

# BaBar VME Crate Specifications

Rev. 1.0, SLAC, 5/27/97

Each crate must satisfy all VME64 requirements (ANSI/VITA 1-1994). In addition to the standard specifications, the crates must meet requirements below. There are two types of VME crates: a 6U module crate and a 9U module crate.

## 6U Crate

1. The crate must have 21 functional slots
2. The card depth is 160mm. The depth of the crate including power connectors shall be less than 600 mm. The total height of the crate including crate, power supply, and fan-tray shall be less than 9U.
3. The backplane will contain all P1 and P2 slots fitted with pins in the back which are available for plugging in connections. Rear-side PCB guides for 160 mm deep cards to P1/P2. Rear cards must be able to mate with pins from the back plane. The area behind P1/P2 connector positions shall not be blocked (free access to P1/P2), so that rear cards can be removed.
4. The monolithic 21-slot P1/P2 backplane must have automatic daisy-chaining.
5. The power supplies shall be removable when the crate is mounted in a rack. All electrical power connections must be made with easily removable connectors.
6. The fan tray shall be removable when the crate is mounted in a rack. All electrical power connections must be made with easily removable connectors. The air flow shall be from the bottom to the top. The air-flow must be measured by the vendor on a rectangular grid. The grid must be measured over each functional slot with a rectangular spacing of at least 3 locations. The minimum acceptable air flow is 200 lfm at any location in the crate. The maximum temperature rise for a fully loaded crate is 10 degree Celsius.
7. The AC source is either 115V or 208V, 60 Hz, and must be switchable (automatic sensing/switching or manual). US power plugs.
8. The power supply shall have following voltages and currents:
  - +5V -> 200 A
  - +12V -> 10A
  - -12V -> 10A
9. The power supply must meet or exceed current VME power supply specifications. The 1985 VME specifications state the peak to peak ripple must be less than 50 mV for frequencies less than 10 MHz. The voltage limits for above voltages under all running conditions are defined by:
  - +4.875V < +5V < +5.25V
  - +11.7V < +12V < +12.6V
  - -12.3V < -12V < -11.7V
10. The power supplies and fan-trays must be reliable. The MTBF of the power supplies and fan-tray of one crate must exceed 60,000h.
11. The power supply shall be turned on/of by two means: a front-panel switch and by a TTL level

input signal, connector located on the rear of the crate.

12. The front-panel display shall have a digital display for current and voltage for all three voltages. A switch can be used to select which voltage/current is displayed.
13. Each crate shall have the provision for external monitoring of the 3 voltages, 3 currents, and crate temperature in one (or both) of following ways:
  - Option 1: Monitoring values converted to equivalent analog voltages provided on rear side connector. The analog monitoring signals must be within the range from 1V to 9V. The maximum cable length is 25 feet. The connector shall be mounted on the rear side of the crate. All lines shall be short circuit protected. Fusing is not acceptable.
  - Option 2: Industrial standard digital bus interface providing monitored values. Connector to be in the front of the crate, two connectors for easier daisy-chaining. For this option CAN bus standard is preferred.
14. A TTL level output shall indicate when the crate power trips. A TTL level output shall indicate when the fan fails. The crate shall have a TTL input that allows for bus reset. All signals to be on the back of the crate.
15. Each crate must shut down when a power supply is out of range.
16. Each crate must shut down when the temperature exceeds a certain values, tentatively 50 degrees Celsius.
17. Each crate must shut down upon a failure of a fan.

## **9U Crate**

1. The crate must have 21 functional slots
2. The card depth is 400 mm. The depth of the crate including power connectors shall be less than 750 mm. The total height of the crate including crate, power supply, and fan-tray shall be less or equal 12 U.
3. The backplane will contain all P1/P2 slots fitted with pins in the back which are available for plugging in connections. Rear-side PCB guides for 160 mm deep cards to P1/P2. Rear cards must be able to mate with pins from the back plane. The area behind P1/P2 connector positions shall not be blocked (free access to P1/P2), so that rear cards can be removed.
4. The monolithic 21-slot P1/P2 backplane must have automatic daisy-chaining.
5. P3 custom backplane shall be mounted by crate supplier. P3 backplane is supplied by SLAC. Power connections to be made to P3 are +12 V, -5.2 V, +5V and ground.
6. The power supplies shall be removable when the crate is mounted in a rack. All electrical power connections must be made with easily removable connectors.
7. The fan tray shall be removable when the crate is mounted in a rack. All electrical power connections must be made with easily removable connectors. The air flow shall be from the bottom to the top. The air-flow must be measured by the vendor on a rectangular grid. The grid must be measured over each functional slot with a rectangular spacing of at least 3 locations. The minimum acceptable air flow is 200 lfm at any location in the crate. The maximum temperature rise for a fully loaded crate is 10 degree Celsius.
8. The AC source is either 115V or 208V, 60 Hz, and must be switchable (automatic sensing/switching or manual). US power plugs.

9. The power supply shall have following voltages and currents:
  - +5V -> 400 A
  - +12V -> 20A
  - -12V -> 10A
  - -5.2V -> 100A
10. The power supply must meet or exceed current VME power supply specifications. The 1985 VME specifications state the peak to peak ripple must be less than 50 mV for frequencies less than 10 MHz. The voltage limits for above voltages under all running conditions are defined by:
  - +4.875V < +5V < +5.25V
  - +11.7V < +12V < +12.3V
  - -12.3V < -12V < -11.7V
  - -5.4 < -5.2V < -5.0V
11. The power supplies and fan-trays must be reliable. The MTBF of the power supplies and fan-tray of one crate must exceed 60,000h.
12. The power supply shall be turned on/of by two means: a front-panel switch and by a TTL level input signal, connector located on the rear of the crate.
13. The front-panel display shall have a digital display for current and voltage for all four voltages. A switch can be used to select which voltage/current is displayed.
14. Each crate shall have the provision for external monitoring of the 4 voltages, 4 currents, and crate temperature in one (or both) of following ways:
  - Option 1: Monitoring values converted to equivalent analog voltages provided on rear side connector. The analog monitoring signals must be in the range from 1V to 9V. The maximum cable length is 25 feet. The connector shall be mounted on the rear side of the crate. All lines shall be short circuit protected. Fusing is not acceptable.
  - Option 2: Industrial standard digital bus interface (serial link) providing monitored values. Connector to be in the front of the crate, two connectors for easier daisy-chaining. For this option CAN bus standard is preferred.
15. A TTL level shall indicate when the crate power trips. A TTL level shall indicate when the fan fails. The crate shall have a TTL input that allows for bus reset. All signals to be on the back of the crate.
16. Each crate must shut down when a power supply is out of range.
17. Each crate must shut down when the temperature exceeds a certain values, tentatively 50 degrees Celsius.
18. Each crate must shut down upon a failure of a fan.