coolant Temp	3-6	110	0 and 11	0
DM1	65,226 (00FECA)	Low Oil Pressure	3-6	100	1 and 11	0
DM1	65,226 (00FECA)	Amber warning light/Check Transmission	1 b 4&3 3-6	2003	31	3
DM1	65,226 (00FECA)	High Trans Temperature	1 b 4&3 3-6	177	15	3
DM1	65,226 (00FECA)	Low Coolant Level	3-6	111	1 and 11	0

Note:
In the table bytes are numbered 1 to n and bits are numbered 1 to 8. 1 is LSb..

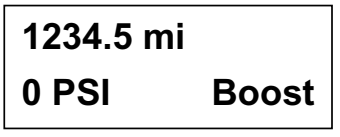
6. MESSAGE DISPLAY CENTER

The message display is a graphical, backlit, LCD that displays information to the vehicle operator. The messages that are displayed include:

1. Odometer
2. Trip Odometer (optional)
3. Boost Pressure
4. Percent Engine Load
5. Instantaneous Fuel Rate
6. Average Fuel Rate
7. Engine hours
8. Engine RPM
9. Coolant Temperature
10. Engine Oil Pressure
11. Fuel Level
12. Transmission Temperature
13. Primary Air Pressure
14. Secondary Air Pressure
15. Dimmer %
16. Intake Manifold Temperature
17. Injection Pressure
18. Vehicle Speed
19. Battery Voltage
20. Ammeter
21. Instrument Panel Diagnostic Information

6.1. Drive Mode Screen

During normal operation the LCD displays the odometer or trip value on the top line and a selected parameter on the second line. (Boost Pressure shown in the following example)



6.2. Odometer

The odometer function is in the speedometer. The season odometer displays 0.0 - 9,999,999.9 and the trip odometer, when offered, will display 0.0 - 9999.9. Both have a resolution of 0.1 mi/km. Leading zeros are only displayed in the 1's position. The vehicle distance is calculated every 80 msec. from the vehicle speed transmitted on the J1939 data bus by the engine ECM and stored within the speedometer in kilometers. It can be displayed on the LCD in miles or kilometers. The odometer reading will be displayed when the ignition switch is off by activating the gauge backlight.

6.2.1. ACCURACY

Accuracy of the odometer value is dependant on two (2) main variables. 1) The algorithm in the speedometer for calculating distance, and 2) the speed value transmitted by the ECM. The algorithm has been designed and written to calculate the distance with the accuracy and resolution necessary to exceed SAE recommendations. The distance is calculated every 80 msec. to reduce error during any rapid speed change the vehicle might make. The speed data is dependant on the calibration parameters for tire size and axle ratio being properly entered into the ECM. These are the same parameters necessary to have the ECM properly calculate the vehicle speed and distance value. Testing has indicated that the algorithm will calculate mileage within ±0.07% of actual based on the speed received. This far exceeds the SAE recommended ±0.3% found in SAE J1226.

6.2.2. NORMAL SHUTDOWN

The odometer value is stored to the EEPROM at each 1-kilometer increment (0.62 mi) and when the ignition switch is turned off. The value is stored to 1/100 of a kilometer resolution (33 ft) using a 4-byte memory location within an array. Each store is made sequentially to one (1) of eight (8) locations in the array so at any point in time the last eight (8) values are maintained. Each value stored is verified at the time it is saved. Multiple store attempts to a location will be made if necessary, and if not successful, the memory location will be tagged as bad. The "precount" that is used to increment the odometer every 1/100th km is also saved. The "precount value is 115200. Therefore, our internal resolution is 1/11520000th of a km or 0.003385827 inches. This value is stored on power down and recovered on power up.

Odometer Value Array									
Value n	Byte 1	Byte 2	Byte 3	Byte 4	**Value n+4**	Byte 1	Byte 2	Byte 3	Byte 4
Value n+1	Byte 1	Byte 2	Byte 3	Byte 4	**Value n+5**	Byte 1	Byte 2	Byte 3	Byte 4
Value n+2	Byte 1	Byte 2	Byte 3	Byte 4	**Value n+6**	Byte 1	Byte 2	Byte 3	Byte 4
Value n+3	Byte 1	Byte 2	Byte 3	Byte 4	**Value n+7**	Byte 1	Byte 2	Byte 3	Byte 4

6.2.3. ABNORMAL SHUTDOWN

If there is battery power loss at the speedometer prior to turning the ignition off, an abnormal shut down will occur. The odometer value, when power is restored, will return to the last kilometer increment value saved; i.e. the last XXX.0 kilometer rollover. Therefore, the **maximum** distance lost by an abnormal shutdown will be 0.9 km (0.56 mi). Battery loss that occurs >4 seconds after

turning the ignition off will NOT result in an abnormal shutdown. The occurrence of an abnormal shutdown during the life of a vehicle should be rare.

6.2.4. DURABILITY

The EEPROM store routine will allow for a minimum of 4 million store cycles. The design will accommodate 200 key-offs per day, 260 days per year, for 20 years plus 1.609344 million kilometers (1,000,000 mi) which could be seen if the vehicle is used on a delivery route, with a 51% safety factor (200*260*20+1,609,334) = 2,649,334+51% = 4,000,494 store cycles. An error recovery scheme is implemented that will allow the odometer value to be recovered should a hardware failure in one of the EEPROM memory cells occur.

6.2.5. ERROR RECOVERY

The error recovery algorithm will check each stored value to determine if the values are in sequence (low to high) and 1 km or less apart. If this condition is found no errors are present and no further action is required. If a value is found to be out of order or greater than 1 km from the others, the software will identify the largest value in the group with the proper sequence and use that value.
In the unlikely event the speedometer fails in such a way that the odometer value cannot be displayed, the factory, in most instances, will be able to recover the stored value.

6.2.6. MAXIMUM READING

The odometer will stop incrementing when the maximum display count is reached. Therefore, the value will not rollover to zero and continue incrementing but will freeze at 9,999,999.9.

6.2.7. SERVICE PROGRAMMING

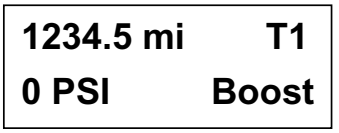
If replacement of the speedometer becomes necessary, the actual vehicle mileage may be programmed into the odometer using Actia proprietary software. The mileage may be incremented, but not decremented, using this software.

6.2.8. SERVICE GAUGES

Replacement speedometers will be shipped in a mode that allows the installer to preset actual vehicle distance, thus eliminating the need to "tag" the vehicle. Documentation on how this mode works can be found in Actia document # 104426.

6.3. Trip Odometer

The trip odometer may be displayed by pressing the ***t*** button. This will toggle you between the Odometer and the Trip Odometer. You will know the trip odometer is being displayed by the **T1** symbol in the top right corner of the message center display.



6.4. Priority Messages

Priority messages are displayed in the LCD due to various inputs or data messages.
When a new fault appears, associated priority message is displayed, overwriting the odometer/trip display. After 5s, the exit command will appear, allowing the return to the normal display by pressing the ***m*** button. If several faults are defined, the more command will be displayed.
It will then be possible to scroll thru the list of faults by pressing the ***t*** button.

6.4.1. ENGINE MAINTENANCE

This message is displayed when the fault is received via J1939 (DM1EngMaintLamp).

6.4.2. ENG COMM FAILURE

This message is displayed when the master gauge does not receive the J1939 data from the engine. This is accomplished by monitoring for the presence of the engine speed message (PGN61444).

6.4.3. TRANS COMM FAILURE

This message is displayed when the master gauge does not receive the J1939 data from the transmission. This is accomplished by monitoring for the presence of the ETC #1 message (PGN61442).

6.4.4. ALTERNATOR

This message is displayed when the associated binary input is switched low.

6.4.5. SERVICE ENGINE SOON

This message is displayed depending on the service distance and delay information received via J1939 (PGN65216).

6.4.6. SANDERS REFILL

This message is displayed when the associated binary input is switched low.

6.4.7. ETC

This message is displayed when the associated binary input is switched low.

6.4.8. BATTERY VOLTAGE ERROR

This message is displayed if the voltage message received from the ECM via the J1939 contains a wrong value (error or not available or underrange or overrange) (PGN65271).

6.4.9. VEHICLE SPEED ERROR

This message is displayed if the vehicle speed received from the ECM via the J1939 contains a wrong value (error or not available) during a certain time (PGN65265).

1081-17 rev F	11/22/04	*Page* 24/37

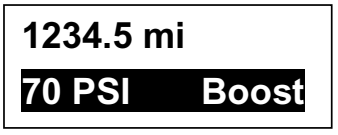
6.4.10. TURN SIGNAL ON

This message is displayed if the right or the left turn signal indicator is left ON for a distance of 1 mile

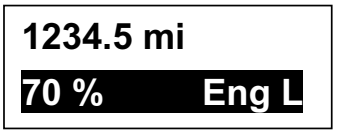
6.5. Second Line Display Selection

Pressing the ***m*** button for < 5 seconds allows the selection of the parameter to be displayed on the second line. The parameter will highlight in **reverse video** indicating it is selected. Pressing the ***m*** or ***t*** button will display a different parameter from the list. To select the highlighted parameter simply do nothing and the highlight will disappear leaving the parameter displayed. Parameters that can be displayed are:

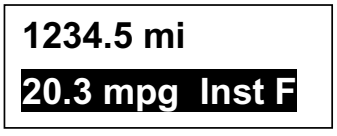
Boost Pressure



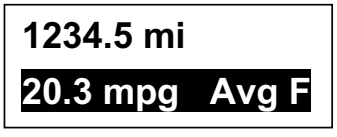
Engine Load



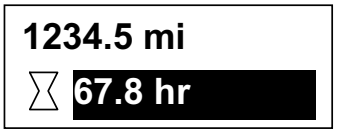
Instantaneous Fuel Economy



Average Fuel Economy



Hourmeter



608

1081-17 rev F	11/22/04	*Page* 25/37

6.6. Settings and Diagnostic

With the park brake set and in the Drive Mode Screen, pressing the ***m*** button for >5 seconds brings up the following screen:

```
1-Set Units
2-Contrast
3-Instrument Diag
     V  Select   Λ
```

The item highlighted in **reverse video** will be selected when both the ***m*** and ***t*** buttons are pressed together. Pressing the ***m*** or ***t*** button separately will move the highlight through the list, as indicated by the arrow, so other items can be selected. There are 6 items in this menu as follows:

```
4- Read Param
5-Ammeter Calib
6-Engine Diag
     V  Select   Λ
```

6.6.1. SET UNITS

Selecting menu item 1 brings up the following screen that is used to select if values are to be displayed in metric units or English units.

```
Current Units
ENGLISH
Press t for METRIC
Press m to Exit
```

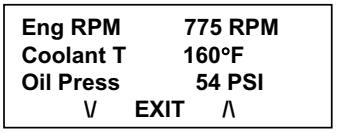
6.6.2. CONTRAST

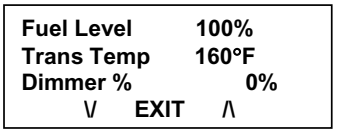
Selecting menu item 2 display a screen to allow setting the LCD contrast. Pressing the ***m*** (+) button will increase contrast while pressing the ***t*** (-) button will decrease contrast.

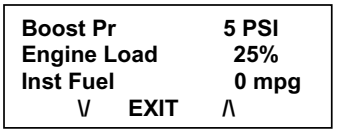
```
CONTRAST ADJUST
+        -
```

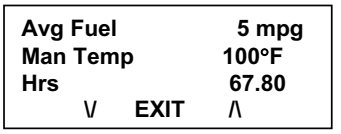
6.6.3. READ PARAMETERS

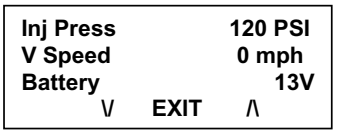
Item 4-Read Param – This screen displays various parameter received by the master gauge. The main use for these screens is in troubleshooting the system.

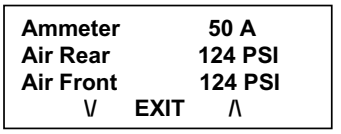






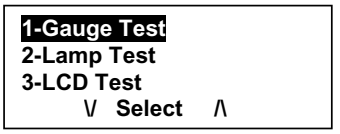


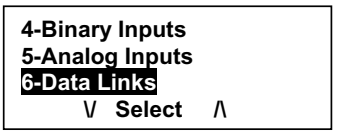




6.6.4. INSTRUMENT DIAGNOSTICS

Selecting menu item 3 in the Settings and Diagnostic Menu will display the instrument diagnostic menu. There are 6 items in this menu and is navigated the same as the previous menu.

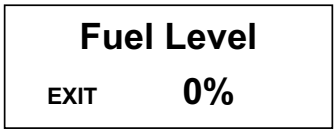


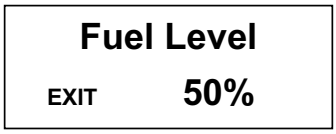


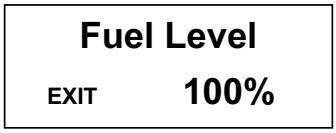
1081-17 rev F	11/22/04	*Page* 27/37

6.6.4.1. Gauge Test

The selected gauge will be driven through three positions pausing at each position for 500 mSec. as shown in the LCD as a percentage of scale. This test will proceed through all gauges and return to the menu. Pressing the ***m*** button (Exit) will end the test and return to the menu.







6.6.4.2. Lamp Test

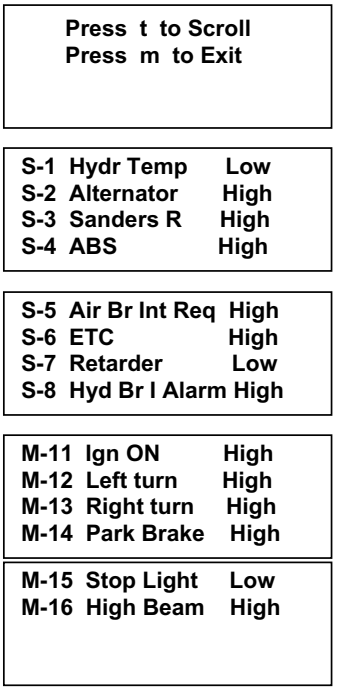
Item 2-Lamp Test – Turns each IP warning lamp (not the vehicle load) on then off displaying the lamp name and status in the LCD. This test goes through all warning lamps and then returns to the menu. Pressing the ***m*** button (Exit) will end the test and return to the menu. (High beam test shown as an example)

6.6.4.3. LCD Test

Item 3 – Displays the Bluebird logo in normal and reverse video three times and then returns to the menu.

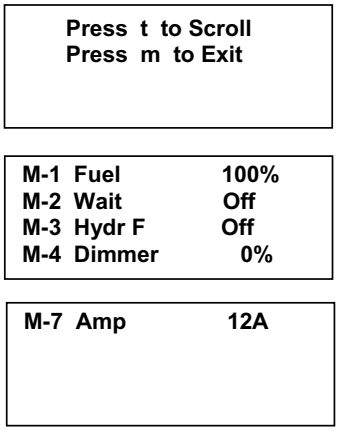
6.6.4.4. Binary Inputs

Item 4 – Displays the module, pin number, and status of each binary input defined in the system. Pressing the ***m*** button exits the test and returns to the menu. Pressing the ***t*** button scrolls the display to the next 4 inputs. The value "high" and "low" refers to the voltage level at the connector pin. This information will be continuously updated to assist in troubleshooting



6.6.4.5. Analog Inputs

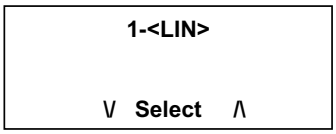
Item 5 – Displays the module, pin number, and status "Out of Range High", "Out of Range Low", or the actual value of each analog input defined in the system. Pressing the ***m*** button exits the test and returns to the menu. Pressing the ***t*** button scrolls the display to the next 4 inputs.

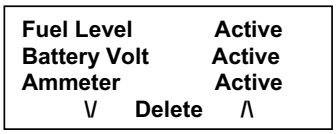


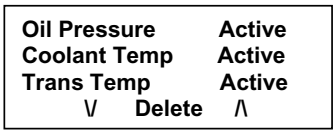
1081-17 rev F	11/22/04	*Page* 29/37

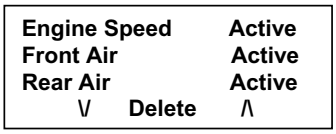
6.6.4.6. Data Link

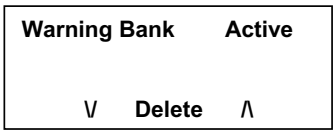
Item 6– The LIN will be checked and each device found on that data bus would be displayed. The roll call for the LIN bus may be updated using the appropriate menu selection. **Devices may only be deleted if they are designated inactive.**





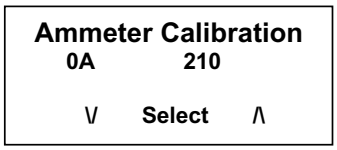






6.6.5. AMMETER CALIBRATION

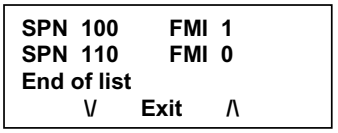
Selecting menu item 5 brings up the following screen that is used to calibrate the ammeter in the field. The instructions for using this menu are listed below:



1) Connect both wires on the ammeter shunt together on one side of the shunt (which side does not matter).
2) Use the up down arrows to change the calibration factor until you read 0A on the display.
3) Verify that the gauge closely coordinates with the display.
4) Press both buttons to save calibration.
5) Reconnect ammeter shunt wires to the normal configuration.

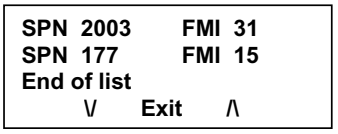
6.6.5.1. Engine Diagnostic

Item 6-Engine Diagnostics – This screen displays the Suspect Parameter Number (SPN) and Failure mode Identifier (FMI) as received from the engine for active faults via J1939 (DM1SPN100) (Two active faults shown below as an example)



6.6.5.2. Trans Diagnostic

Item 7-Trans Diagnostics – This screen displays the Suspect Parameter Number (SPN) and Failure mode Identifier (FMI) as received from the transmission for active faults via J1939 (DM1HighTransTempLamp). (Two active faults shown below as an example)



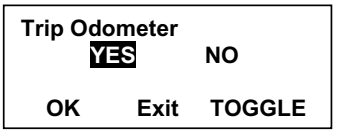
6.7. Setup Menu

Holding m and t pressed while turning the ignition on enters the setup menu. Trip, Default Parameter, Self-Test and can be enabled and disabled by the user.

614

6.7.1. TRIP

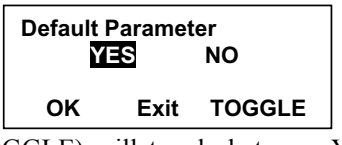
Shows if the Trip Odometer is present (YES). Pressing ***m*** (OK) will go to the next selection. Pressing both ***m*** and ***t*** will exit to the start up screen.



Pressing ***t*** (TOGGLE) will toggle between YES and NO, while pressing ***m*** (OK) will save the selection and go to the next selection. Pressing both ***m*** and ***t*** will exit to the start up screen.

6.7.2. DEFAULT PARAMETER

Shows if the default parameter line is present (YES). Pressing ***m*** (OK) will go to the next selection. Pressing both ***m*** and ***t*** will exit to the start up screen.

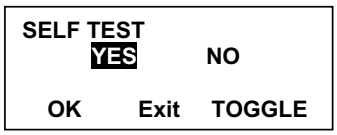


Pressing ***t*** (TOGGLE) will toggle between YES and NO, while pressing ***m*** (OK) will save the selection and go to the next selection. Pressing both ***m*** and ***t*** will exit to the start up screen.

1081-17 rev F	11/22/04	*Page* 31/37

6.7.3. SELF TEST

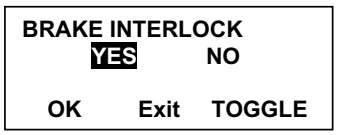
When YES is selected, the start up self test will zero the pointers, sound three tones from the speaker, sweep the gauge pointers through 50%, 100%, then back to zero, and turn all warning lights on for 5 seconds. When NO is selected the pointers will zero and all warning lights will be turned on for 5 seconds



Pressing ***t*** (TOGGLE) will toggle between YES and NO, while pressing ***m*** (OK) will save the selection and go to the next selection. Pressing both ***m*** and ***t*** will exit to the start up screen.

6.7.4. BRAKE INTERLOCK

When YES is selected, the brake interlock warning light functions are activated as listed in paragraph 5.4.12. When NO is selected the brake interlock warning light functions are deactivated.

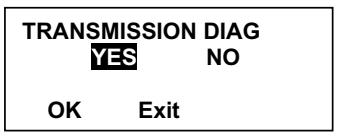


Pressing ***t*** (TOGGLE) will toggle between YES and NO, while pressing ***m*** (OK) will save the selection and go to the next selection. Pressing both ***m*** and ***t*** will exit to the start up screen.

615

6.7.5. TRANSMISSION DIAGNOSTICS

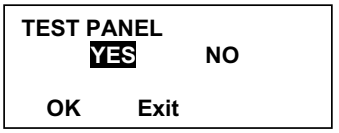
When YES is selected, the active transmission SPN and FMI faults are displayed. When NO is selected the transmission diagnostics functions are deactivated.



Pressing ***t*** (TOGGLE) will toggle between YES and NO, while pressing ***m*** (OK) will save the selection and go to the next selection. Pressing both ***m*** and ***t*** will exit to the start up screen. The toggle function is not active on this menu and will be activated upon future implementation.

6.7.6. TEST PANEL

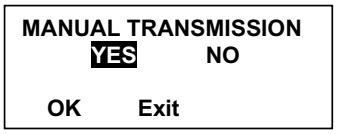
When YES is selected, the software is configured as a production chassis test fixture. When NO is selected the production chassis test fixture are deactivated. This feature can only be activated through Actia provided software.



Pressing ***m*** (OK) will save the selection and go to the next selection. Pressing both ***m*** and ***t*** will exit to the start up screen. The toggle function is not active on this menu

6.7.7. MANUAL TRANSMISSION

When YES is selected, the configure the software to ignore the loss of transmission communications and not display a "TRANS COMM" message as listed in paragraph 7.4.3. When NO is selected the manual transmission functions are deactivated.

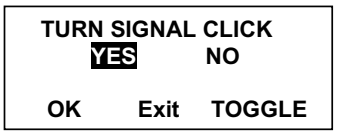


616

Pressing ***t*** (TOGGLE) will toggle between YES and NO, while pressing ***m*** (OK) will save the selection and go to the next selection. Pressing both ***m*** and ***t*** will exit to the start up screen. The toggle function is not active on this menu and will be activated upon future implementation.

6.7.8. TURN SIGNAL CLICK

When YES is selected, the software is configured to enable the turn signal "click". When NO is selected the turn signal "click", the turn signal "ON" (see 7.4.10) and the turn signal "reminder audible alarm" (see 5.6 (1)) will be disabled.

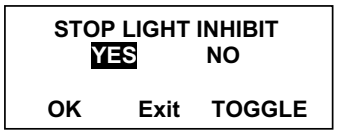


Pressing ***t*** (TOGGLE) will toggle between YES and NO, while pressing ***m*** (OK) will save the selection and go to the next selection. Pressing both ***m*** and ***t*** will exit to the start up screen.

1081-17 rev F	11/22/04	*Page* 33/37

6.7.9. STOP LIGHT INHIBIT

When YES is selected, the software is configured to disable the "stop light" warning indicator, unless in a warning condition created from the brake interlock circuit (see 5.5.12). When NO is selected the "stop light" warning indicator will be enabled (see 5.5.12).



Pressing ***t*** (TOGGLE) will toggle between YES and NO, while pressing ***m*** (OK) will save the selection and go to the next selection. Pressing both ***m*** and ***t*** will exit to the start up screen.

7. GLOSSARY/ABBREVIATIONS

TBD – To be determined
EEPROM – Electrically Erasable Programmable Read Only Memory
SAE – Society of Automotive Engineers
PGN – Parameter Group Number (J1939)
SPN – Suspect Parameter Number (J1939)
FMI – Failure Mode Identifier (J1939)
ECM – Electronic Control Module
TVD – Total Vehicle Distance

1081-17 rev F	11/22/04	*Page* 34/37

8. TROUBLESHOOTING

	Observation (Symptom)	Problem	Things to check
1	All gauge pointers wagging end to end; LCD message "NO J1939 DATABUS; Various warning lights may be on or off but are not flashing	No J1939 Databus being received by the speedometer	1) Wiring at speedometer 8 position connector pins 3, 4, & 8 2) IP J1939 stub disconnected from backbone harness 3) Bus termination resistor missing (speedometer 8 position connector pins 4 & 8 must be connected together 4) Engine controller not configured for J1939 communication
2	All gauge pointers, except speedometer, wagging end to end; All warning lights are flashing	No LIN Databus between the speedometer and the other gauges and warning modules	1) Check the 3-wire harness between the speedometer, other gauges, and warning modules 2) Remove one gauges at a time from the LIN bus harness and observe if LIN communications is restored.
3	Instrument panel does not power up; No activity on any gauge or warning lights		1) 9-16V power at speedometer J1 pin 1 2) 9-16V power at speedometer J2 pin 11 3) Ground at speedometer J1 pin 2
4	Speedometer indicating 0; Read parameter Speed = 0	Engine controller sending speed data as zero (0) on J1939	1) Transmission not sending tail shaft speed to engine 2)Broken data link between engine and transmission
5	Speedometer pointer wagging; Read parameter Speed = NA	No engine speed data on J1939	Engine controller not sending vehicle speed information
6	Tachometer pointer wagging; Read parameter Eng RPM = NA	No engine speed data on J1939	Engine controller not sending engine speed information
7	Tachometer pointer wagging; Read parameter Eng RPM = a value	No LIN Databus going to tachometer	Check the 3-wire harness between the speedometer, other gauges, and warning modules
8	Coolant temp gauge pointer wagging; Coolant temp warning light OFF or ON; Read parameter coolant temp = NA	No coolant temp data on J1939	Engine controller not sending engine coolant temperature information
9	Coolant temp gauge pointer wagging; Coolant temp warning light flashing	No LIN Databus going to coolant temp gauge	Check the 3-wire harness between the speedometer, other gauges, and warning modules
10	Oil pressure gauge pointer wagging; Oil pressure warning light OFF or ON; Read parameter oil psi = NA	No oil pressure data on J1939	Engine controller not sending engine oil pressure information
11	Oil pressure gauge pointer wagging; Oil pressure warning light flashing	No LIN Databus going to oil pressure gauge	Check the 3-wire harness between the speedometer, other gauges, and warning modules
12	Trans temp gauge pointer wagging; Trans temp warning light OFF or ON; Read parameter trans temp = NA	No trans temp data on J1939	Transmission controller not sending trans temperature information
13	Trans temp gauge pointer wagging; Trans temp warning light flashing	No LIN Databus going to trans temp gauge	Check the 3-wire harness between the speedometer, other gauges, and warning modules

	Observation (Symptom)	Problem	Things to check
14	Voltmeter pointer wagging; Voltmeter warning light OFF or ON; Read parameter Voltmeter = NA	No voltmeter data on J1939	Transmission controller not sending trans temperature information
15	Voltmeter pointer wagging; Voltmeter warning light flashing	No LIN Databus going to voltmeter	Check the 3-wire harness between the Speedo, other gauges, and WB modules
16	Fuel gauge pointer stuck at EMPTY; Low fuel warning light ON	Fuel sender wire shorted to ground	Wire to speedometer pin 1 shorted to chassis
17	Fuel gauge pointer stuck at FULL; Low fuel warning light OFF	Fuel sender wire open circuit	Wire to speedometer pin 1 open
18	Fuel gauge pointer wagging; Low Fuel warning light flashing	No LIN Databus going to fuel level gauge	Check the 3-wire harness between the speedometer, other gauges, and warning modules
19	Front Air pressure gauge pointer wagging; Read parameter air = NA	Warning module does not have air transducers programmed	Contact Actia Corp.
20	Front Air pressure gauge pointer wagging; Low air warning light flashing	No LIN databus between the right warning module and the speedometer	Check the 3-wire harness between the speedometer, other gauges, and warning modules
21	Rear Air pressure gauge pointer wagging; Read parameter air = NA	Warning module does not have air transducers programmed	Contact Actia Corp.
22	Rear Air pressure gauge pointer wagging; Low air warning light flashing	No LIN databus between the right warning module and the speedometer	Check the 3-wire harness between the speedometer, other gauges, and warning modules
23	Ammeter reading seem low / high	Ammeter not calibrated	Calibrate ammeter per section 6.6.5
24	Ammeter pointer stuck at +150 / -150	Ammeter wires open / short circuit	Wire to speedometer pins 7 or 8 open / shorted to chassis
25	Warning modules do not perform lamp test on turn on; Icons not flashing	No power to the warning module	Check the 3-wire harness between the speedometer, other gauges, and warning modules
26	Left Turn icon stuck off; Left turn binary input reads low	Left turn binary input will not go high	Wire to Speedo J2 pin 12 broken or shorted to chassis
27	Left Turn icon stuck on; Left turn binary input reads high	Left turn binary input shorted high	1) Bad turn signal switch 2) Wire to Speedo J2 pin 12 shorted to ignition voltage
28	Right Turn icon stuck off; Binary input reads low	Right turn binary input will not go high	Wire to Speedo J2 pin 13 broken or shorted to chassis
29	Right Turn icon stuck on; Binary input reads high	Right turn binary input shorted high	1) Bad turn signal switch 2) Wire to Speedo J2 pin 13 shorted to ignition voltage
30	Hi Beam icon is stuck OFF; Hi Beam binary Input reads low	Input is not switching high	Wire to Speedo J2 pin 16 broken or shorted to chassis
31	Hi Beam icon is stuck ON; High Beam binary input reads high	Input shorted high	1) Bad headlight or dimmer switch 2) Wire to Speedo J2 pin 16 shorted to ignition voltage
32	Park Brake icon is stuck OFF; Park Brake binary Input reads low	Input is not switching high	Wire to Speedo J2 pin 14 broken or shorted to chassis
33	Park Brake icon is stuck ON; Park Brake binary input reads high	Input shorted high	1) Bad park brake switch 2) Wire to Speedo J2 pin 14 shorted to ignition voltage

	Observation (Symptom)	**Problem**	**Things to check**
34	Stop Light icon is stuck OFF; Stop Light binary Input reads low	Input is not switching high	Wire to Speedo J2 pin 15 broken or shorted to chassis
35	Stop Light icon is stuck ON; Stop Light binary input reads high	Input shorted high	1) Service Brake switch 2) Wire to Speedo J2 pin 15 shorted to ignition voltage
36	Stop light seems to work erratically	Master gauge is not set to the right setting	1) Verify that the master gauge is set to the right set up (with or w/o brake interlock) 2) Make sure the signals from the brake interlock are working correctly – see section 4.4.12
37	Hydraulic Brake Failure icon stuck off; Hydraulic Brake Failure binary input reads high	Hydraulic Brake Failure binary input will not switch low	Wire to Speedo J2 pin 3 broken or shorted to ignition voltage
38	Hydraulic Brake Failure icon stuck on; Hydraulic Brake Failure binary input reads low	Hydraulic Brake Failure binary input shorted low	Wire to Speedo J2 pin 3 shorted to chassis
39	Wait to Start icon stuck off; Wait to Start binary input reads high	Wait to Start binary input will not switch low	Wire to Speedo J2 pin 2 broken or shorted to ignition voltage
40	Wait to Start icon stuck on; Wait to Start binary input reads low	Wait to Start binary input shorted low	Wire to Speedo J2 pin 2 shorted to chassis
41	High Hyd. Oil Temp icon stuck off; High Hyd. Oil binary input reads high	High Hyd. Oil binary input will not switch low	Wire to warning bank module pin 1 broken or shorted to ignition voltage
42	High Hyd. Oil icon stuck on; High Hyd. Oil binary input reads low	High Hyd. Oil binary input shorted low	Wire to warning bank module pin 1 shorted to chassis
43	Alternator message will not display; Alternator message binary input reads high	Alternator message binary input will not switch low	Wire to warning bank module pin 2 broken or shorted to ignition voltage
44	Alternator message stuck on; Alternator message binary input reads low	Alternator message binary input shorted low	Wire to warning bank module pin 2 shorted to chassis
45	Sanders Refill message will not display; Sanders Refill message binary input reads high	Sanders Refill message binary input will not switch low	Wire to warning bank module pin 3 broken or shorted to ignition voltage
46	Sanders Refill message stuck on; Sanders Refill message binary input reads low	Sanders Refill message binary input shorted low	Wire to warning bank module pin 3 shorted to chassis
47	ABS icon stuck off; ABS binary input reads high	ABS binary input will not switch low	Wire to warning bank module pin 4 broken or shorted to ignition voltage
48	ABS icon stuck on; ABS binary input reads low	ABS binary input shorted low	Wire to warning bank module pin 4 shorted to chassis
49	ABS icon seems to work opposite than it should; ABS binary input reads opposite than it should;	Master gauge is set to the wrong ABS system.	If an air system, verify through the datalinks menu, the presence of air gauges. If a hydraulic system, verify through the datalinks menu, the abscence of air gauges.
50	ETC message will not display; ETC message binary input reads high	ETC message binary input will not switch low	Wire to warning bank module pin 6 broken or shorted to ignition voltage

	Observation (Symptom)	**Problem**	**Things to check**
51	ETC message stuck on; ETC message binary input reads low	ETC message binary input shorted low	Wire to warning bank module pin 6 shorted to chassis
52	Retarder icon stuck off; Retarder binary input reads high	Retarder binary input will not switch low	Wire to warning bank module pin 7 broken or shorted to ignition voltage
53	Retarder icon stuck on; Retarder binary input reads low	Retarder binary input shorted low	Wire to warning bank module pin 7 shorted to chassis
54	Stop Engine icon stuck off; Stop Engine FMI not Active in Eng. Diag. Menu	No stop engine data on J1939	Engine controller not sending stop engine information
55	Stop Engine icon stuck on; Stop Engine FMI Active in Eng. Diag. Menu	Engine controller sending stop engine FMI on J1939	1) Engine controller Error 2) Broken sender wire between engine sender
56	Low Coolant Level icon stuck off;	No coolant level data on J1939	Engine controller not sending Low Coolant Level information
57	Low Coolant Level icon stuck on;	Engine controller sending Low Coolant Level data on J1939	1) Engine controller Error 2) Coolant level sender error
58	Check Trans icon stuck off; Check Trans FMI not Active on transmission diagnostic tool	No Check Trans FMI on J1939	Transmission controller not sending check trans information
59	Check Trans icon stuck on; Check Trans FMI Active on transmission diagnostic tool	Transmission controller sending check trans FMI on J1939	1) Transmission controller Error 2) Transmission sender error
60	Trans Temp icon stuck off; Trans Temp data not Active in read parameters menu	No Trans Temp Data on J1939	Transmission controller not sending trans temp information
61	Trans Temp icon stuck on; Trans Temp reading higher than set point in read parameters menu	Transmission controller sending erroneous data on J1939	1) Transmission controller Error 2) Transmission sender error