



PRODUCT BRIEF Version 1.0

SI - VEU 3.0

Vehicle Enterprise Unit

Sep 2005

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VEHICLE ENTERPRISE UNIT 3.0

Highlights

- Intel® PXA255 XScale Processor operating at 200MHz
- 32 MB SDRAM, 8MB StrataFlash®
- 32-bit ARM7 micro controller operating at 60MHz
- Real Time Clock with battery back-up
- Compact Flash Socket
- Up to two RS-232 ports
- 802.11b Wireless LAN connectivity
- Quad-band GSM/GPRS or CDMA 2000 cellular Modem
- ORBCOMM Satellite Network Connectivity
- 12-channel GPS Receiver
- On-Board Diagnostics (OBDII), SAE J1708 and J1939 CAN Bus interface
- Impact Detection using 3-axis accelerometer
- Emergency Button (activates covert microphone)
- Ignition Detect for automatic on/off
- Odometer reading including variable reluctance sensing
- Nine general-purpose digital I/O pins
- 12 or 24 VDC input with over-voltage protection
- Operating temperature: -40 to +85 °C

Overview

Processor

The Vehicle Enterprise Unit SI-VEU3.0 is powered by the low-power 32-bit Intel® PXA255 Processor with Intel® XScale Technology operating at 200MHz. The PXA255 is ARM architecture v.5TE compliant and has Intel® Superpipelined RISC Technology. The processor has a built-in 32KB data and 32KB instruction cache and a 2KB Mini data cache for streaming data. The unit also uses a dedicated 32-bit Philips LPC2119 micro controller operating at 60MHz for the entire vehicle interface. The LPC2119 is based on a 32-bit ARM7TDMI-S™ CPU. The processor has a built-in 128KB Flash and 16KB RAM.

Memory

Apart from the 64KB cache, the SI-VEU3.0 has 32MB SDRAM and 8MB Page/Burst-Mode Intel StrataFlash® for higher performance. In addition, a CF socket is provided for additional memory. The micro controller has 128KB built-in Flash and 16KB RAM.

Operating System

The SI-VEU3.0 is built on the latest Microsoft Windows CE.NET operating system. CE.NET version 5.0 provides enhanced real-time processing, greater interoperability and faster performance.

Accelerometer

The SI-VEU3.0 comes with a three-axis accelerometer capable of handling up to $\pm 6g$. The third axis eliminates any mounting limitations, which are common to 2-axis devices.

This feature can be used to detect a vehicle impact, useful for alerting a central office or for accident reconstruction.

Real Time Clock

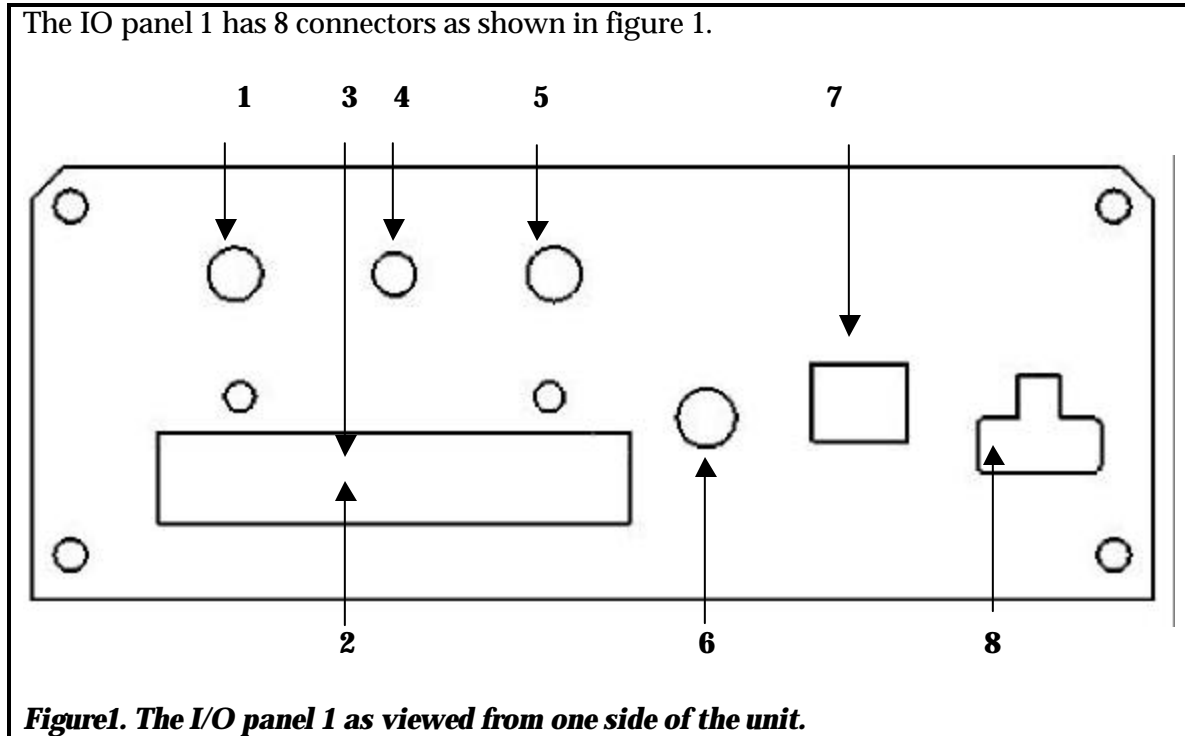
The SI-VEU3.0 features a battery powered Real Time Clock that comes standard.

GPRS/CDMA

The SI-VEU3.0 comes with a choice of either a GPRS or a CDMA cellular modem for data communication. Two-way voice communication is available only with additional equipment from Si Solutions.

The Quad-band GSM/GPRS Modem Module (Wavecom WISMO Quik Q2426) is capable of operating at E-GSM/GPRS 900/1800 or 850/1900 bi-band. The Module has a transmit power of 2W at EGSM 900/GSM 850 and 1W at 1800/1900MHz. The SIM card is user-accessible through an external connector with a locking mechanism.

The 1xRTT CDMA module (Wavecom WISMO Q2438) is capable of supporting the following four bands and modes: CDMA Band Class0 (Cellular 800MHz Band), CDMA Band Class1 (PCS 1900 MHz Band), AMPS (Cellular 800MHz Band) and the Qualcomm gpsOne (L1 1575.42MHz Band).

IO Panel 1

The connectors as numbered in figure 1 are listed below in detail:

1. Satellite Modem

The SI-VEU3.0 has an optional Satellite Modem (Delphi DS100) to connect to the ORBCOMM Satellite Network. The Modem has a transmit frequency of 148 to 150.05 MHz at 5Watts.

2. CF Card

A Compact Flash socket is provided on the SI-VEU3.0. Any standard CF storage card can be used on this slot for additional storage or updating CE.NET images. This slot is user-accessible externally.

3. SIM Card

This is the SIM card holder for the GPRS Modem.

4. Cell Phone Antenna

A 50-Ohm bulkhead SMC jack is available for connecting an antenna to the GPRS/CDMA module.

5. GPS System

A 12-channel GPS receiver (Trimble Lassen iQ) comes standard with the SI-VEU3.0. An SMA female connector is provided for antenna connection to the GPS.

6. 802.11b WLAN

The SI-VEU3.0 offers IEEE 802.11b connectivity. The unit also supports IEEE 802.11e and IEEE 802.11i with WMM Quality of Service enhancements and WPA Security enhancements. This is achieved through the Philips BGW200 chip. There is an SMA jack available for connecting to an external antenna. Alternatively, wireless LAN connectivity could also be achieved through wireless Compact Flash card.

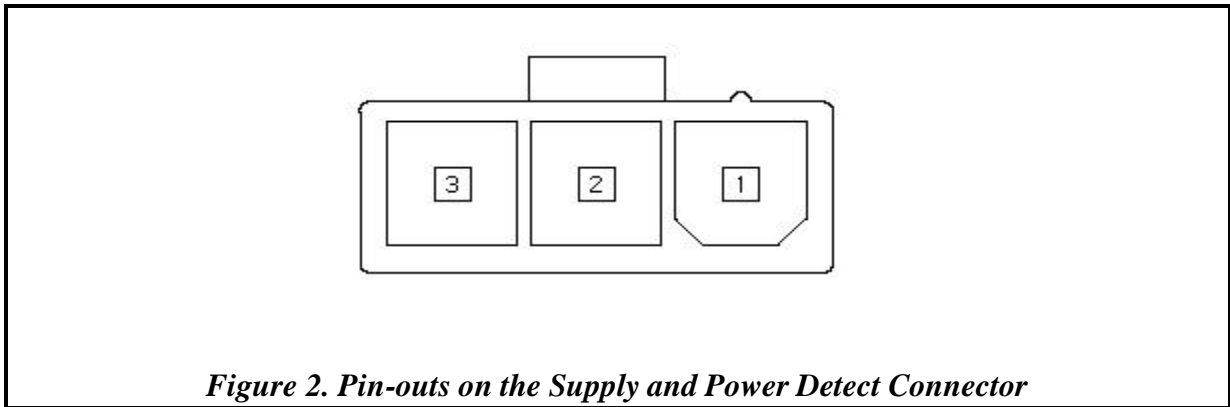
7. Power Switch

This is the main power switch for the unit. The Switch indicates “0” while OFF and “1” while ON.

8. Power and Ignition Detect

The SI-VEU3.0 operates at 12/24V DC. The power connector also has an Ignition detect line to automatically wake the SI-VEU3.0 from sleep mode. This feature is used to conserve battery when vehicle is off. The Ignition detect line has internal protection against over voltage. The pin-out of the connector, as viewed externally is shown in Figure 2 and described in Table 1.

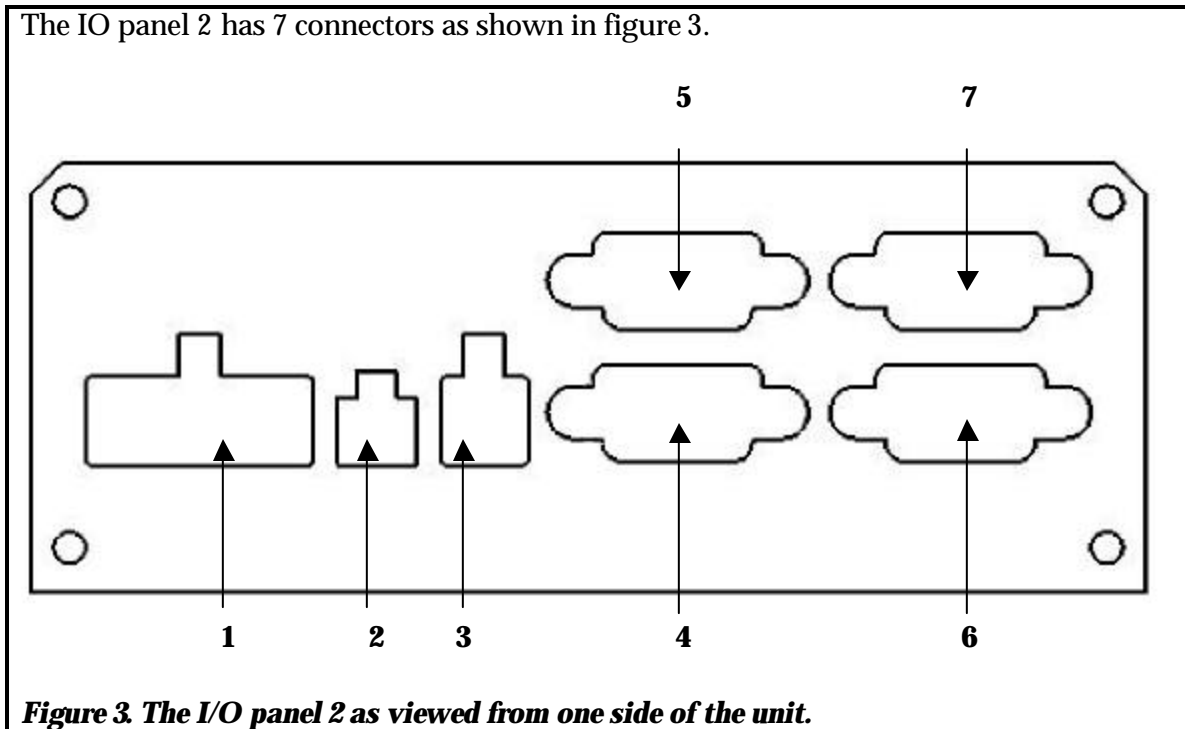
The mating connector is Molex Mini-Fit, Jr.TM P/N: 39 - 01 - 403x and crimp P/N: 44485 - 1211 with 18AWG wire.



Pin#	Description
1	Input Supply (12/24V DC)
2	Ground
3	Ignition Detect

Table 1. Pin Descriptions of the supply Power Connector

IO Panel 2



The connectors as numbered in figure 1 are listed below in detail:

1. Digital I/O, Emergency and Odometer

The SI-VEU3.0 features five general-purpose inputs. These input lines can detect digital pulses (e.g. button presses) and have internal protection against over-voltage. The SI-VEU3.0 also has four general-purpose outputs, which can source up to 0.2A each. These lines are accessible through a dual row 6x2 Molex Minifit Jr. Connector.

Apart from the general-purpose I/O, the SI-VEU3.0 has three other digital input lines: two for odometer reading, and one to detect if the emergency button is activated. When the emergency button is pressed, the unit automatically dials the dispatch office (via the cellular modem) and transmits cabin audio through a concealed microphone. There are two inputs to determine the vehicle speed. The Wheel Tick line requires positive input pulses to detect the speed and the Variable Reluctance line senses the change in the reluctance in the engine to determine the speed of the vehicle.

The pin-outs are as shown in the table below in Table2 and Table3.

12	11	10	9	8	7
6	5	4	3	2	1

Table 2. Pin-outs on the Digital I/O Connector

Pin #	Description
1	GND
2	Variable Reluctance (Odometer)
3	Digital Input 4
4	Digital Input 3
5	Digital Input 2
6	Digital Input 1
7	Emergency
8	Wheel Tick (Odometer)
9	Digital Output 4
10	Digital Output 3
11	Digital Output 2
12	Digital Output 1

Table 3. Pin Descriptions of the Digital I/O Connector

The mating connector is Molex Mini-Fit, Jr.™ P/N: 39 - 01 - 2120/2125 and crimp P/N: 44485 - 1211 with 18AWG wire.

2. Covert Microphone

A covert microphone is provided as an option with the SI-VEU3.0. This microphone is activated and the voice transmitted automatically through the GPRS/GPS Modem once the emergency button is activated. A four-pin connector is available for connecting this microphone.

The pin-outs are as shown in the table below in Table 4.

Microphone Input	3.3V DC
GND	GND

Table 4. Pin-outs on the Covert Microphone Connector as seen from the outside.

The mating connector is Molex Micro-Fit 3.0™ P/N: 43025 - 0400 with crimp P/N: 43030 - 000x using 20-24AWG wire.

3. SAE J1708 and J1939 Interface

The SI-VEU3.0 also includes SAE J1708 and J1939 CAN Bus interface for data communications between microcomputer systems in heavy-duty vehicle applications. These lines are accessed through the 2x2 dual row Molex Minifit Jr. connector. The pin description is given in Table 3. Please note that the J1939 CAN Bus is available both through this connector as well as through the standard OBDII Connector. The pin-outs are as shown in the table below in Table5 and Table6.

4	3
1	1

Table 5. Pin-outs on the J1708 and CAN Connector

Pin #	Description
1	J1708-
2	High Speed CAN L
3	J1708+
4	High Speed CAN H

Table 6. Pin Descriptions of the Connector for SAEJ1708 and J1939 Bus

The mating connector is Molex Mini-Fit, Jr.™ P/N: 39 - 01 - 2040/2045 and crimp P/N: 44485 - 1211 with 18AWG wire.

4. Display Unit Interface

This stacked DB15 connector is reserved for interfacing the SI-VEU3.0 to our display unit, the SI-DU1.0

5. OBDII Vehicle Interface

The SI-VEU3.0 has a 9-pin female D-Sub connector to interface to the On-Board Diagnostics Phase-2 (OBD II) port on the vehicle. The pin descriptions are given in Table 2. The OBDII vehicle interface on the SI-VEU3.0 includes all OBDII protocols:

- J1850 PWM, the 41.6 kHz protocol commonly used in Ford Motor Company vehicles.
- J1850 VPW, the 10.4 kHz protocol commonly used in General Motors and some Daimler-Chrysler vehicles
- ISO 9141 and ISO 14230 (KWP2000), which are protocols that are commonly used in imported vehicles such as Volkswagen.
- J1939 CAN Bus interface

Pin# on DB9	Pin# on J1962 OBD	Description
1	5	Signal GND
2	4	Chassis GND
3	6	High Speed CAN H
4	7	ISO 9141-2K
5	9	High Speed CAN L
6	10	J1850 -
7	2	J1850 +
8	15	ISO 9141-2 L
9	16	Battery Positive

Table 7. Pin Descriptions of the female DB9 and J1962 OBD pins for OBDII interface

6. COM A

This is the first of the two COM ports we have available on the SI-VEU3.0. Full flow control is achieved on this port through a male DB9 connector. This acts as the DTE side of the RS-232 communication channel. Windows CE designates this port as COM 4.

7. COM B

This is the second COM port on the SI-VEU3.0. Full flow control is achieved on this part through a DB9 connector. This acts as the DTE side of the RS-232 communication channel. This port is not available if the unit is equipped with the ORBCOMM Satellite Modem. Windows CE designates this port as COM 5.