User Manual

VIPC310

3U VMEbus
IndustryPack® Carrier

Manual Revision: 5 8/2/99 Hardware Revision: C

VIPC310

3U VMEbus IndustryPack® Carrier

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This product has been designed to operate with IndustryPack carriers and compatible user–provided equipment. Connection of incompatible hardware is likely to cause serious damage.

GreenSpring Computers
181 Constitution Drive
Menlo Park, CA 94025
(415) 327–1200
(415) 327–3808 FAX

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Product Description

VIPC310 is part of the IndustryPack family of modular I/O components. The VIPC310 provides mechanical support and electrical interface for two single high IndustryPacks, or one double high IndustryPack. The VIPC310 is GreenSpring's general purpose, low cost, 3U IP carrier. The Rev C version features reliable surface mount CMOS technology and an improved power system. The Rev C is fully compatible with its predecessors; all existing programmable logic has been retained, and the interrupt scheme is identical. Memory and I/O addressing shunts have been re-located, but function in the same manner. The new revision is offered in optional extended temperature range or optional twinax I/O connectors for use with IP-1553.

The VIPC310 conforms to the IndustryPack Logic Interface Specification. This guarantees compatibility with the wide range of IndustryPacks currently available and planned. As of this writing, the current IP Logic Specification is ANSI/VITA 4—1996

Each of the IndustryPacks interfaces with a 50-pin flat cable header accessible through the front panel of the VIPC310. The two IPs are identified as A and B. The interface connectors are mounted directly on the

IndustryPack carrier, providing a modular and reliable cabling system. Interface cables may be inserted or removed without removing the VIPC310 from the VME chassis. IPs may be snapped in or removed without interfering with the I/O cabling.

VIPC310 meets VMEbus Specification C.1 (also known as IEEE P1014/D1.2 and IEC 821 bus) for 3U, or "single high," form factor. VMEbus I/O, standard memory, and interrupt functions are all supported on the VIPC310.

IndustryPack I/O is mapped into the VMEbus A16/D16 space "short I/O". Both user and supervisor access are supported, as are read-modify-write ("test and set") operations. The size of I/O on each IP is fixed by the IP Specification at 64, 16-bit, words. In addition each IP has an identification PROM which occupies 64 words. Thus the two IPs, A and B, occupy 512 bytes in the VMEbus system’s 64 kilobytes of short I/O space.

VIPC310 provides VMEbus A24/D16 "standard memory space" access for IPs with memory. This carrier is configurable from 64 kilobytes to 2 megabytes of memory per IP, for a maximum of 4 megabytes.

Interrupts are fully supported. Each IP may generate up to two separate interrupt requests. The VIPC310 supports these as VMEbus interrupt levels 1, 2, 4, & 5. Each IP that requests interrupt service must provide its own 8-bit vector. This vector is provided to the VMEbus during bus interrupt acknowledge cycles.

Access acknowledge and power check LEDs are provided on the front panel for quick visual verification. IP Logic Interface cycles trigger LED flashes that indicate IP slot selection and normal cycle completion. Two access acknowledge LEDs are provided, one for each IP slot. A power check circuit detects blown fuses and line faults on either IP slot. When the power check LED is lit, VIPC310 is ready and both IP slots are energized.

The VIPC310 now provides fuse protection, RF filtering, and de-coupling capacitance on all IP power lines. Power filtering improves performance of precision analog IPs. VMEbus power-up, power-down, and bus reset functions are fully supported.

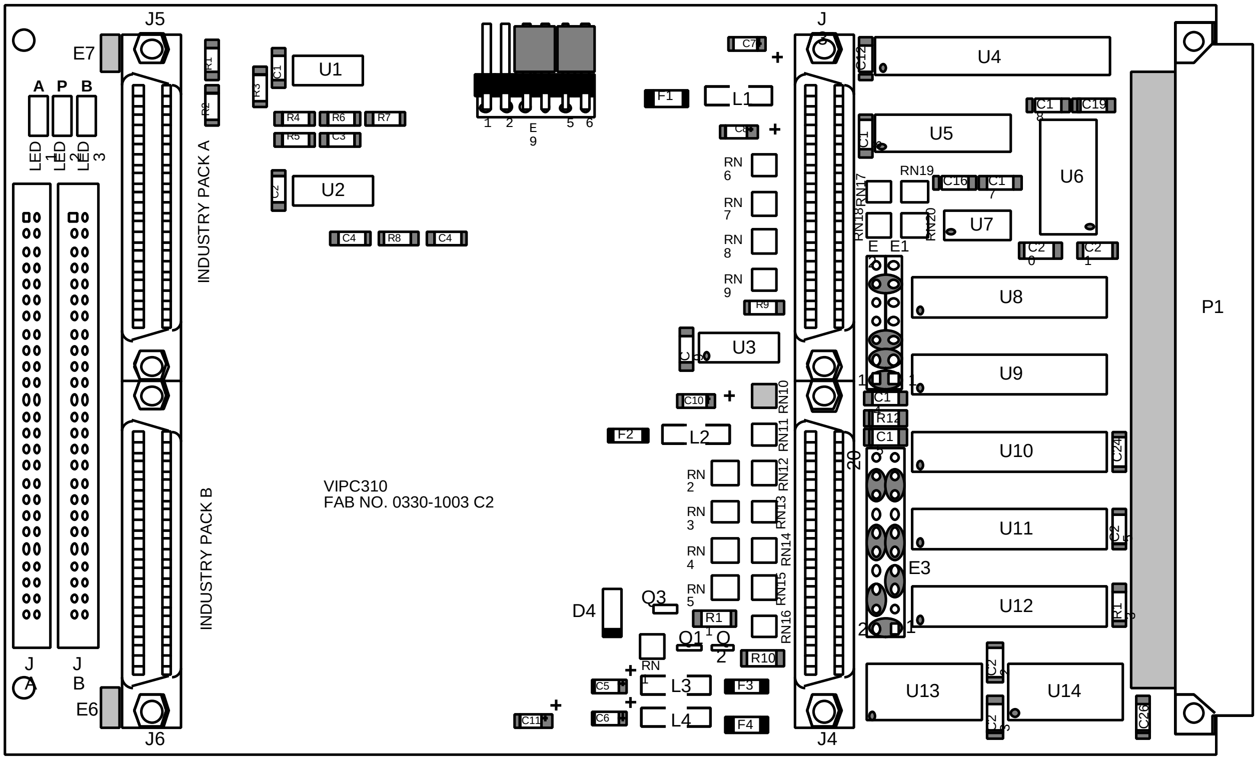


Figure 1 VIPC310 Rev. C Assembly Diagram

Installation of IndustryPacks

IndustryPacks are installed on the VIPC310 carrier board by simply snapping them in. Press the IP and the carrier board together with your fingers until the two pairs of mating connectors are flush. The connectors are keyed, so the IP can only be installed correctly.

There are two locations for IPs. These are identified as A and B. The white lettering on the VIPC310 shows the location of each slot.

All IPs mate with 50-pin flat cable receptacle connectors for their I/O. The front panel labeling indicates which connector is associated with which IP. Pin 1 for each cable is identified by the arrow mark on the connector or a square solder pad.

Many connector manufacturers are able to provide suitable mass terminated receptacles. The following are recommended:

AMP	1-499506-2
Robinson Nugent	IDS-C50NPK-SR-TG

After an IP has been installed, four stainless steel screws may be used to secure the IP to the carrier board. This is normally necessary only in high vibration or shock environments. Insert the screw through the IP and the two connectors. Attach the nut on the solder side of the VIPC310. Tighten using small tools, taking care not to damage either the IP or the support board. The screws used are standard (metric) M2 x 18 stainless slotted flat head. These screws and nuts come with each IP.

Cables, Screw kits and Engineering Kits are available from GreenSpring Computers.

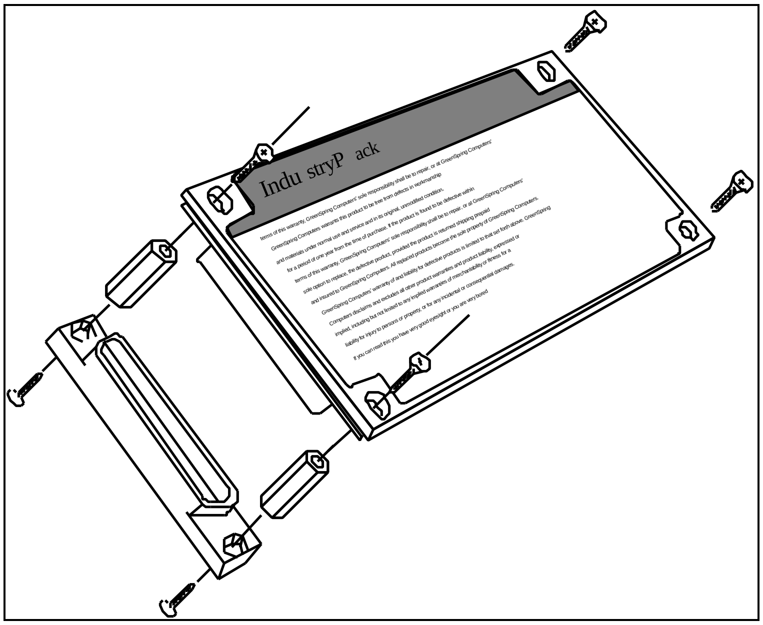


Figure 2 IndustryPack Installation

IndustryPack installation instructions

Install the four hex standoffs onto the IndustryPack Connectors. Fasten the standoffs to the IndustryPacks with four M2 x 5mm flat head machine screws. Install the IndustryPack onto the carrier board. Fasten the IndustryPack to the carrier with four M2 x 5mm pan head machine screws.

Please use a thread locking compound on all screws.

IndustryPack installation for non-compliant carriers

Some carrier boards use non-compliant 50 pin connectors. These connectors mate with IndustryPacks but cannot use the standard mounting hardware. A hardware kit for non-compliant carriers is available. The order number is EK-NCC. This must be ordered separately. Contact your local GreenSpring Representative or the factory for price and delivery.

Install the IndustryPack onto the carrier board. Fasten the IndustryPack to the carrier with four M2 x 16mm flat head machine screws and four M2 hex nuts. Use caution when tightening the screws. Too much force may damage the IndustryPack.

I/O Addressing

IP Spaces

I/O and ID addressing on the VIPC310 is determined by two elements. The first is the base address of the carrier. Second is the offset of the IP and the desired access subspace.
The 512 bytes the VIPC310 occupies in the A16 VMEbus short I/O space is divided into four subspaces. Each IndustryPack has a an I/O space of 128 bytes, or 0x80 bytes in hexadecimal. Additionally, each IndustryPack has an ID PROM space occupying the adjacent 128 bytes. The VIPC310 provides two IndustryPacks slots, A and B. The I/O Space of slot B starts at an offset of 256 bytes from the carrier base address. The figure below shows the subspace allocations.

Address	VIPC310 Subspace
Carrier Base + 0x0000	IP A, I/O Space
Carrier Base + 0x0080	IP A, ID Space
Carrier Base + 0x0100	IP B, I/O Space
Carrier Base + 0x0180	IP B, ID Space

Figure 2 VIPC310 I/O & ID Subspaces

I/O Spaces and Configuration

The VIPC310 occupies 512 continuous bytes in the VMEbus short I/O space. This consists of 64, 16-bit, words for each IP's I/O and ID space. The carrier base address is set with shunt groups E1 and E2. The relationship of shunts to VMEbus A16 address lines is shown in Figure 3.

Select signals are generated by comparing VMEbus address lines with the shunt group values. A shunt installed between E1 and E2 selects a given address line as zero. A shunt removed selects the address line as a one. Thus, a carrier base address of 0x0000 is selected when all seven shunts are installed, and carrier base address of 0xFE00 is selected when all seven shunts are removed. The VIPC310 may be located on any 512 byte, or 0x200 hex, boundary however; GreenSpring recommends the common practice of locating VME carriers on 4096 byte, or 0x1000, boundaries.

Shunt Location	Add. Line	Default	Value
E1-7 to E2-7	A15	IN	0
E1-6 to E2-6	A14	OUT	1
E1-5 to E2-5	A13	OUT	1
E1-4 to E2-4	A12	IN	0
E1-3 to E2-3	A11	IN	0
E1-2 to E2-2	A10	IN	0
E1-1 to E2-1	A09	IN	0

Figure 3 E1 & E2, I/O Base Address Shunts
Default Base Address = 0x6000

VIPC310s are shipped with the default I/O base address set to 0x6000. For reference, the default base address shunt setting is shown below. For new system development and debug, we recommend starting with the 0x6000 default address to test carriers and IPs before re-configuration to other locations.

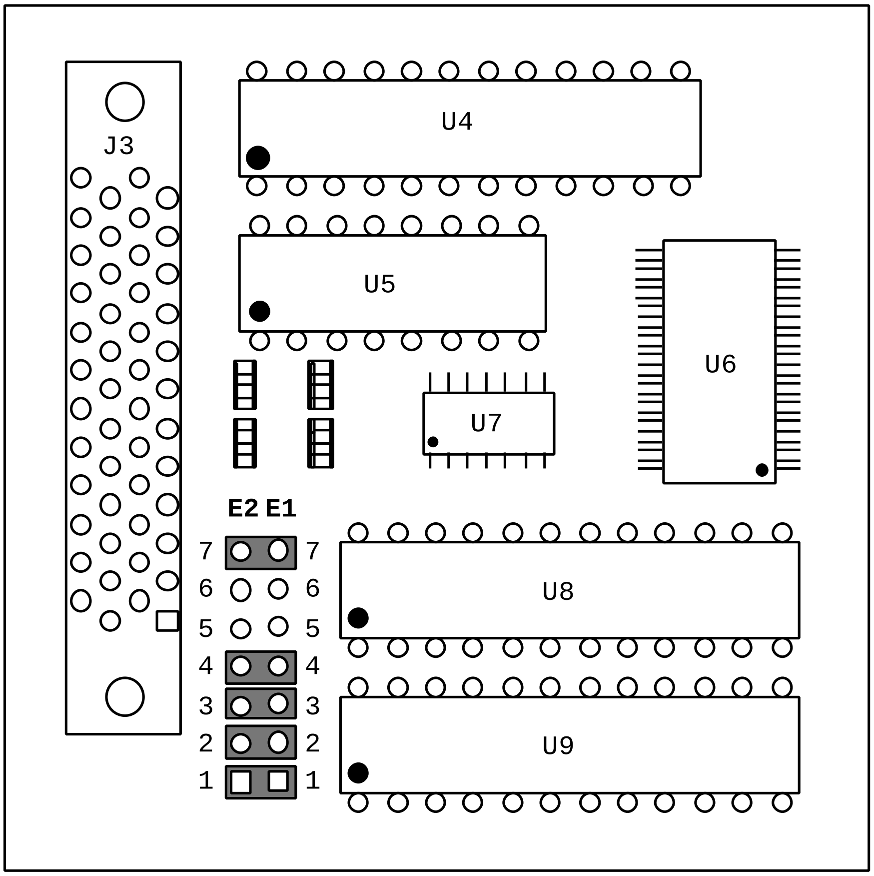


Figure 4 Default I/O Base Address Shunt Settings
I/O Base Address = 0x6000

To improve visual orientation all shunt groups and through hole components have square solder pads on pin number one.

The I/O base address shunts are also used to select the memory base address, if memory is enabled. As an example, if the I/O base address is 0x6000 (in A16 space), then the memory base address is 0x600000 (in the A24 space). See the Memory Addressing section for more information. To disable memory entirely, remove the shunt between E3.1 and E3.2.

ID Spaces

All IPs must have an ID PROM. This ID PROM is at least 32 bytes. It may be larger. It provides certain fixed information about the IP, which is defined in the IndustryPack Specification. This information includes the IP's manufacturer, model code, and manufacturing revision level. It may also include driver identification codes and calibration information.

ID PROMs are typically used by software for auto configuration, auto calibration, and revision maintenance. Additional configuration management functions are possible. The ID PROM is not required to be accessed nor its information used by the host software. However, since the IP PROM may contain critical calibration or configuration information, software usage is highly encouraged.

The figure below shows the required information in each ID PROM. See the IndustryPack Specification and the User Manual for each IP for more information.

Address	Description	Contents
0x3F		
0x2*nn+1	User Space	
0x2*nn-1		
0x19	IP Module Specific Space	
0x17	CRC	
0x15	Number of bytes used	= nn
0x13	Driver ID, high byte	
0x11	Driver ID, low byte	
0x0F	Reserved	0x00
0x0D	Revision	
0x0B	Model Number	
0x09	Manufacturer ID	
0x07	ASCII "C" for 8Mhz	0x43
	or ASCII "H" for 32 Mhz	or 0x48
0x05	ASCII "A"	0x41
0x03	ASCII "P"	0x50
0x01	ASCII "I"	0x49

Figure 5 Required ID PROM Information

Other Addressing Issues

Many IPs use only the low order, or odd, byte. For these IndustryPacks the bytes are accessed at location offsets of 0x1, 0x3, etc. This odd byte I/O convention is a Motorola 68000 micro-processor family convention and VMEbus standard. Furthermore, Motorola processors and VMEbus use so called "Big Endian" byte ordering, that is; in a 16 bit word, the bits are ranked in descending order from left to right (i.e. $D_{15}...D_8\ D_7...D_0$). On "Little Endian" processors, like Intel products, the byte order is reversed; the low order byte is on the left (i.e. $D_7...D_0\ D_{15}...D_8$). In systems using Little Endian CPUs this difference can cause considerable confusion

IPs are not required to decode all of their allotted I/O space. Normally accessing un-decoded space, or empty IP slots, will cause a VMEbus BERR generated by the offending CPU's bus time out circuitry. If a CPUs time out is disabled, BERR will not occur, and the bus will "hang."

Memory Addressing

IndustryPacks may contain memory as well as I/O. VIPC310 supports up to 2 megabytes per IP, or 4 megabytes per carrier. This should be adequate for most A24/D16 applications. Systems with larger memory requirements should consider an extended memory carrier. Memory addressing on the VIPC310 consists of three parts: The first is enabling memory. Second is calculating and setting the IP memory size and offset. The last is setting the memory base address.

Enabling Memory

To enable A24/D16 memory access on the VIPC310 install a shunt from E3.1 to E3.2. To disable memory access, remove the shunt between E3.1 and E3.2.

Setting Memory Size and Offset

Shunt group E3 enables memory and sets the size. Shunt E9 determines the memory offset between IPs. VIPC310 is configured for two 128 kilobyte IPs at the factory. Below shows the default settings for the E3 group. E3.1 and E3.2 enable memory, the rest of the E3 group is used to select the memory size. Select signals are generated by comparing VME address values to the base address value. The E3 shunts route comparator inputs to VME address lines or short pairs to identical states. The E9 group determines the offset between IPs. To determine shunt settings, use the charts below Separate charts are provided for one or two memory IP applications.

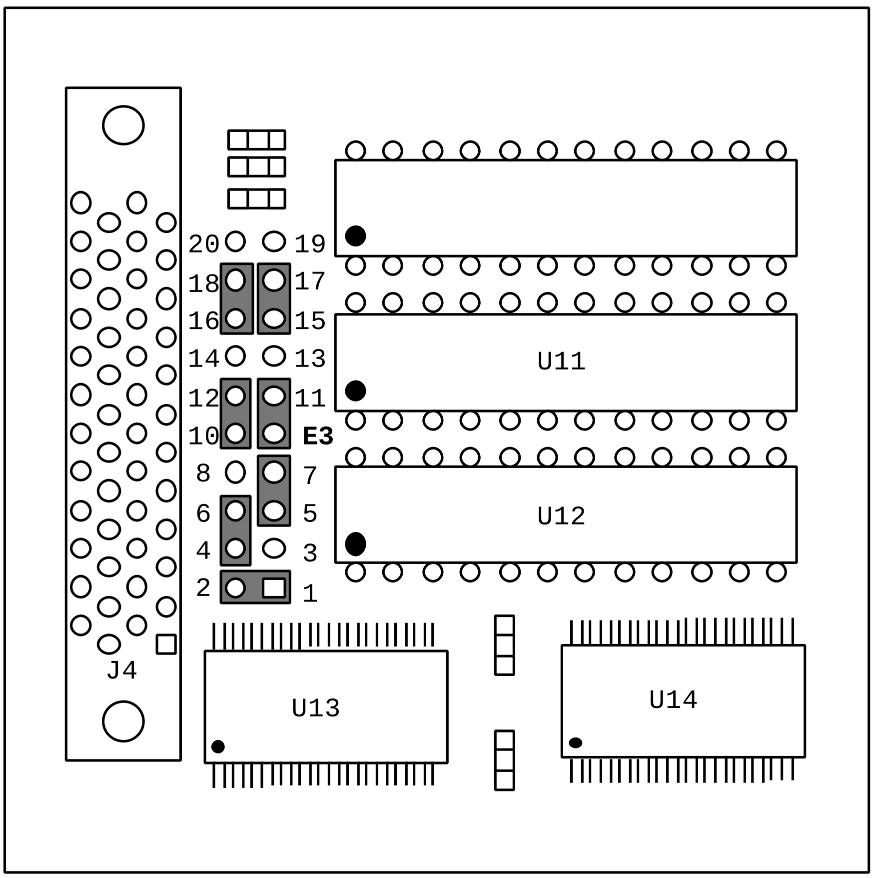


Figure 6 Default Memory Size Shunt Settings
256 kilobytes

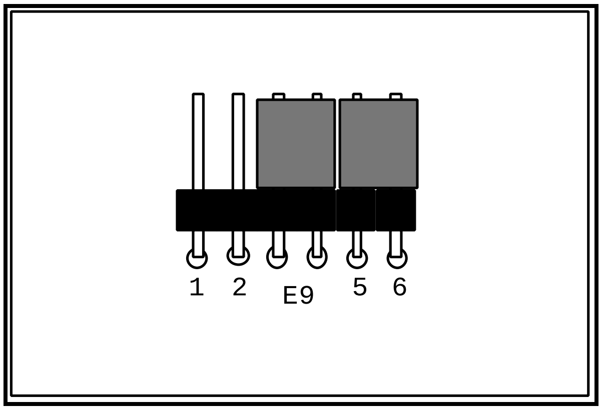
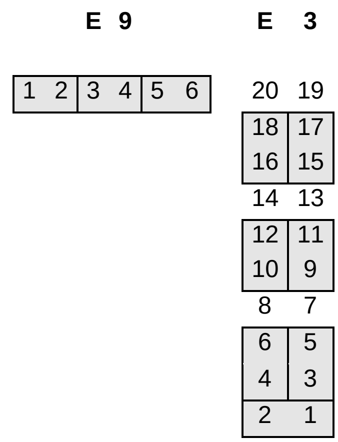


Figure 7 Default Memory Offset Shunt Settings
128 Kilobytes per IP

Total VIPC310 Memory Size	IP Size	IP Slot	IP Location Base +
128 kilobytes	64 k	A	0x000000
	64 k	B	0x010000



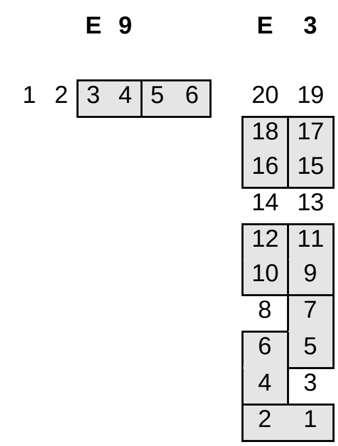
Legend:

SHADED = IN

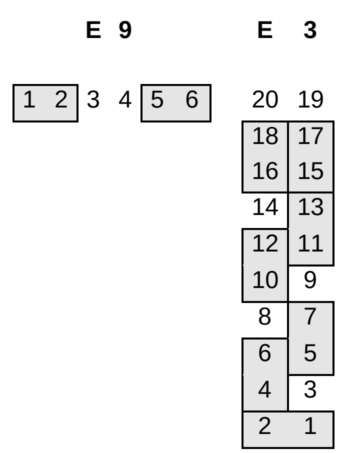
NO SHADING = OUT

Total VIPC310 Memory Size	IP Size	IP Slot	IP Location Base +
256 kilobytes	128 k	A	0x000000
	128 k	B	0x020000

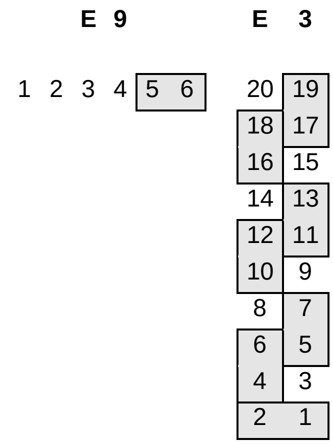
DEFAULT SETTING



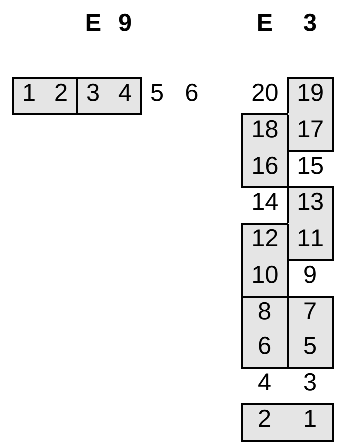
Total VIPC310 Memory Size	IP Size	IP Slot	IP Location Base +
512 kilobytes	256 k	A	0x000000
	256 k	B	0x040000



Total VIPC310 Memory Size	IP Size	IP Slot	IP Location Base +
1 megabyte	512 k	A	0x000000
	512 k	B	0x080000



Total VIPC310 Memory Size	IP Size	IP Slot	IP Location Base +
2 megabytes	1 M	A	0x000000
	1 M	B	0x100000



Total VIPC310 Memory Size	IP Size	IP Slot	IP Location Base +
4 megabytes	2 M	A	0x000000
	2 M	B	0x200000

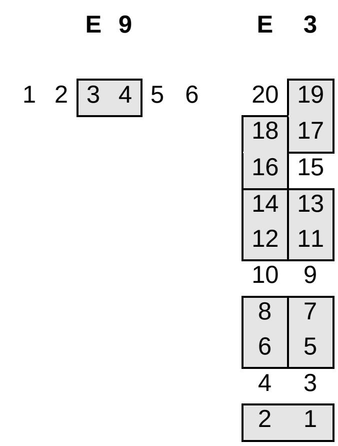
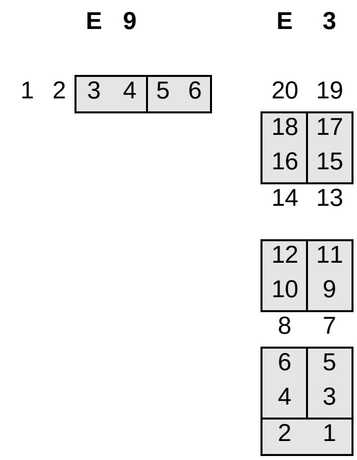


Figure 8 Memory Size Configurations for two memory IPs

Total VIPC310
Memory Size
128 kilobytes

128 Kbytes in Slot A if E1.1 to E2.1 is IN

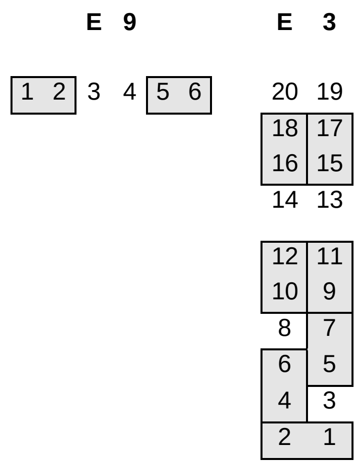
128 Kbytes in Slot B if E1.1 to E2.1 is OUT



Total VIPC310
Memory Size
256 kilobytes

256 Kbytes in Slot A if E1.2 to E2.2 is IN

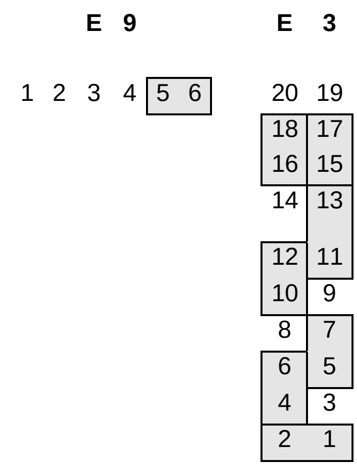
256 Kbytes in Slot B if E1.2 to E2.2 is OUT



Total VIPC310
Memory Size
512 kilobytes

512 Kbytes in Slot A if E1.3 to E2.3 is IN

512 Kbytes in Slot B if E1.3 to E2.3 is OUT

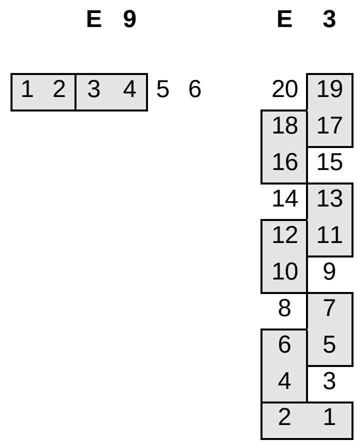


Total VIPC310 Memory Size

1 megabyte

1 Meg in Slot A if E1.4 to E2.4 is IN

1 Meg in Slot B if E1.4 to E2.4 is OUT



Total VIPC310 Memory Size

2 megabytes

2 Megs in Slot A if E1.5 to E2.5 is IN

2 Megs in Slot B if E1.5 to E2.5 is OUT

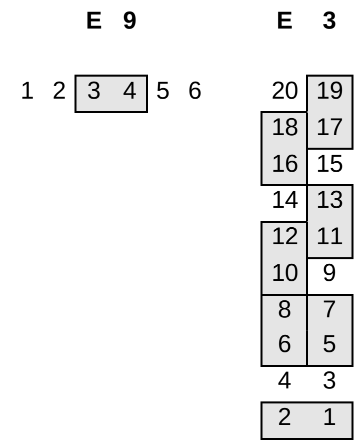


Figure 9 Memory Size Configurations for one memory IP

Setting Memory Base Address

The base address is set with the same seven shunts used to set the I/O base address. The memory and I/O base addresses "track" each other. The base address for memory is 256 times the base address of I/O. In other words, the E1 to E2 shunt group value is shared for both memory and I/O selection. In hexadecimal notation this conversion is done by shifting left one byte, or two zeros. For example: the VIPC310 default I/O base address is 0x6000 in the A16 space therefore the default memory base address in A24 space is 0x600000. For reference the default base address diagram is shown, again, below.

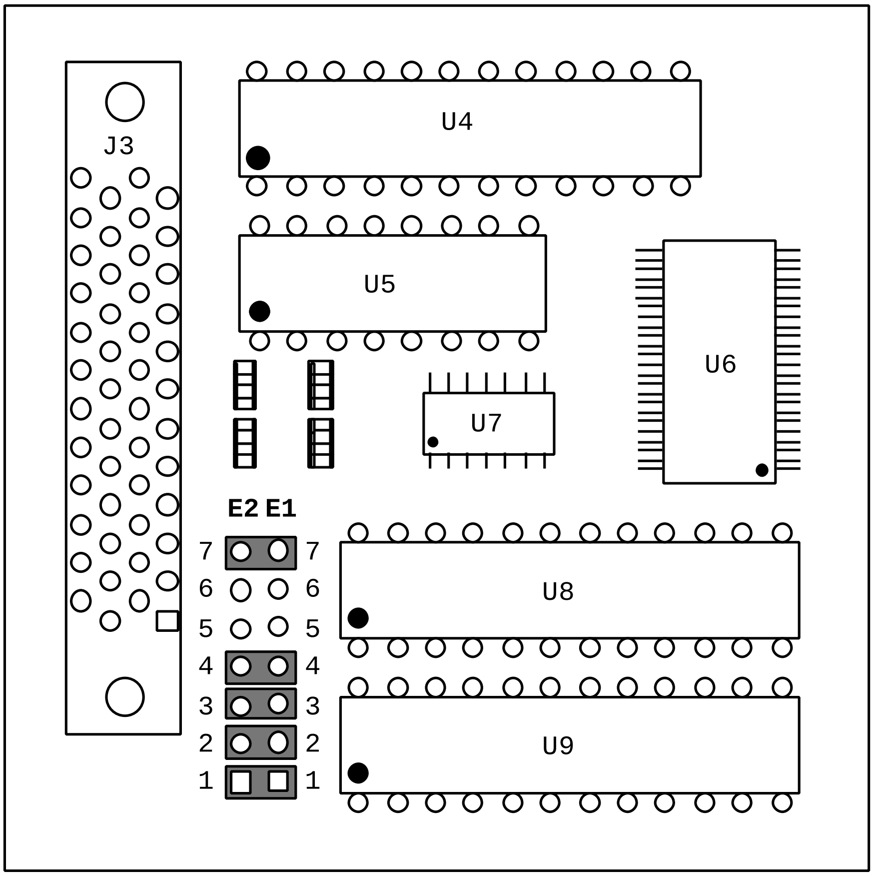


Figure 10 Default I/O Base Address Shunt Settings
Memory Base Address = 0x600000

In the E1 to E2 group, a shunt installed selects a given address line as zero. A shunt removed selects the address line as a one. Thus, for memory, a base address of 0x000000 is created when all seven shunts are installed. A base address of 0xFE0000 is created when all seven shunts are removed. The correspondence between shunt locations and VME A24 address lines is shown below.

Shunt Location	Address Line	Default	Value
E1-7 to E2-7	A23	IN	0
E1-6 to E2-6	A22	OUT	1
E1-5 to E2-5	A21	OUT	1
E1-4 to E2-4	A20	IN	0
E1-3 to E2-3	A19	IN	0
E1-2 to E2-2	A18	IN	0
E1-1 to E2-1	A17	IN	0

Figure 11 Memory Base Address Shunts
Default = 0x600000

On VIPC310 memory cycles the higher order VMEbus address lines are routed directly to the IP address lines. This simplifies matters by eliminating complicated address re-mapping and decoding wait states. The memory sizing scheme uses the base address shunt values as well. **When using memory, these two factors require the carrier A24 base address be on a boundary equal to the sum of all memory space available on the carrier.**

For example: Using a VIPC310 with two memory IPs, the largest of which being one megabyte, would require configuring the carrier for one megabyte per slot. The sum of available memory space on the carrier is two megabytes total, or one megabyte per slot. The carrier base, and IP slot A base, must be on a two megabyte boundary in the A24 space (i.e. 0x400000, 0x600000, 0x800000 etc.). The slot B base would be at carrier base + one megabyte (i.e 0x500000, 0x700000, 0x900000 etc.).

Shunt Functions, by Location

The following tables provide functional descriptions, indexed by shunt, of all shunts and default settings on the VIPC310.

Shunt	to	Shunt	State	Factory	Function
E1.1	to	E2.1	IN	DEFAULT	Base address select; I/O A09 = 0, Memory A17 = 0
			OUT		Base address select; I/O A09 = 1, Memory A17 = 1
E1.2	to	E2.2	IN	DEFAULT	Base address select; I/O A10 = 0, Memory A18 = 0
			OUT		Base address select; I/O A10 = 1, Memory A18 = 1
E1.3	to	E2.3	IN	DEFAULT	Base address select; I/O A11 = 0, Memory A19 = 0
			OUT		Base address select; I/O A11 = 1, Memory A19 = 1
E1.4	to	E2.4	IN	DEFAULT	Base address select; I/O A12 = 0, Memory A20 = 0
			OUT		Base address select; I/O A12 = 1, Memory A20 = 1
E1.5	to	E2.5	IN		Base address select; I/O A13 = 0, Memory A21 = 0
			OUT	DEFAULT	Base address select; I/O A13 = 1, Memory A21 = 1
E1.6	to	E2.6	IN		Base address select; I/O A14 = 0, Memory A22 = 0
			OUT	DEFAULT	Base address select; I/O A14 = 1, Memory A22 = 1
E1.7	to	E2.7	IN	DEFAULT	Base address select; I/O A15 = 0, Memory A23 = 0
			OUT		Base address select; I/O A15 = 1, Memory A23 = 1

Figure 12 E1 & E2, Base Address
Default = 0x6000

Shunt	to	Shunt	to	Shunt	State	Factory	Memory Select if all E3 terms are TRUE. Function
E3.1	to	E3.2			IN	DEFAULT	A24 memory enable
					OUT		A24 memory disable. All E3 Shunts disabled.
E3.3	to	E3.5			IN		TRUE if VME A17 = E1.1—E2.1 state
		E3.5	to	E3.7	IN	DEFAULT	Always TRUE
		E3.5			OUT		Illegal if Memory Enabled
E3.9	to	E3.11			IN	DEFAULT	TRUE if VME A18 = E1.2—E2.2 state
		E3.11	to	E3.13	IN		Always TRUE
		E3.11			OUT		Illegal if Memory Enabled
E3.15	to	E3.17			IN	DEFAULT	TRUE if VME A19 = E1.3—E2.3 state
		E3.17	to	E3.19	IN		Always TRUE
		E3.17			OUT		Illegal if Memory Enabled
E3.4	to	E3.6			IN	DEFAULT	TRUE if VME A20 = E1.4—E2.4 state
		E3.6	to	E3.8	IN		Always TRUE
		E3.6			OUT		Illegal if Memory Enabled
E3.10	to	E3.12			IN	DEFAULT	TRUE if VME A21 = E1.5—E2.5 state
		E3.12	to	E3.14	IN		Always TRUE
		E3.12			OUT		Illegal if Memory Enabled
E3.16	to	E3.18			IN	DEFAULT	TRUE if VME A22 = E1.6—E2.6 state
		E3.18	to	E3.20	IN		Always TRUE
		E3.18			OUT		Illegal if Memory Enabled

Figure 13 E3, Memory Size
Default = 256 kilobytes

Shunt	State	Factory	Function
E6	IN OUT	 DEFAULT	Short Shield to GND Floating shield
E7	IN OUT	 DEFAULT	Short Shield to GND Floating shield

Figure 14 E6 & E7, Shields

Shunt	to	Shunt	State	Factory	Function
E9.1	to	E9.2	IN OUT	 DEFAULT	SIZ0 = 0 SIZ0 = 1
E9.3	to	E9.4	IN OUT	DEFAULT	SIZ1 = 0 SIZ1 = 1
E9.5	to	E9.6	IN OUT	DEFAULT	SIZ2 = 0 SIZ2 = 1

Figure 15 E9, IP Offset
Default = 128 kilobytes/IP

SIZ0	SIZ1	SIZ2	SIZn Settings Decoded
0	0	0	64k per IP, 128k base
0	0	1	1M per IP, 2M base
0	1	0	256k per IP, 512k base
0	1	1	4M per IP, 8M base
1	0	0	128k per IP, 256k base
1	0	1	2M per IP, 4M base
1	1	0	512k per IP, 1M base
1	1	1	reserved

Figure 16 E9, Size Settings Decoded

Interrupts

Each IndustryPack may generate up to two interrupts, called IRQ0* and IRQ1*. Since there are two packs, A and B, there are four possible interrupt sources. Each of these four sources is mapped to a fixed VMEbus interrupt level, as shown in the figure below.

Interrupt Source	VMEbus Level
Pack A, IRQ 0	level 4
Pack A, IRQ 1	level 5
Pack B, IRQ 0	level 2
Pack B, IRQ 1	level 1

Figure 17 Interrupt Map

On the VMEbus, higher level numbers are higher priority. Some IndustryPacks allow the user to choose either IRQ0 or IRQ1 for the Pack's interrupt. Some IPs use both interrupts; some use none. IPs with only one interrupt level are required to use IRQ0.

All VMEbus interrupts are vectored. All IndustryPack interrupts are vectored. The IP provides the vector. Although two IPs mounted on the VIPC310 have only four distinct levels, there are up to 192 available vectors. Many IPs take advantage of vectors to send information. For example, serial communication errors use a different vector than buffer-full/buffer-empty vectors. Some IPs are able to generate a large number of distinct vectors. The VME systems integrator should maintain a vector map to assure that there is no overlap of vector usage of different IP or VME boards.

Per the IndustryPack Specification, a system reset will clear any pending interrupts from the IPs. Most IPs require a specific write operation to enable interrupts following a reset. It is good practice for the software to initialize all IPs in a system prior to enabling interrupts.

I/O Cabling

Cabling to IndustryPacks is through the front panel of the VIPC310. Two standard 50-pin flat ribbon cable connectors are provided, one for each IP. Connector assignment is marked on the front panel. The connector for IP A is right angle, protruding through the front panel. Mating to this connector is generally done with a straight mass-terminated receptacle. An optional key is provided. Note that pin, marked with a dot on the front panel, is down.

The connector for IP B is a straight header. Mating to this connector is generally done with a right angle receptacle. Route the cable under the ears in the front panel provided for this purpose.

Many connector manufacturers are able to provide suitable receptacles. The following are recommended:

AMP	1-499506-2
Robinson Nugent	IDS-C50NPK-SR-TG

Cables and Engineering Kits are available from GreenSpring Computers.

The right angle mounting in conjunction with the front panel ears provides an effective strain relief for the "B" cable. To add this strain relief function to the "A" cable, securely tie the two cables together at the front panel.

Occasionally it is desirable to be able to connect and disconnect a cable without removing the carrier board from the backplane. This is easily done with the "A" cable. To accomplish the same function with the "B" cable, place a dual 50-pin male-male header in the "B" cable near the front panel, then disconnect at this header. It is still possible to use the built-in strain relief function by tying both cables to the portion of the "A" cable before the in-line added header.

Flat cables are numbered from pin 1 at one side (commonly marked with a red stripe) monotonically to pin 50 at the other side. Flat cable connectors are numbered to match the cable numbering. Each cable header consists of two rows of 25 pins. One row connects to even number lines, the other row to odd numbered lines. Pin 1 is marked on the VIPC310 connectors with a square pad, and on most shells and cable receptacles with a molded arrow or line (often barely visible).

The flat cable pin numbers, the VIPC310 cable header pin numbers, and the IndustryPack I/O pin numbers are mapped identically: Pin 1 to pin 1 through pin 50 to pin 50. The I/O wiring is not connected to any other VMEbus or local power signals. Each IndustryPack "owns" (that is, defines completely) all 50 of its I/O lines.

Caution*: Few IndustryPacks provide galvanic isolation of signals. Many IPs run the logic interface ground lines directly to the I/O lines. It is the user's responsibility to perform all I/O wiring. Care must be taken to avoid ground loops, and to avoid applying excessive voltage to any line. Equipment that may be turned on or off independently of the VMEbus system, or wiring which may be connected or disconnected while power is on must be reviewed particularly carefully by the user.*

Front Panel Indicators

ACK LEDs

There are three green LED indicators on the VIPC310 front panel. These are labeled IndustryPack Select A, PWR and B on the front panel or LED1, LED2 & LED3, respectively, on the fab. Each time IP A is successfully accessed the A indicator will turn on for about one third second. The B indicator functions in the same manner. Accesses more frequent that three times a second will show as a continuously illuminated indicator. The ACK LEDs respond to I/O, memory and interrupt accesses cycles.

The trigger for the pulse stretcher that drives the LEDs is the acknowledge signal from the IPs. Thus if the host software attempts to access an IP, but selects an unused location to which the IP does not respond, the indicator LED on the front panel will not blink. The indicators do not show that the IndustryPack carrier is being selected, but rather that the associated IP has completed an access. Similarly, the indicator LEDs do not show interrupts pending, but do show interrupt acknowledge cycles.

Power Check LED

The power check LED is marked with PWR. The power check circuit detects blown fuses or line faults on either IP slot. When the power check LED is lit, VIPC310 is ready and both IP slots are energized.

User Options

Disabling Memory Access

All memory accesses to the VIPC310 may be disable by removing the shunt on header E3.1 to E3.2. Removing this shunt does not disable I/O, ID or interrupt accesses. Removal is recommended if no IndustryPack with memory (or memory based I/O addressing) is installed. Removing the E3.1 to E3.2 shunt is the *only* way to disable the carrier from responding to VMEbus memory accesses.

(If no memory based IP is installed, but E3.1 to E3.2 is in place, then the carrier board will decode some group of memory locations, enabling its data bus drivers. Since no IP responds, no VMEbus DTACK* will be issued, nor will either of the front panel indicators illuminate. Should another VME board be decoding memory, however, at the same address, its data transfer cycle will be corrupted. This condition must be cleared with a system reset.)

Ground Plane under I/O connectors

The VIPC310 is constructed from a six layer printed circuit board. Two of the layers are primarily for power and ground distribution via copper planes. These copper planes do not extend to I/O connectors of the IndustryPacks nor the front panel I/O connectors. This is to reduce noise on I/O cabling. Digital power and ground planes tend to carry a moderate amount of high frequency noise. This noise may capacitively couple to sensitive analog wiring on these connectors.

The default shipping configurations is: no ground plane under the I/O connectors. This is the recommended configuration for most IndustryPacks.

Users may connect a floating ground plane under the I/O connectors to the local digital ground plane by placing shunts in locations E7 and E8. This configuration reduces the impedance of the I/O wiring, and generally reduces cross talk slightly on digital signals. This configuration is optional for high speed digital IndustryPacks, such as SCSI.

IP Logic Interface

The VITA-4 specification is the definitive reference for the IP bus logic interface. When this manual was written, the current revision was:

ANSI/VITA 4-1996
Specification Revision 1.0
IP Mezzanine Module Standard

This document, or its successor, is available from GreenSpring or VITA. VITA can be contacted at the following address.

VITA Standards Organization
10229 North Scottsdale Road, Suite B
Scottsdale Az. 85252
Voice: 602-951-8866
Fax: 602-951-0720

For quick reference, the table below shows the IP Logic pin assignments. Some of these signals may not be supported on this product.

Pin #	Signal	Pin #	Signal	Pin #	Signal	Pin #	Signal
1	GND	2	CLK	26	GND	27	+ 5V
3	Reset*	4	D0	28	R/W*	29	IDSel*
5	D1	6	D2	30	DMAReq0*	31	MemSel*
7	D3	8	D4	32	DMAReq1*	33	IntSel*
9	D5	10	D6	34	DMAck*	35	IOSel*
11	D7	12	D8	36	Reserved	37	A1
13	D9	14	D10	38	DMAEnd*	39	A2
15	D11	16	D12	40	Error*	41	A3
17	D13	18	D14	42	IntReq0*	43	A4
19	D15	20	BS0*	44	IntReq1*	45	A5
21	BS1*	22	- 12V	46	Strobe*	47	A6
23	+12V	24	+ 5V	48	Ack*	49	Reserved
25	GND			50	GND		

Figure 18 IP Logic Interface Pin Assignment

Construction and Reliability

IndustryPacks, and carriers, were conceived and engineered for rugged industrial environments. The VIPC310 is constructed out of 0.062 inch thick FR4 material. The six copper layers consist of a ground plane, a power plane and four digital signal planes.

Through hole component mounting is used. IC sockets use gold plated screw–machine pins. High insertion and removal forces are required, which assists in keeping components in place. If the application requires unusually high reliability or is in an environment subject to high vibration, the user may solder the four corner pins of each socketed IC into the socket, using a grounded soldering iron. Shunts may be replaced with wire–wrap® wires if desired.

The IndustryPack connectors are keyed, shrouded and gold plated on both contacts and receptacles. They are rated at 1 Amp per pin, 200 insertion cycles minimum. These connectors make consistent, and correct, insertion easy and reliable.

The IP is secured to the carrier with four metric M2 stainless steel screws. The heads of these screws are countersunk into the IP. The four screws provide significant protection against shock, vibration, and incomplete insertion. For most applications they are not required.

The IndustryPack provides a low temperature coefficient of 0.89 W/°C for uniform heat. This is based on the temperature coefficient of the base FR4 material of .31 W/m–°C, and taking into account the thickness and area of the IP. This coefficient means that if 0.89 Watts is applied uniformly on the component side, that the temperature difference between the component and the solder side is one degree Celsius.

Warranty and Repair

GreenSpring Computer warrants this product to be free from defects in workmanship and materials under normal use and service and in its original, unmodified condition, for a period of one year from the time of purchase. If the product is found to be defective within the terms of this warranty, GreenSpring Computer's sole responsibility shall be to repair, or at GreenSpring Computer's sole option to replace, the defective product. The product must be returned by the original customer, insured, and shipped prepaid to GreenSpring Computers. All replaced products become the sole property of GreenSpring Computers.

GreenSpring Computer's warranty of and liability for defective products is limited to that set forth herein. GreenSpring Computers disclaims and excludes all other product warranties and product liability, expressed or implied, including but not limited to any implied warranties of merchandisability or fitness for a particular purpose or use, liability for negligence in manufacture or shipment of product, liability for injury to persons or property, or for any incidental or consequential damages.

GreenSpring's products are not authorized for use as critical components in life support devices or systems without the express written approval of the president of GreenSpring Computers, Inc.

Service Policy

Before returning a product for repair, verify as well as possible that the suspected unit is at fault. Then call the Customer Service Department for a RETURN MATERIAL AUTHORIZATION (RMA) number. Carefully package the unit, in the original shipping carton if this is available, and ship prepaid and insured with the RMA number clearly written on the outside of the package. Include a return address and the telephone number of a technical contact. For out–of–warranty repairs, a purchase order for repair charges must accompany the return. GreenSpring Computers will not be responsible for damages due to improper packaging of returned items. For service on GreenSpring Products not purchased directly from GreenSpring Computers contact your reseller. Products returned to GreenSpring Computers for repair by other than the original customer will be treated as out–of–warranty.

Out of Warranty Repairs

Out of warranty repairs will be billed on a material and labor basis. The current minimum repair charge is $100. Customer approval will be obtained before repairing any item if the repair charges will exceed one half of the quantity one list price for that unit. Return transportation and insurance will be billed as part of the repair and is in addition to the minimum charge.

For Service Contact:

Customer Service Department
GreenSpring Computers
181 Constitution Drive
Menlo Park, CA 94025. U.S.A.
(415) 327–1200
(415) 327–3808 fax

Specifications

VMEbus Conformance	Revision IEEE P1024/D1.2
VMEbus Form Factor	3U (single high)
IndustryPack® Conformance	ANSI/VITA 4—1996
Number of IndustryPacks	Two single high, or One double high
IP Memory Mapping	A24/D16 VME AM Codes: 39, 3A, 3D & 3E
Memory Size	None, or 128 Kbytes to 4 MB in 6 increments.
IP I/O Mapping	A16/D16 VME AM Codes: 29 & 2D
I/O Size	512 bytes
VMEbus Interrupts	IRQ1, IRQ2, IRQ4, IRQ5
I/O Interconnect	Two 50-pin .100 inch flat cable connectors
Front Panel Indicators	IP access acknowledge LEDs for each slot One power check LED
Power Requirements	+5 V @ 460 mA typical +12V @ 0 mA -12V @ 0 mA Additional power is consumed by IndustryPacks
Environmental	0°C to 70°C operating, Standard Product. –40°C to 85°C for —ET and —TX options. 5 to 95% relative humidity non-condensing
Size	172 mm deep 128.5 mm high (incl. front panel) 13.6 mm thick
Weight	0.14 Kg