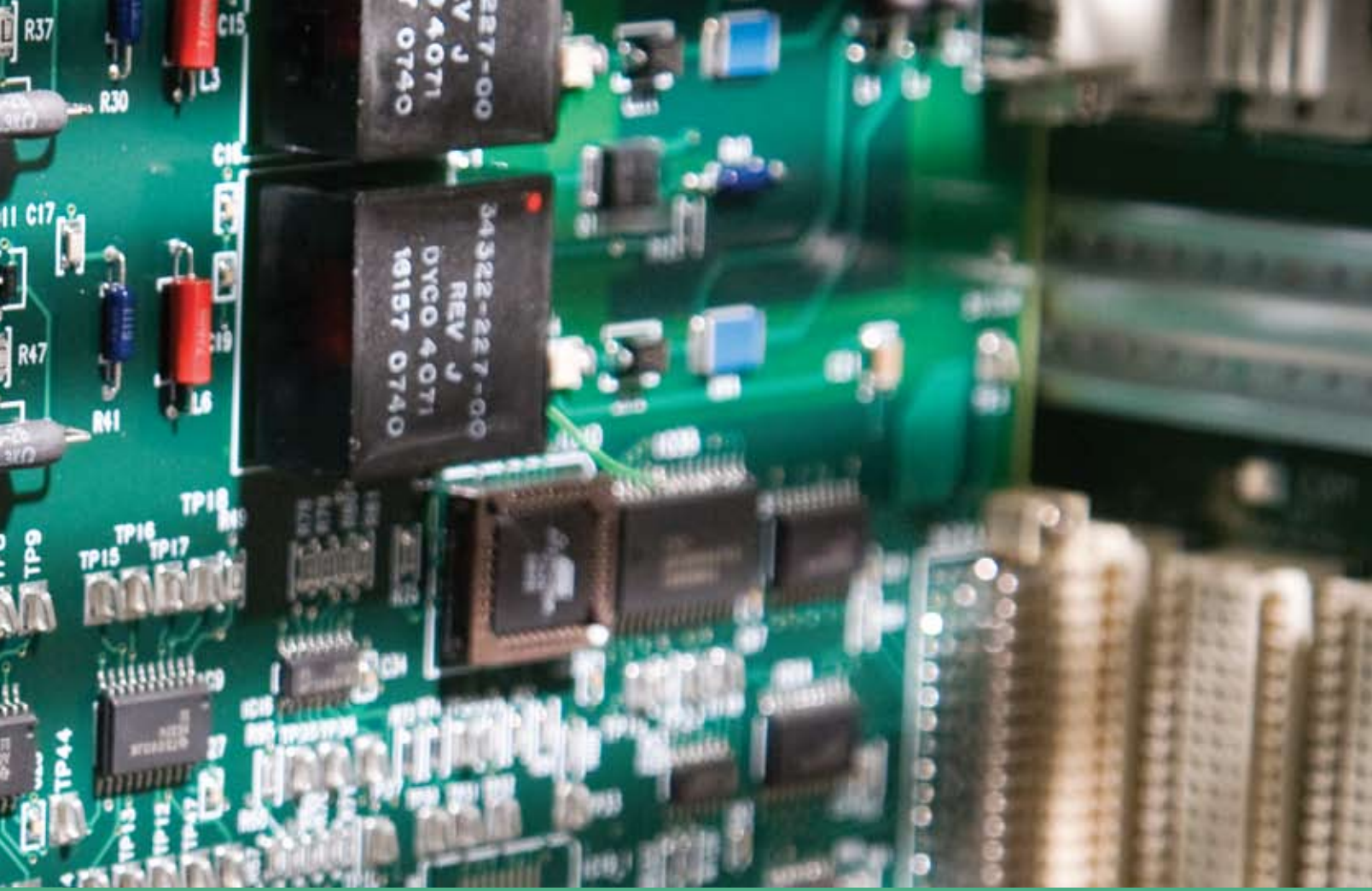




iVPI Module

Interlocking



In This Section:

iVPI

VPI® II Overview

Specifications

Hardware

Application Tools

iVPI Integrated Vital Processor Interlocking

NEW!

The NEW Standard in Railroad /Commuter Interlocking and Block Control



The New Standard in Interlocking Solutions

Alstom is extremely excited to introduce its **iVPI**, the New Standard for Interlocking and Block Signaling. The “i” represents the high degree of technological integration this solution offers. **iVPI** contains all required local emergency control and communication interfaces for CTC as well as train detection for approach track circuits, including Automatic Train Control cab signaling.

Leveraging Proven Product and Safety Design

iVPI provides a highly Integrated platform based on proven VPI® and Genrakode™ technology for use with any size interlocking, from a single, remotely controlled switch machine at an end of siding to a large interlocking plant. The interlocking and track circuit functionality are now resident in the same module, scaling down the overall size.

iVPI Integrated Vital Processor Interlocking

FEATURES

- Track Circuit Function and Interlocking Control “**integrated**” into one compact module, based on standard card file technology. Eliminates wire wraps.
- **Fewer PCB’s**, 4 to 1 board reduction ratio from former CPIB product. Surface mount technology. Reduces maintenance and spares cost and inventory.
- Improved “**integration**” with transparent interface to all radio offerings to provide vital and/or non vital communication to fit the needs of the application. Ethernet enabled.
- **Primary diagnostics** are “**integrated**” in iVPI to facilitate maintenance with “GO/no GO” and “I/O” status indicators for each board. Uses MMS (Maintenance Management System) for local and remote testing and troubleshooting including transition to field automation.
- **Safety** - iVPI “**integrates**” the proven safety design of VPI and Genrakode. A MTBHE (Meantime Between Hazardous Events) of **10,000,000,000 hours**.



iVPI and optional LCP (Local Control Panel)



iVPI 21 slot module

Specifications

Product Characteristics	Alstom iVPI
Number of Track Circuits	Up to 20 track circuits per system (Note)
Maximum Track Circuit Length	24,000 feet @ 3 ohms per 1,000 feet ballast
Lamp Control	8 outputs per board; maximum 40 boards per system
Cab Signal Generator Controls	8 outputs per board; maximum 10 boards per system (Available 2009)
Vital Inputs / Outputs	8 outputs per board; maximum 40 boards per system 16 inputs per board; maximum 20 boards per system
Operating Voltage	9 to 16 VDC
Networking Capability	Ethernet Interface for connectivity of greater than 40 nodes
Scalability	Control of a single switch point to a complex interlocking
Recorder Logging Capability	Up to 11,000 events
Graceful Degradation	Between interlocking control and track circuits through system partitioning

Note: Includes Expansion Module.

iVPI Integrated Vital Processor Interlocking



The **ONE SOLUTION** for All
Your Interlocking Needs



iVPI 21 Slot Module

Eliminates the need for a full rack arrangement,
iVPI is scalable and is available in:

21 Slot Modules

Allows for extensive I/O capabilities or multiple segregated systems per module. Multiple modules can be combined for controlling a large mainline interlocking.

11 Slot Modules

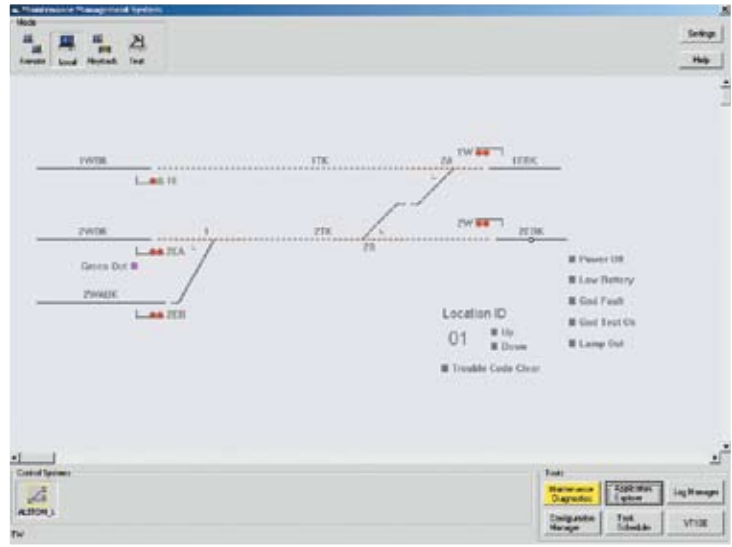
Scalable to wayside applications to control remote signals, switches, etc. Housed in compact wayside case and lightning protected.

The ONE CONSTANT maintained is the same approved safety design principles that have resulted in zero safety incidents for over 20 years and 1,500 systems worldwide!

Maintenance Management System (MMS) for iVPI

FEATURES

- **On-Screen Control and Indication Panel is User Configurable for Small to Large Applications**
- **Graphical Diagnostics with iVPI Module View decrease system downtime and ease maintenance**
- **Remote or Local Diagnostic**
- **Recording and Playback of all Time-Stamped Status, Diagnostic and Event data - data logging views, real time troubleshooting help with corrective action step**
- **Verifies the installed hardware and software components**
- **Built-In Configuration Management for iVPI System Validation**
- **Watch application parameters and logic while systems are running**



iVPI MMS Graphical Interface



The **Maintenance Management System (MMS)** provides a single graphical framework for total system exploration of **iVPI** including full local control panel capabilities, diagnostics monitoring with online help, vital and nonvital application logic troubleshooting and testing and interlocking maintenance scheduling. MMS is a personal or laptop computer based user-friendly interactive program, which may be installed within an interlocking rack of equipment or kept portable.

This supports field installation, test maintenance, preventative maintenance and condition monitoring of field devices. MMS can be configured as a single access point to multiple iVPI systems.

MMS consists of the MMS editor and runtime programs. An MMS project is created using the MMS editor that imports application files from CAAPE. (See page 198 for details on CAAPE package.)

Maintenance Management Tool (MMS) for iVPI

System Requirements	List Price
PC Running Windows NT 4.0, SP6 or later, 2000	\$5,000.00
5 GB Available Hard Drive Space	
128 MB of RAM Minimum	

Ordering Information

For assistance in ordering the Maintenance Management System (MMS) for iVPI or for assistance in selecting and configuring a new system or addition, please contact the Alstom Customer Service Center at 800-717-4477.

VPI® II Vital and Non-Vital Interlocking Control

Classic Alstom VPI with Ethernet Connectivity



VPI Integrated Code/Communication System

Alstom **VPI® Interlocking Control Systems** have set the worldwide standard for microprocessor-based interlocking control. The newly expanded family of Alstom microprocessor products and components makes these integrated, modular systems the best value ever, so you can lower the total life cycle cost of your system.

From the smallest end-of-siding to giant installations like Grand Central Terminal in New York City, the VPI system and Alstom microprocessor-based components help meet your needs for vital and non-vital wayside control and communication. The microprocessor-based VPI Interlocking Control System performs vital logic with the highest level of safety that is fully equal to relay based systems. And the VPI Interlocking Control System is thoroughly field proven. Since the first installation in 1986 there have been no unsafe failures, an unblemished record of VPI Controlled Vital System Operation in excess of 72,000,000 hours.

The VPI system has been formally verified or audited for safety by the London Underground Limited, Dutch National Railway, CP Rail, Metro-North Commuter Railroad, Queensland Railroad (Australia), and Bay Area Rapid Transit (BART).

Today you can use Alstom microprocessor-based interlocking products to handle both vital and non-vital functions cost-effectively. These products include the widest range of enhancements and easiest troubleshooting available.

You can easily interface VPI systems to other vital and non-vital wayside equipment, local control panels, and central office provided by Alstom or other suppliers.

VPI system software includes extensive self diagnostic capability. Diagnostic and system monitor routines in the software can be used to diagnose and isolate failures and to provide status information about the its internal processing.

These built-in capabilities, most maintenance, troubleshooting and system testing tasks require only a simple terminal interface such as a laptop or hand-held terminal to isolate the failure to a specific circuit board or input/output port. This makes testing simple and straightforward.

In addition, the VPI system provides maintenance LEDs on each PC board. The LEDs provide the maintainer with indications of input and output status, and of proper communication among all system boards. With the optional MMS (Maintenance Management System), you can continuously monitor and download logged event data from a VPI system from any convenient site through network phone lines, direct wiring, and/or data radio.

VPI® II Vital and Non-Vital Interlocking Control

VPI II

The latest generation of interlocking control is focused on improved performance and maintainability. The introduction of the VPI II addresses the full cycle of interlocking control with improvements in design, verification, test functions and maintenance. This achieves a significant increase in system performance. Some of the key features of the VPI II are:

System Architecture

With increased processing capacity and network connectivity, VPI II provides industry leading flexibility in interlocking application and partitioning. Options allow for distributed or centralized traffic control through networked main processing and I/O and point of issue diagnosis for system faults. More system wide control can be performed in a single system to meet the demands of the application. This reduces the overall number of systems required, and improves overall performance as there are fewer systems exchanging time critical interlocking control and status parameters.

System Condition Monitoring

The newest Maintenance Management System allows easy access to the system's operational status, troubleshooting of failed components, and configuration management of hardware and software. All "smart" system components that pass information over the integrated network are readily available to maintenance, engineering and/or dispatch centers for tracking system operation.

Product Roadmap

All future evolutions of the VPI II product line will involve a major emphasis on reducing post-commissioning operational costs and increasing system performance as demands for lower headways and increased ridership occur. The new CPU II main processor provides the processing horsepower to accomplish this goal.



VPI CPU Boards

Local or Centralized Maintenance Management System

Significantly improves mean time to restore through advanced diagnostics, streamlined field tests, and utilities for extensive site data management such as event logs and configuration information.

Upgraded Central Processor

Extended capacity for larger interlockings which results in decreased train routing latencies.

Network Capability

The VPI II has a flexible system for partitioning through efficient communication of signaling control, fault diagnosis and vital and non-vital health monitoring information.

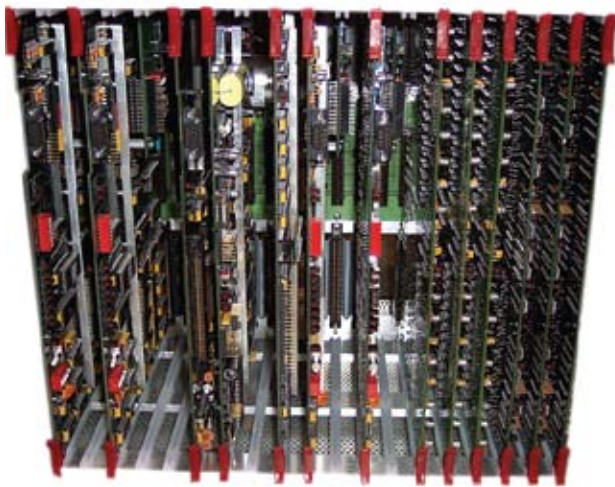
LED Signal Drive

Upgraded adjustment and monitoring features improve setup and maintenance of LED Signal Aspects.

VPI® II Vital and Non-Vital Interlocking Control



VPI Chassis and boards



FEATURES

- **Proven**
No unsafe failures since the first installation in 1986
Total hours of VPI Controlled Vital System Operation in excess of 72,000,000 hours
- **Expandable**
From end-of-siding, to interlockings with up to 35 switch machines
- **Flexible**
Modular architecture
Forward and backward compatibility
- **Cost-Effective**
VPI will lower your system's life cycle costs
- **Easy to Maintain**
Self diagnostics make the system virtually maintenance-free
- **Integrated**
High degree of subsystem integration

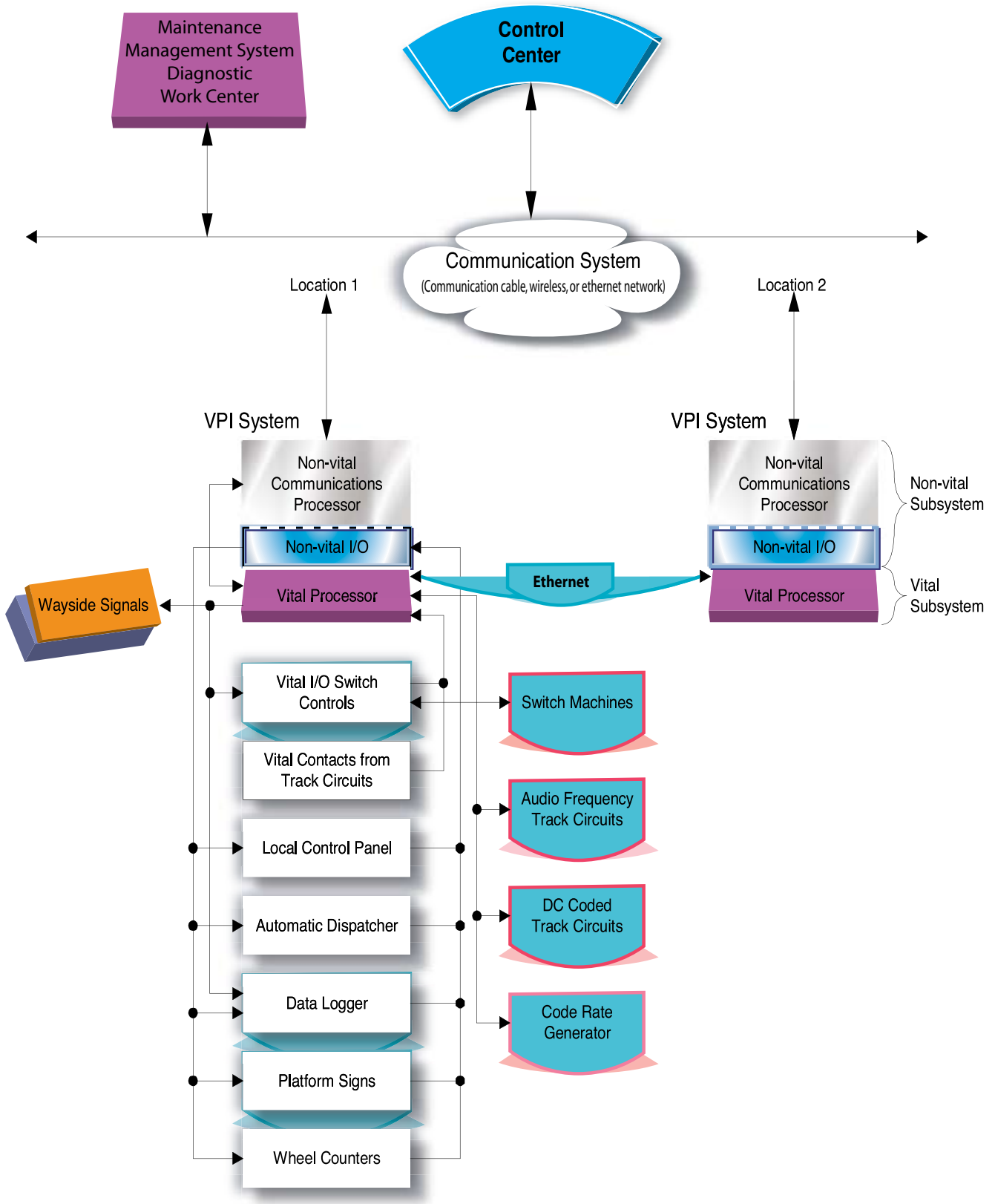
Specifications - VPI® Module (Chassis and Boards)

Data	Value
Logic Input Power	5 VDC (+ 0.25) at 8 Amperes max. per module
High Voltage Isolation Rating	Meets AREMA requirements
Operating Temperature	-40 to +160 F (-40 to +70 C)
Humidity	0 to 95% Non-Condensing
Typical Weight per module (with some boards)	15 lbs. (6.80 kg)
Dimensions	14" H x 19" W x 23" D (35.6 cm H x 48.3 cm W x 58.5 cm D) (Depth includes cable dress at rear chassis)

Ordering Information

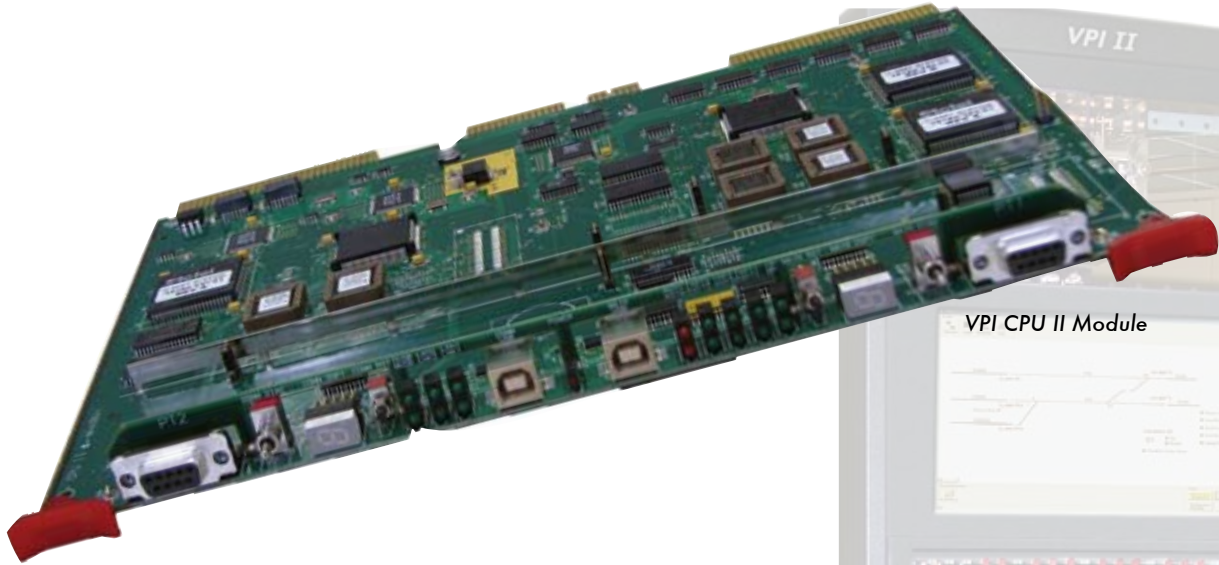
For assistance in ordering chassis and boards for your system or for assistance in selecting and configuring a new system or addition please contact the Alstom Customer Service Center at 1-800-717-4477.

Alstom Interlocking System Block Diagram



Interlocking

VPI® II Network Connectivity



VPI CPU II Module

The Next Step for Interlocking Control

Introduction

VPI II represents the next generation of controlling interlockings which focus on improving performance and system maintainability. VPI II network connectivity recognizes the current and future applications require flexible system partitioning and efficient communication of signal control, fault diagnosis and health monitoring (both vital and non-vital) information.

VPI II's on-board network capability can now utilize customer installed network systems and reduce dependencies on dedicated line and fiber circuits, reducing both the initial cabling expense as well as future related maintenance requirements.

To meet the needs of Signal Engineers in providing application solutions for Interlocking and Train Control, Alstom has released the next generation of VPI II with the following improvements:

The following is a brief, high-level summary of the CPU II and CSEX3 modules that are the integral pieces of the VPI II system.

CPU II Module

The CPU II is the vital system board for VPI II that incorporates vital logic processing, vital I/O control and monitoring, on-board programming, extended capacity for large interlocking controls and communications between same systems within the train control room and room to room. CPU II contains two microprocessors that separately perform the vital processing and the high-speed communications functions.

The communication layer contains a network stack while the applications layer allows the Signal Engineer to develop the application logic for the interlocking or train control system. Combined with tools contained in the CAAPE package, the Signal engineer can read / download / upload the system software and application data structures to Flash PROMs. The separate processors minimize any impact to the vital system while communicating with other system boards with a similar network interface capability.

VPI® II Network Connectivity



VPI CSEX4 Board

CSEX4 Board

The **CSEX4** board has two Ethernet communication channels and four serial ports (three ports which are programmable, one port is always the MAC – Maintenance ACcess) available with each serial port being capable of operating up to 57.6KBPS. This board is designed such that it can also be interfaced directly to standard communication equipment such as Fiber Optic Modems, Multiplexers, and Network Adapters. The CSEX4 board can be application programmed with non-vital logic to perform man-machine interfaces, to perform, entrance-exit logic and a multitude of other non-vital functions. The board can be used to interface with communications bases Local Control Panel and/or computers; or using the nonvital I/O boards it can directly interface to discrete wired Local Control Panels.

The CSEX4 board also contains a battery backed-up memory section and clock/calendar to support the onboard DATALOGGER™ software used for logging both vital and non-vital variables. Three of the communication ports in addition to the two Ethernet ports can be utilized for external non-vital communications. Each port may be configured with the same or with a different communication protocol. The choice of protocols is assigned and configured in the Computer Aided Application tools by the signal engineer. A library of almost forty communication protocols common to the railroad and transit industry is included in the Computer Aided Application package. Typical protocols included are industry standards such as GENISYS, Data Train. MODBUS and MCS among others.

Supported Protocols

Manual	Company Name/Protocol Description
P2346A	Algemene Sein Industrie B.V., ASI by Netherlands Spoorwegen (NS) / Lokale Controle Eenheid (LCE)
P2346B	Westinghouse Brake & Signal / S2
P2346C	ALSTOM / GRS K-K2
P2346D	ALSTOM / GRS DataTrain IV
P2346E	ALSTOM / GRS DataTrain VIII
P2346F	Union Switch & Signal / Genisys
P2346G	Union Switch & Signal / 504, 506, 514
P2346H	Safetran / SCS128
P2346LDTS	LG Industrial Systems / LDTS
P2346M	Modicon / Modbus RTU
P2346N	ALSTOM / GRS DataTrain II
P2346P	Rockwell International / Advanced Railroad Electronic System
P2346Q	Canadian National RR / CN2000
P2346R	GE/Harmon / MCS1
P2346S	ALSTOM / GRS J-Code
P2346T	Bailey / S9600
P2346U	Advanced Train Control System Wayside Interface Unit, Specification 3 & 4
P2346X	Hanning & Kahl / HCS-R radio control route equipment
P2346Y	ALSTOM Signal Netherlands for PRORAIL / OPCE
None	ASCII

Note: CSEX3, all protocols included with CAAPE

VPI® II Lamp Driver Output Module (LDO2)



VPI LDO2 Module

LDO2 (LAMP DRIVER OUTPUT) MODULE

The new Lamp Driver Output Board is a vital output board used to provide power to signals for both transit and railroad applications. Using the same proven vital techniques found on other VPI vital output boards, the new LDO2 includes the following features:

- **Current Monitoring** - reads the current through the output every 200 milliseconds. This current can be compared to one of eight different threshold levels from 0.0 to 3.25 Amps, which will turn the output off if it is not drawing the minimum required current. The filament checking routines enables down grading and prevents against overcurrent and short protection.
- **Cable Integrity Check** - uses isolated voltage sensing at the output to determine if a potential exists across the output when the output is off. A separate switch for each output can be used to select the system reaction to this event by logging the error or dropping a vital relay.
- **Diagnostic Interface to VPI CPU II Board** - registers all current readings and error conditions and can be read or cleared via the CPU II board.
- **Board Edge User Interface** - registers all current readings and error conditions and can be read or cleared alternatively via the Board Edge User Interface.

Call Our
Customer Service
Center

1-800-717-4477

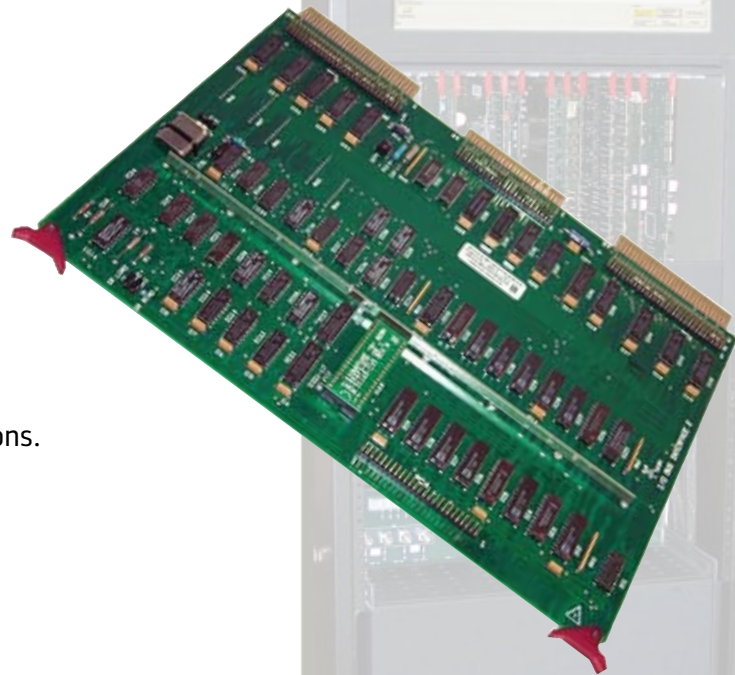
FEATURES

Circuit Modules

- **CPU II/Polynomial Divder**
All vital application logic is stored on this board and executed from it.

Performs calculations necessary for evaluating expressions and verifying the system program, guaranteeing proper system operation.
- **Vital Serial Controller**
Communicates vital information between VPI systems via serial transmission link, no line wires needed.

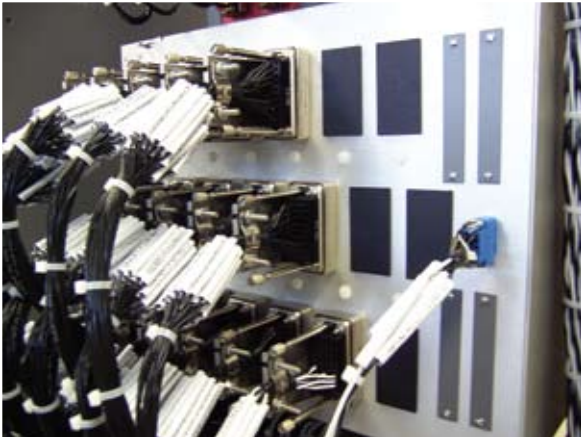
Incorporates full duplex communication up to 19,200 bps, with Manchester encoding and extended CRC check to ensure data integrity.
- **Vital Relay Driver**
Receives system information, vitally processes it and, if correct, provides output to vital disconnect relay.
- **Input/Output Interface**
Provides proper interface to vital inputs and outputs.
- **VPI Supervisory Communications and Control Subsystem**
Extended code system emulator performs non-vital applications functions.



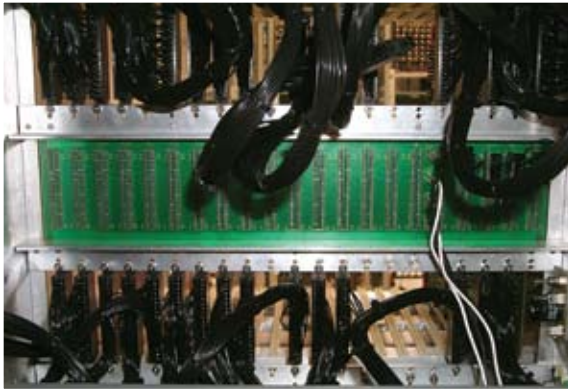
Alstom can customize the VPI to many specific requirements. Different hardware configurations can be designed with one processor controlling up to 35 switch machines, related track circuits and signals. This is accomplished through the availability of up to 320 vital inputs and 320 vital outputs, 640 non-vital I/O ports and vital and non-vital communication interfaces. The VPI module has 21 slots for circuit boards and it mounts in a standard 19-inch rack. A single VPI system may be comprised of more than one module, depending on the amount of vital I/O and system logic that is required. The

module is designed to be flexible and expandable. Printed circuit boards may be located in a variety of slots, depending on your requirements. Additional expansion modules are interconnected by ribbon cables. Input/output cables are connected directly to edge connectors on the boards to minimize cable connections. Optional configurations are available using standard AMP Type M connectors mounted on the rear panel (28-way connectors for vital functions, 50-way or 75-way for non-vital functions), direct wire interfaces or backplane cards with WAGO style connectors.

Interlocking



Plug Coupled Chassis



Direct Wire Chassis



CPIB Chassis

Chassis Configurations

- **Plug Coupled Chassis**

The VPI II plug coupled chassis includes internal cable harness assemblies. These assemblies connect the VPI II PCB I/O point(s) to a series of AMP type M-series plug couplers, mounted on the rear panel of the chassis. The rear panel also contains a 14-pin type M-series plug coupler for the 5 VDC power connection and provisions for up to four 60-way ribbon cable connectors for connecting to expansion chassis.

- **Direct Wire Chassis**

The direct wire chassis is configured to allow the I/O wiring to be economical by directly inserting wire into the PCB edge connectors in the chassis. This chassis configuration does not allow for quick removal of the chassis from a wired rack. However, all the PCBs can be removed and no active electronic components are left in the chassis. This version is intended for applications where the rack housing this chassis provides a plugcoupled connection to the other interlocking equipment.

- **Control Point in a Box (CPIB) Chassis**

The CPIB interface chassis uses Back Plane Interface Cards (BPIC) with WAGO style (spring cage clamp) wire termination blocks and printed circuit board edge connectors to map the I/O termination points on the VPI II PCBs to discrete wire connectors. The chassis is designed to allow these interface PCBs to be inserted and removed from the rear of the chassis. This provides a wire termination method that can be quickly disconnected (by removing the printed circuit boards) and individual I/O points may be disconnected for troubleshooting. This chassis style is intended for low density applications.

Ordering Information - Vital Central Processor Unit

Features

- Performs calculations necessary for evaluating expressions and verifying the system program, guaranteeing proper system operation.
- All vital application logic stored on this board and executed from it.

Ordering Number	Description	Price
31166-374-01	CPU II Board, system sftw included w/CAAPE	Call for Pricing
31166-374-02	CPU II Board w/Communication Processor, system sftw included w/CAAPE	
01169-691-ON	System EEPROMs (PLCC 29F010 FLASH, 2/brd) included w/brd	
01169-767-ON	ADS EEPROMs, (PLCC 29F040 FLASH, 2/brd) included w/brd	
31166-029-32	CPU/PD Board, w/40025-366-00 system sftw	
01169-648-ON	System/ADS EEPROMs (DIP 29F010 FLASH, 4/brd) order ADS PROMs separately	\$ 35.00

Ordering Information - Vital Relay Driver

Features

- Receives system information, vitally processes it and, if correct, provides output to vital disconnect relay.

Ordering Number	Description	Price
59473-740-02	VRD Board (9-15 VDC operation)	Call for Pricing
56001-787-05	B1 Relay Neutral, 100 ohms, 4FB, 2F, 1B	

Ordering Information - Input/Output Interface

Features

- Provides proper interface to vital input and output boards and drives system bus in extension chassis.

Ordering Number	Description	Price
59473-827-01	IOB, I/O Bus Interface Board	Call for Pricing
59473-871-01 to 59473-871-04	Signature Header (A – D) respective (Grps 01 – 04) one for each board in system, determined by CAAPE	

Ordering Information - Vital Serial Controller

Features

- Is available for point to point VPI vital communication, VPI multi-drop ATP communications, or VPI multi-drop Genrakode communications.
- Supports an RS232 interface serial transmission link, eliminating the need for line wires. Incorporates full duplex or half duplex communication up to 19,200 bps, with Manchester encoding and extended CRC check to ensure data integrity.

Ordering Number	Description	Price
59473-939-10	VSC Board, 4-Wire pt to pt w/40025-322 sftw	Call for Pricing
59473-939-11	VSC Board, RS232 interface pt to pt w/daughter brd and 40025-322 sftw	
59473-939-12	VSC Board, 4-Wire multi-drop w/ 40025-323 sftw used for ATP	
59473-939-13	VSC Board, 2-Wire multi-drop w/40025-324 sftw used for Genrakode, 15 Parameters /Track	
59473-939-14	VSC Board, 2-Wire multi-drop w/40025-348 sftw used for Genrakode w/T-Code, 25 Parameters/Track	
01169-646-ON	EPROM (DIP 27C128, 1/brd) order separately	

For assistance in ordering chassis and boards for your system or for assistance in selecting and configuring a new system or addition please contact the Alstom Customer Service Center at 800-717-4477.

Ordering Information - Vital Direct Input

Ordering Number	Description	Price
59473-867-01	DI Board, 16 discrete inputs with filtering (9-15 VDC)	Call for Pricing
59473-867-02	DI Board, 16 discrete inputs w/o filtering (9-15 VDC)	
59473-867-03	DI Board, 16 discrete inputs with hold circuit (9-15 VDC)	
59473-867-04	DI Board, 16 discrete inputs with filtering (45-55 VDC)	
59473-867-05	DI Board, 16 discrete inputs with filtering (9-22 VDC)	
59473-867-07	DI Board, 16 discrete inputs with filtering (24-34 VDC)	
59473-871-01 to 59473-871-16	Signature Header (A - P) respective (Grps 01 - 16) one for each board in system, determined by CAAPE	

Ordering Information - Vital Output

Ordering Number	Description	Price	
Lamp Driver Output			
59473-749-02	LDO Board, 8 outputs (9-18 VDC, 2.9 Amp operation, 100mA Threshold)	Call for Pricing	
59473-749-03	LDO Board, 8 outputs (15-30 VDC, 2.9 Amp operation, 100mA Threshold)		
59473-749-04	LDO Board, 8 outputs w/o Cold Check (9-18 VDC, 2.9 Amp operation, 100mA Threshold)		
31166-340-01	LDO2 Board, 8 outputs (9-18 VDC, 3.3 Amp operation, 100mA Threshold)		
31166-340-02	LDO2 Board, 8 outputs w/o current monitor, (9-18 VDC, 3.3 Amp operation, 100mA Threshold)		
Single Break Output			
59473-739-01	SBO Board, 8 outputs, Supply 9-30 VDC, Output = [Supply - typical 1 VDC], 0.5 Amp, 3mA Threshold		
Double Break Output			
59473-747-01	DBO Board, 8 outputs, Supply 9-15 VDC, Output = [Supply - (5*outAmp)], 0.6 Amp operation, 3mA Threshold, same keying as Group 02 board		
59473-747-02	DBO Board, 8 outputs, Supply 9-15 VDC, 2 x Output = [2*Supply - (5*outAmp)], 0.3 Amp operation, 3mA Threshold		
59473-747-03	DBO Board, 8 outputs, Supply 9-15 VDC, Output = [Supply - (5*outAmp)], 0.6 Amp operation, 3mA Threshold, different keying as Group 02 board		
59473-977-01	DBO Board, 8 outputs, Supply 30-40 VDC, Out 50 VDC, 140 mA operation, 3mA Threshold		
59473-977-02	DBO Board, 8 outputs, Supply 45-55 VDC, Out 50 VDC, 140 mA operation, 3mA Threshold		
AC Output			
59473-937-02	ACO Board, 8 outputs (90-130 VAC, 40-150Hz, 0.8 Amp operation, 100mA Threshold) w/enhanced EMI protection		
59473-937-03	ACO Board, 8 outputs (90-130 VAC, 40-150Hz, 0.5 Amp operation, 5mA Threshold)		
Board Signature Device			
39780-003-01 to 39780-003-40	Signature PROM, one for each output board in a system, determined by CAAPE		
31166-304-01	Selectable Signature PROM, Could be used in place of PROMs 39780-003-01 to 39780-003-40		

Ordering Information - Vital Code Rate Generator

Ordering Number	Description	Price
31166-261-03	CRG Board for solid state code followers; produces codes of 0, 50, 75, 120, 180 pulses per minute and Steady On	Call for Pricing
31166-261-04	CRG Board for vital relay code followers; produces codes of 0, 50, 75, 120, 180, 270, 420 pulses per minute and Steady On	

For assistance in ordering chassis and boards for your system or for assistance in selecting and configuring a new system or addition please contact the Alstom Customer Service Center at 800-717-4477.

Ordering Information - Vital Timer

Feature

- Provides up to 8 field-settable vital time delays per board, up to 16 timers per system.

Ordering Number	Description	Price
59473-894-01	FSVT Board, 8 timers (0 – 59:59 sec) for timers one through eight	Call for Pricing
59473-894-02	FSVT Board, 8 timers (0 – 59:59 sec) for timers nine through sixteen	

Ordering Information - Non-Vital Code System Emulator Extended

Feature

- Extended code system emulator; emulates electronic or relay-based code system and also performs non-vital application functions and data logging. Typical functions include local control panel interface and N/X logic.

Ordering Number	Description	Price
31166-175-02	CSEX3 Board, 5 communication interfaces, includes blank EE PROMs	Call for Pricing
31166-175-03	CSEX3 Board, 4 communication interfaces, + 1 DC code, includes blank EE PROMs	
01169-767-ON	System/Application EEPROMs (PLCC 29F040 FLASH, 2/brd)	

Ordering Information - Non-Vital Input

Ordering Number	Description	Price
59473-757-02	NVI Board, 32 high-true inputs (18-33 VDC)	Call for Pricing
59473-757-03	NVI Board, 32 high-true inputs (9-18 VDC)	
31166-276-01	NVID Board, 32 differential inputs, (9-18 VDC) w/switches to force each input on/off	
31166-276-02	NVID Board, 32 differential inputs, (9-18 VDC) no switches	
31166-276-03	NVID Board, 32 differential inputs, (18-33 VDC) w/switches to force each input on/off	
31166-276-04	NVID Board, 32 differential inputs (18-33 VDC) no switches	

Ordering Information - Non-Vital Output

Ordering Number	Description	Price	
DC Output, source or (+) output			
59473-785-03	NVO Board, (18-33 VDC, 250 mA operation) w/Power On Reset	Call for Pricing	
59473-785-04	NVO Board, (9-18 VDC, 250 mA operation) w/Power On Reset		
59473-785-05	NVO Board, (4.5-14.5 VDC, 250 mA operation) w/Power On Reset		
DC Output, sink or (-) output			
31166-123-01	NVO-SNK Board, (4.5-5.5 VDC, 250 mA operation) w/Power On Reset		
Relay Output			
31166-238-01	NVR Board, (0-35 V AC or DC , 1 Amp operation) w/Power On Reset, coil supply from 9-18 VDC	Call for Pricing	
31166-238-02	NVR Board, (0-35 V AC or DC, 1 Amp operation) w/Power On Reset, coil supply from 18-35 VDC		
AC Output			
59473-936-02	NVOAC Board, (5-250 VDC, 250 mA operation) w/Power On Reset		

For assistance in ordering chassis and boards for your system or for assistance in selecting and configuring a new system or addition please contact the Alstom Customer Service Center at 800-717-4477.

VPI® II Hardware

Ordering Information - Non-Vital Train to Wayside Communication

Ordering Number	Description	Price
VPI Chassis Plug-In Boards		
31166-099-02	NVTWC-MOD Board, 2-channel TWC for BART	Call for Pricing
31166-100-02	NVTWC-MUX Board, Processor Multiplexer for BART	
31166-119-02	NVTWC-FSK Board, 4 channel TWC for MARTA	
31166-119-03	NVTWC-FSK Board, 4 channel TWC for Shanghai, Taipei, Taegu	
31166-119-04	NVTWC-FSK Board, 4 channel TWC for WMATA	
31166-119-05	NVTWC-FSK Board, 4 channel TWC for Seoul Metro Line 6	
Interface Plates and Wayside Cases		
42560-303-01	B2 Plate, TWC track connection interface for BART	Call for Pricing
43920-076-01	NVTWC coupling case for BART	
42560-302-01	B1 Plate, TWC track connection interface for MARTA	
42560-307-01	B2 Plate, TWC track connection/ATP interface for Shanghai, Taipei, Taegu	
42560-307-03	B2 Plate, TWC track connection/ATP interface for WMATA	
42560-316-01	B2 Plate, TWC track connection/ATP interface for Seoul Metro Line 6	
42560-317-01	NVTWC coupling case filter for Seoul Metro Line 6	

Ordering Information - VPI Chassis

Ordering Number	Description	Price
Plug Coupler Chassis		
31506-015-01	21-slot w/divided motherboard slots 5/6 and plug coupler panel (specify bus and I/O cable harness separately)	Call for Pricing
31506-015-11	21-slot w/plug coupler panel (specify bus and I/O cable harness separately)	
31506-015-15	21-slot-deep, w/divided motherboard slots 5/6 and plug coupler panel (specify bus and I/O cable harness separately)	
31506-015-16	21-slot-deep w/plug coupler panel (specify bus and I/O cable harness separately)	
Direct Wired Chassis		
31506-015-02	21-slot w/divided motherboard slots 5/6, only bus extension panel (specify bus cables separately)	Call for Pricing
31506-015-12	21-slot, only bus extension panel (specify bus cables separately)	
31506-015-03	21-slot w/divided motherboard slots 5/6, no cable panels	
31506-015-13	21-slot, no cable panels	
Control Point In a Box Chassis		
31506-018-01	21-slot w/divided motherboard slots 5/6 for Back Plate Interface Cards	Call for Pricing
31506-018-02	21-slot for Back Plate Interface Cards	

For assistance in ordering chassis and boards for your system or for assistance in selecting and configuring a new system or addition please contact the Alstom Customer Service Center at 1-800-717-4477.

Ordering Information - VPI Back Plane Interface Card For CPIB Chassis

Ordering Number	Description	Price
31166-194-01	BPIC Vital Output (SBO, DBO, ACO, LDO, LDO2, CRG)	Call for Pricing
31166-195-01	BPIC Vital Direct Input (DI)	
31166-196-01	BPIC Nonvital I/O (NVI, NVO)	
31166-197-01	BPIC VRD and Module Power Interface (VRD)	
31166-198-01	BPIC Vital Serial Communication (VSC)	
31166-199-01	BPIC Non-vital Communication (CSEX3)	
31166-336-01	BPIC Vital Processor (CPU/PD, CPU2 w/o Communication Processor) BPIC, (CRG)	

Ordering Information - DC to DC Power Converter

Features

- Provides the 5-volt VPI logic power
- Provides the 12-volt VRD and DBO power if source is above 15 VDC

Ordering Number	Description	Price
42560-287-03	B2 Plate, In 8-35 VDC, Out 5.1 VDC, 20 Amp, CageClamp Terminals	Call for Pricing
42560-287-05	B2 Plate, In 8-35 VDC, Out 5.1 VDC, 8 Amp, CageClamp Terminals	
42560-287-09	B2 Plate, In 8-35 VDC, Out 12 VDC, 4 Amp, CageClamp Terminals	
42560-287-10	B2 Plate, In 8-35 VDC, Out 12 VDC, 10 Amp, CageClamp Terminal	

Ordering Information - Hand Held Terminal

Ordering Number	Description	Price
31609-012-00	Rugged low powered hand held control display unit with 4-row by 16 character display and RS232 interface used with CPU/PD and CPU II	Call for Pricing
54844-426-00	Panel mount bracket for holding Hand Held Terminal	

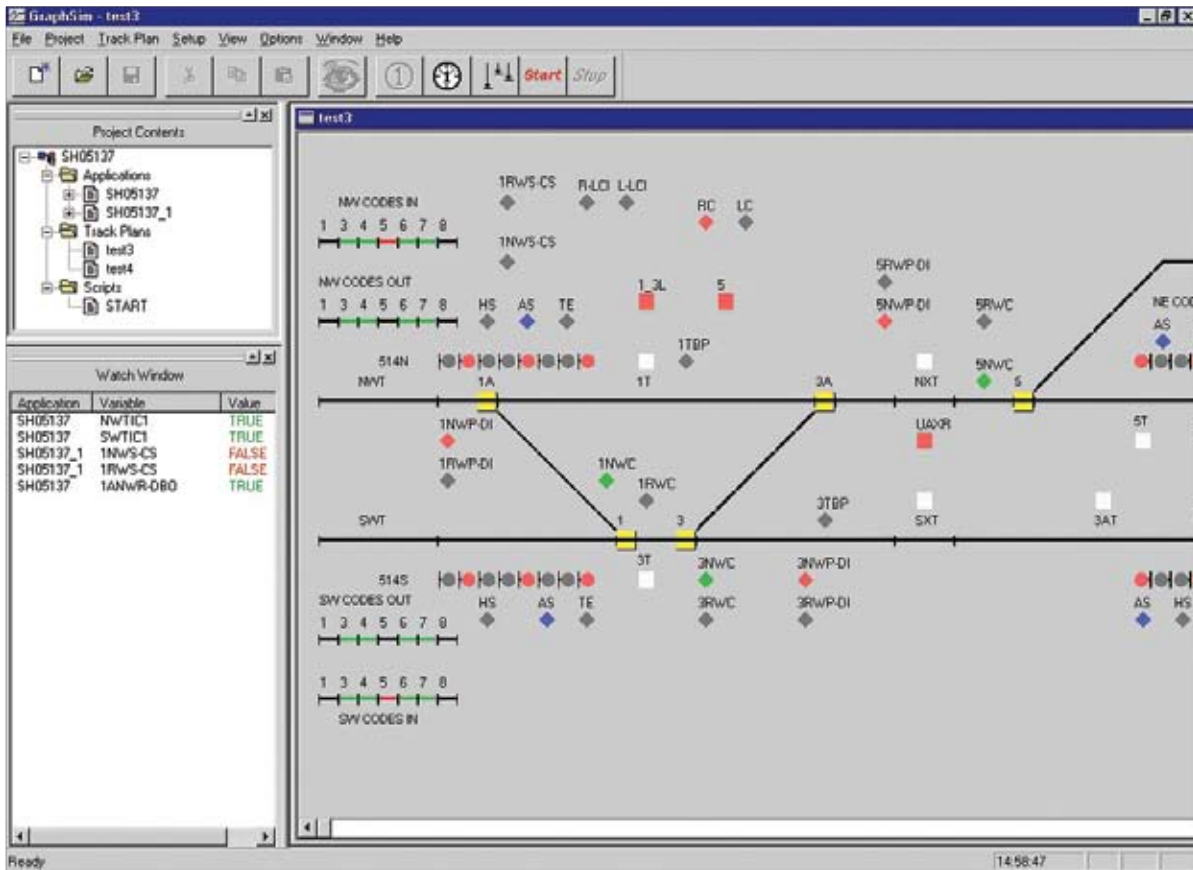
Ordering Information - Local Control Panel

Features

- Wide input power voltage range (9-33V DC)
- Key Switch to request local control mode with Local Control indicator
- Lamps ON/OFF and Lamp Test buttons
- 24 push buttons with 24 LED indicators, backlighting the push buttons
- Eight Non-Vital Outputs, relay contacts, 0.5 Amp DC or AC
- Eight Non-Vital Inputs, 9-18 VDC
- RS485 communications port

Ordering Number	Description	Price
42560-315-02	B5 Plate, 24 lighted pushbuttons, 8 non-vital inputs, 8 Form A Relay Outputs, and serial communication to CSEX Board	Call for Pricing

VPI® Tools CAAPE



The **VPI Computer-Aided Application Programming Environment (CAAPE)** is a comprehensive set of development tools for creating vital and non-vital applications. These tools are integrated together within a development environment for easy access and include graphical application building utilities, compilers for VPI vital and non-vital applications, vital Application Data Verifier (ADV) and Graphical Simulators. It provides for graphical hardware configuration, relay or ladder logic program definition and communication assignments. It also allows for the printing of the graphical relay circuits for final documentation. The build utilities include a library editor to create and maintain commonly used logic routines for easy reuse.

CAAPE includes an **Application Data Verifier (ADV)**, which is an inverse compiler that generates circuit check reports from application files illustrating hardware configurations and interlocking logic design as resident within memory devices to be installed in VPI field equipment. It produces documentation that tracks and highlights differences in an interlocking following changes to interlocking logic or configuration, thereby reducing the retest cycle.

The **Graphical Simulator** consists of tools to generate control and indication panels and simulators to exercise the vital and non-vital logic. The logic equations and variables can be viewed graphically with the corresponding states during simulation run-time. Multiple VPI systems can be simulated simultaneously.

FEATURES

CAAPE

- Graphical or Textual Application Generation
- Integrated Application Design, Compiling, Simulation, Verification and Configuration Management
- Utilities for Printing Graphical Application Logic and Verifying File CRC's and Checksums

ADV

- Reconstructs Application Design from EPROM
- Generates Reports for Circuit Check
- Validates Configuration Management
- Helps Verify that Application PROM Data Matches the Intended User Input
- Reduces Field Test Time

Graphical Simulator

- Decrease Factory and Field Testing
- Simulate VPI Systems to Test Application Logic Without Hardware
- Simulate Multiple VPI Applications and Systems Simultaneously
- Use Track Plan Display to Simulate Operation of Field Devices
- View Status of Application Logic in Graphical Format, Set Breakpoints and Change-points to Stop Simulation at Specific Points in the Logic
- Monitor and Record the States of Selected Equations

Specifications

System Requirements	List Price
PC Running Windows 95, 98, NT 4.0, SP2 or later, 2000, or XP	\$7,500.00
200 MB Available Hard Drive Space	
64 MB of RAM Available	

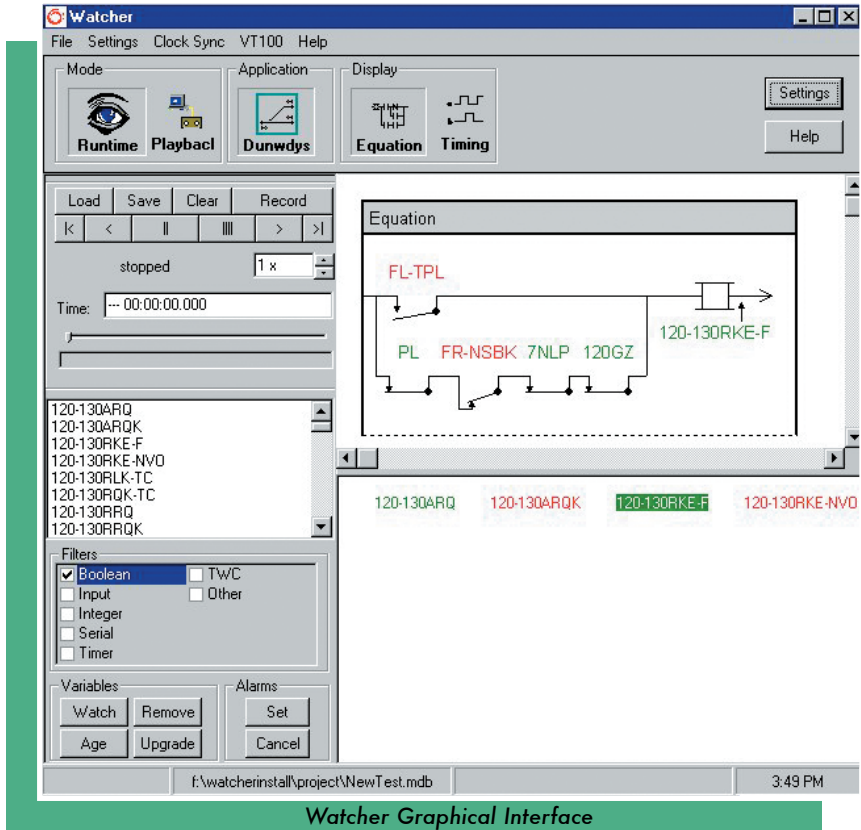
Ordering Information

For assistance in ordering CAAPE for your system or for assistance in selecting and configuring a new system or addition, please contact the Alstom Customer Service Center at 800-717-4477.

VPI® Tools Watcher

FEATURES

- **Easy to Set up - Decreases the Required Access Time in the Field**
- **Runtime View of Application Logic and Parameter States**
- **Monitor Record and Playback Multiple Parameters' States over Time**
- **Parameters are Displayed Using Their Assigned Names**



Watcher is a program for a personal or laptop computer that interfaces to an active VPI system to view vital and nonvital application variables' real-time status during factory, field or post installation activities. It can provide full-time or part-time parameter monitoring, reduces test time and facilitates field troubleshooting. Watcher is a troubleshooting, test and

monitoring tool that provides a graphical representation of VPI logic in realtime. Multiple application variables and their corresponding states may be viewed as well as the text, relay or ladder logic statements. Watcher can record, store and play back the history of changes in the values of selected variables over time by using a timing stripchart view.

Specifications

System Requirements	List Price
PC Running Windows NT 4.0, SP6 or later, 2000	\$3,000.00
500 MB Available Hard Drive Space	
256 MB of RAM Available	

Ordering Information

For assistance in ordering Watcher for your system or for assistance in selecting and configuring a new system or addition please contact the Alstom Customer Service Center at 800-717-4477.

Interlocking