GT200® VME

Hardware Reference

Document No. G-T-MR-G1VME6U#-A-0-A2

FOREWORD

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Curtiss-Wright Controls, Inc. Embedded Computing
Data Communication
2600 Paramount Place Suite 200
Fairborn, OH 45324 USA
Tel: (800) 252-5601 (U.S. only)
Tel: (937) 252-05601

FCC

This product is intended for use in industrial, laboratory, or military environments. This product uses and emits electromagnetic radiation, which may interfere with other radio and communication devices. The user may be in violation of FCC regulations if this device is used in other than the intended market environments.

CE

As a component part of another system, this product has no intrinsic function and is therefore not subject to the European Union CE EMC directive 89/336/EEC.

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1. INTRODUCTION

1.1 How to Use This Manual

1.1.1 Purpose

This document is a reference manual for the GT200 VME card. It provides a physical and functional description of the GT200 VME card. The manual describes how to unpack, set up, install, and operate the hardware.

1.1.2 Scope

This information is intended for systems designers, engineers, and network installation personnel. You need at least a systems level understanding of general computer processing, computer networking, and hardware operation to effectively use this manual.

Style Conventions

- Called functions are italicized. For example, *OpenConnect()*.
- Data types are italicized. For example, *int*.
- Function parameters are bolded. For example, **Action**.
- Path names are italicized. For example, *utility/sw/cfg*.
- File names are bolded. For example, **config.c**.
- Path file names are italicized and bolded. For example, ***utility/sw/cfg/config.c***.
- Hexadecimal values are written with a "0x" prefix. For example, 0x7e.
- For signals on hardware products, an 'Active Low' is represented by prefixing the signal name with a slash (/). For example, /SYNC.
- Code and monitor screen displays of input and output are boxed and indented on a separate line. Text that represents user input is bolded. Text that the computer displays on the screen is not bolded. For example:

```
C:\ls
file1       file2          file3
```

- Large samples of code are Courier font, at least one size less than context, and are usually on a separate page or in an appendix.

1.2 Related Information

- *American National Standard for VME64 (ANSI/VITA 1-1994(R2002))*, VITA www.vita.com.
- *American National Standard for VME64 Extensions (ANSI/VITA 1.1 – 1998(R2003))*, VITA
- *American National Standard for 2eSST (ANSI/VITA 1.5 – 2003)*, VITA P. O. Box 19658 Fountain Hills, AZ 85269 USA
- PCI Local Bus Specification, Revision 2.2, 18 DEC 1998, PCI SIG

- CMC Specification (IEEE P1386/Draft 2.4a), Revision 21 MAR 2001, IEEE
- PMC Specification (IEEE P1386.1/Draft 2.4a), Revision 21 JAN 2001, IEEE
- *LinkXchange GLX4000 Physical Layer Switch User Reference Manual* (Doc. No. F-T-MR-L5XL144), Curtiss-Wright Controls, Inc.
- *LinkXchange VLX2500 Physical Layer Switch User Reference Manual* (Doc. No. F-T-MR-VLX2500#), Curtiss-Wright Controls, Inc.
- *GT200 Hardware Reference for PCI and PMC Cards*, Curtiss-Wright Controls, Inc. (Document No. G-T-MR-G1PCPMCP-A-0-xx)
- *GT200 API Guide*, Curtiss-Wright Controls, Inc. (Document No. G-T-ML-G1AP1)
- Curtiss-Wright Controls, Inc web address: www.cwcembedded.com

1.3 Quality Assurance

Curtiss-Wright Controls' Corporate policy is to provide our customers with the highest quality products and services. In addition to the physical product, the company provides documentation, sales and marketing support, hardware and software technical support, and timely product delivery. Our quality commitment begins with product concept, and continues after receipt of the purchased product.

Curtiss-Wright Controls' Quality System conforms to the ISO 9001 international standard for quality systems. ISO 9001 is the model for quality assurance in design, development, production, installation, and servicing. The ISO 9001 standard addresses all 20 clauses of the ISO quality system, and is the most comprehensive of the conformance standards.

Our Quality System addresses the following basic objectives:

- Achieve, maintain, and continually improve the quality of our products through established design, test, and production procedures.
- Improve the quality of our operations to meet the needs of our customers, suppliers, and other stakeholders.
- Provide our employees with the tools and overall work environment to fulfill, maintain, and improve product and service quality.
- Ensure our customer and other stakeholders that only the highest quality product or service will be delivered.

The British Standards Institution (BSI), the world's largest and most respected standardization authority, assessed Curtiss-Wright Controls' Quality System. BSI's Quality Assurance division certified we meet or exceed all applicable international standards, and issued Certificate of Registration, number FM 31468, on May 16, 1995. The scope of Curtiss-Wright Controls' registration is: "Design, manufacture and service of high technology hardware and software computer communications products." The registration is maintained under BSI QA's bi-annual quality audit program.

Customer feedback is integral to our quality and reliability program. We encourage customers to contact us with questions, suggestions, or comments regarding any of our products or services. We guarantee professional and quick responses to your questions, comments, or problems.

1.4 Technical Support

Technical documentation is provided with all of our products. This documentation describes the technology, its performance characteristics, and includes some typical applications. It also includes comprehensive support information, designed to answer any technical questions that might arise concerning the use of this product. We also publish and distribute technical briefs and application notes that cover a wide assortment of topics. Although we try to tailor the applications to real scenarios, not all possible circumstances are covered.

Although we have attempted to make this document comprehensive, you may have specific problems or issues this document does not satisfactorily cover. Our goal is to offer a combination of products and services that provide complete, easy-to-use solutions for your application.

If you have any technical or non-technical questions or comments, contact us. Hours of operation are from 8:00 a.m. to 5:00 p.m. Eastern Standard/Daylight Time.

- Phone: (937) 252-5601 or (800) 252-5601
- E-mail: DTN_support@curtisswright.com
- Fax: (937) 252-1465
- World Wide Web address: www.cwcembedded.com

1.5 Ordering Process

To learn more about Curtiss-Wright Controls' products or to place an order, please use the following contact information. Hours of operation are from 8:00 a.m. to 5:00 p.m. Eastern Standard/Daylight Time.

- Phone: (937) 252-5601 or (800) 252-5601
- E-mail: DTN_info@curtisswright.com
- World Wide Web address: www.cwcembedded.com

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2. PRODUCT OVERVIEW

2.1 Overview

Curtiss-Wright Controls GT200 VME card is a single-slot, single-card computer that utilizes a Motorola MPC8540 I/O processor, Tundra Tsi148 VME to PCI/X Bridge, 256 MB of DDR SDRAM and 128 MB of Flash memory. The GT200 VME card has one PMC slot in which a GT200 PMC card is installed.

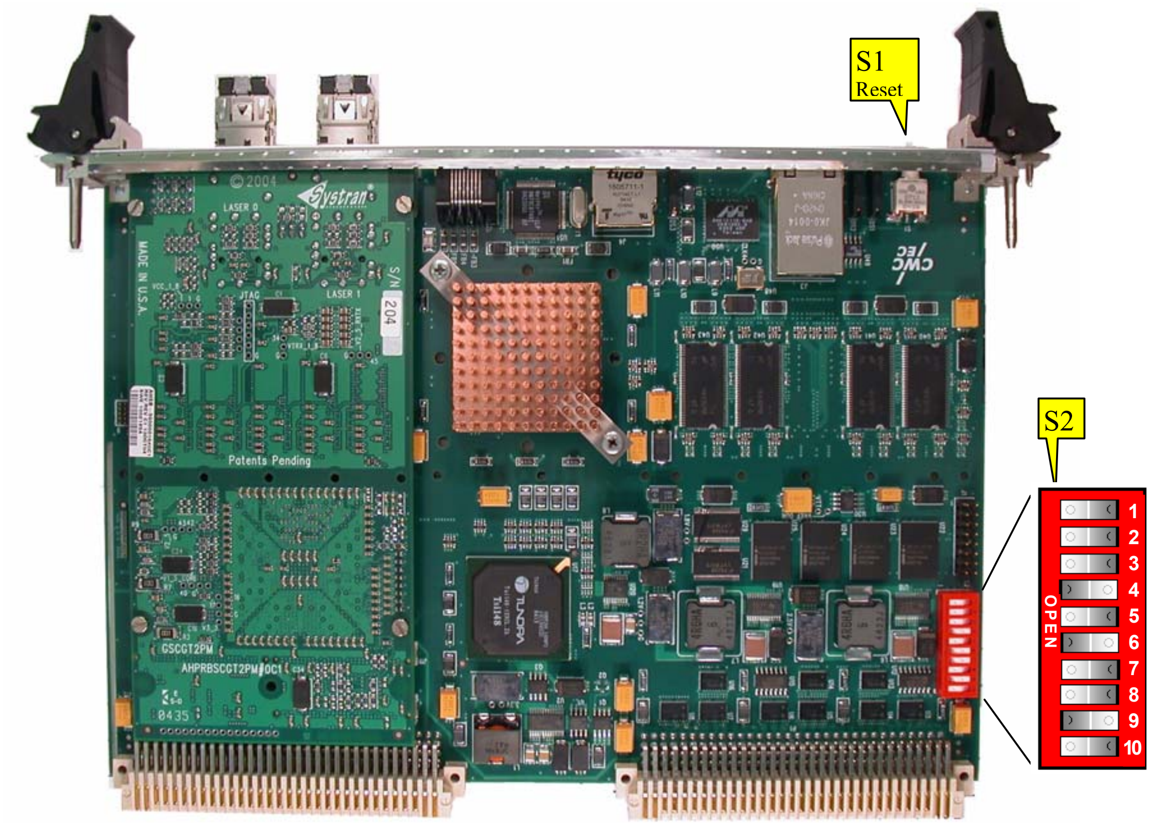


Figure 2-1 GT200 VME Card

2.1.1 Features

The GT200 VME has the following features:

- Supports concurrent network and host accesses with no loss of network data or need to implement network flow control
- Status LEDs that report link status
- Two Small Form Factor Pluggable (SFP) media options available— short wavelength laser (850 nm) and long wavelength laser (1300 nm)
- 2.5 Gbps fiber-optic interface with redundant transceiver option for network topology redundancy
- Operates with the LinkXchange family of switches (2.5 Gbps or faster)
- Tundra Tsi148™ PCI/X-to-VME Bridge
    - Supports VME legacy protocols

    - Two independent single channel DMA controllers
    - Supports 2eSST and 2eVME protocols
- RS-232 serial port
- Two Ethernet interfaces, one 10/100/1000BaseTX and one 10/100BaseTX
- VME64x form factor, will operate in VME64 3-row backplane

2.2 SFP Media Options

The physical media interface of the GT200 design uses SFP transceiver modules. These modules are hot swappable, providing an efficient way to modify the media interface configuration as needed.

Two basic SFP media options are available for the GT200. These media options are a long wavelength laser (1300 nm) and short wavelength laser (850 nm). All cards use a Duplex LC style connector available from most major cable manufacturers.

Figure 2-2 SFP Transceiver Module

Long wavelength laser interconnections are recommended for distances longer than 250 meters, as loss in multimode fiber degrades connections with short wavelength lasers past this distance.

The short wavelength version is useful for intrasystem connections, where you are connecting between cards on the same backplane. It is also suited for short reach intersystem connections (< 250 m).

The SFP transceivers comply with the Small Form-factor Pluggable transceiver MultiSource Agreement (SFP MSA) to ensure compatibility between the different transceiver manufacturers.

2.2.1 LED Descriptions

Six pairs of status LEDs along with RJ-45 connector LEDs are visible from the front panel of the GT200 VME card. The front panel LEDs are shown in Figure 2-3.

From the left end of the panel:

Power ON LED (Green) – Enabled when power is applied to the card
Card Fail LED (Red) – Turns off when board has successfully booted

Ethernet 10/100/1000

- Connector – Tx activity LED (Green) & Rx activity LED (Green)
- 100 Mbps speed indicator LED (Green)
- 1Gbps speed indicator LED (Green)

Ethernet 10/100

- Connector – Tx activity LED (Yellow) & Rx activity LED (Green)
- 10 Mbps speed indicator LED (Green)
- 100 Mbps speed indicator LED (Green)

Fiber Communication Status LEDs

- The Link Select LED (LS) indicates which channel of the GT200 board is selected. When the LED is off, channel 0 is selected. When the LED is on, channel 1 is selected.
- The Link Up LED (LU) turns on when the selected channel is receiving a valid GT200 signal.
- The Signal Detect LEDs (R0, R1) indicate a signal is being received by the corresponding transceiver.
- The Laser Enable LEDs (T0, T1) indicate the corresponding transceiver is turned on.

Figure 2-3 GT200 VME Card Faceplate

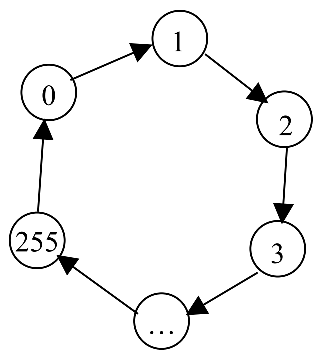
2.3 Topologies

There are various topologies for the GT200 VME card. These topologies should cover most customer applications, though if another topology is desired contact Curtiss-Wright Controls, Inc. Technical Support to see if it is possible. The topologies are:

Non-redundant ring
Redundant ring
Point-to-Point
Daisy Chain
Monitoring
Switch ring
Redundant switch ring

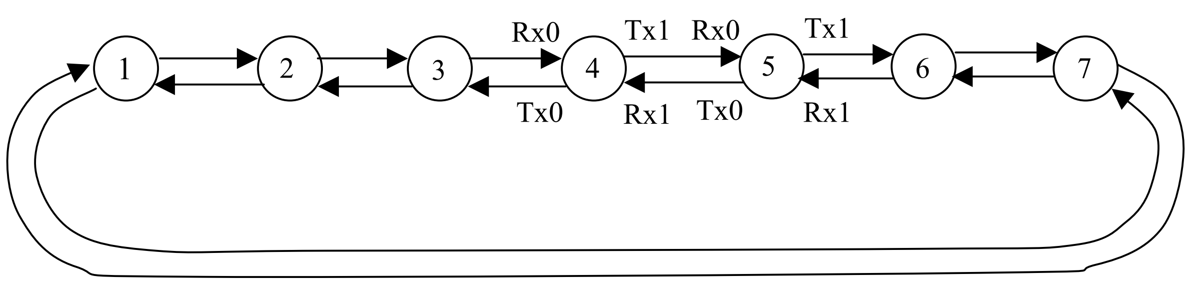
2.3.1 Non-Redundant Ring

This is the simplest of the topologies, with a single transmit/receive connection per node. Any data written to one node is broadcast to all nodes. A break in one node of fiber caused the ring to be broken. This topology would be used in a system where a failure in the ring is not critical.



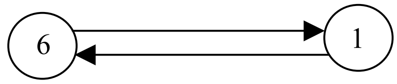
2.3.2 Redundant Ring

This topology is the same as a non-redundant ring; only a second ring is added using the second transceiver to create a ring with data flowing in the opposite direction. A failure in one of the rings does not prevent data from flowing to all the nodes. This topology would be used in critical systems where a break in the ring cannot be tolerated.



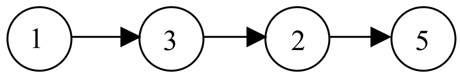
2.3.3 Point-to-Point

This is a special version of the non-redundant ring where there are just two nodes.



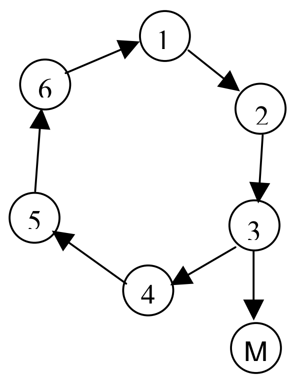
2.3.4 Daisy Chain

This topology only allows data to flow in one direction. This topology is used where data does not need to be sent back to the sending node. The first node in the chain could be a remote sensor sending data to several receiving nodes.



2.3.5 Monitoring

A monitoring topology is a non-redundant ring with one of the nodes transmitting the data on its second transceiver to a monitoring node. The monitoring node can be used to watch the status of the ring and check the ring's health.



2.3.6 LinkXchange GLX4000 Physical Layer Switch

The GLX4000 Physical Layer Switch has the following features:

- Up to 144 non-blocking I/O ports.
- Up to 4.25 Gbps/port data rate.
  - 48 Small Form Factor, Pluggable (SFP) transceiver modules per SFP port card.
  - 48 (SFP) transceiver modules per SFP Retimed port card
  - 48 IEEE 1394b "Firewire" copper media ports per IEEE 1394b port card.
  - Port cards and pluggable transceivers may be mixed in one system.
- Supports Loop, Point-to-Point, One-to-Many communication links.
- Supports multiple physical media options including short wavelength (850 nm), long wavelength (1300 nm), and HSSDC2.
- Automatic port fault isolation.
- Front panel indicators:
  - Signal Detect.
  - Transmitter ON.
  - Heartbeat.
  - Flash Write.
  - Fan/Temperature Alarm.
  - Watchdog.
- Out-of-band control through an Ethernet port.
- Can be controlled from a remote location.
- Dual-redundant hot-swappable power supplies.
- Hot-swappable fans.
- Hot-pluggable Small Form-factor transceiver modules.
- Hot-pluggable port cards.
- Multiple temperature monitoring points within the enclosure.
- Configuration data stored on a removable CompactFlash card.
- Automatic fan speed control based on enclosure temperature.
- Fan tachometer monitor.

For detailed information regarding the GLX4000 features and operation, contact Curtiss-Wright Controls, Inc. and request a copy of the *GLX4000 Physical Layer Switch Hardware Reference Manual* or visit our web site.

2.3.7 VLX2500 Physical LayerSwitch

Curtiss-Wright Controls' VLX2500 Physical LayerSwitch provides the following features:

- 16 non-blocking SFP transceiver ports (with optional 8-port expansion card)
- 3.2 Gbps/port baud rate
- 25.6 Gbps total bandwidth (51.2 Gbps with optional 8-port expansion card)
- Supports Arbitrated Loop, Point-to-Point, One-to-Many communication links
- Optional bypass of retiming circuitry for each port
- Retimed ports support short wavelength (850 nm), long wavelength (1300 nm), and HSSDC2 physical media options
- SFP transceiver MultiSource Agreement (SFP MSA) compatibility for each port to ensure functional support for transceivers from other manufacturers
- Flexible automatic I/O port fault isolation
- Multiple media options
- Hot-swappable SFP modules
- Cross-point configuration controlled across VME Bus or RS-232 port
- Front panel "Signal Detect" status indicators for each port provided
- Front panel "Power On" status indicator
- Front panel "Transmitter On" status indicator for each port
- Front panel "Heartbeat" status indicator
- Provides unique VME card base addressing
- Card Reset switch
- Password Reset switch
- Watchdog timer
- 32 KB Non-volatile SRAM (NVSRAM)

For more detailed information regarding VLX2500 features and operation, contact Curtiss-Wright Controls, Inc. and request a copy of the *LinkXchange VLX 2500 Physical LayerSwitch Hardware Reference Manual* or visit our web site.

2.3.8 Switch Ring

The LinkXchange VLX2500 switch can extend a ring or connect multiple rings. The switch ring topology allows the nodes to be reconfigurable. The node's position within the ring can be reordered, or multiple rings can be formed from groups of nodes connected to the switch.

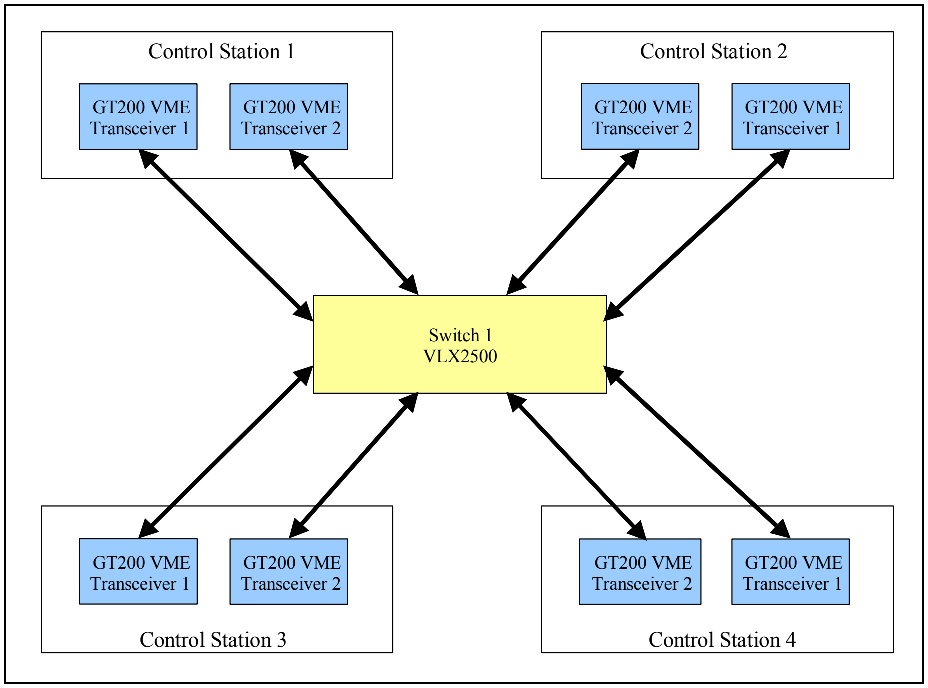


Figure 2-4 Switch Ring

Any node can be the initiating node. Any data write by the host to the GT200 VME memory triggers a message to all nodes to replicate the new data.

2.3.9 Redundant Switch Ring

Multiple VLX2500 switches provide redundancy to protect network integrity.

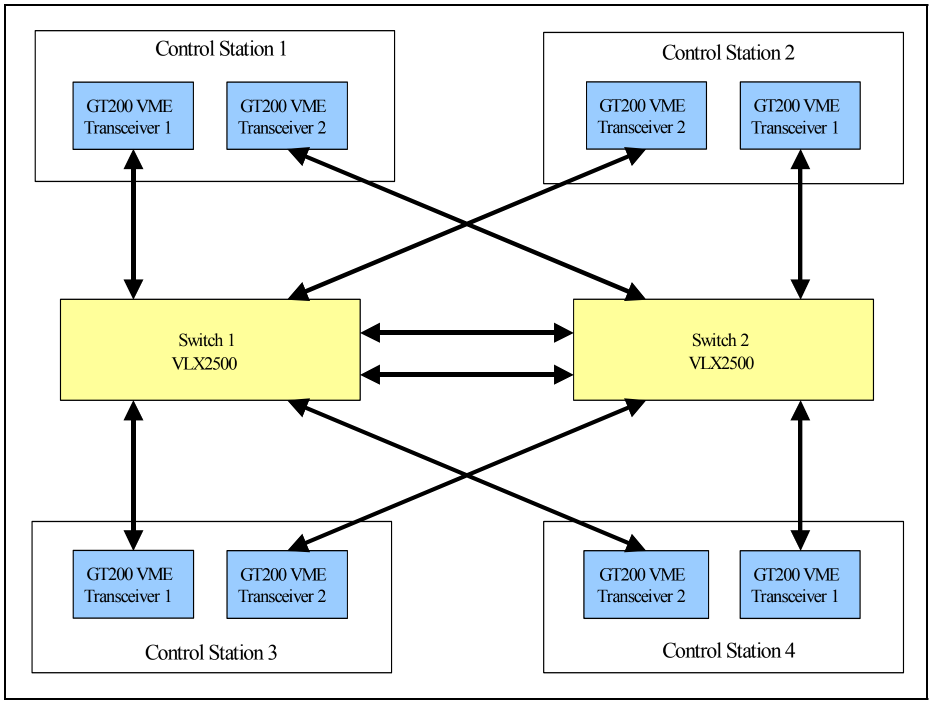


Figure 2-5 Redundant Switch Ring

3. INSTALLATION

3.1 Overview

The GT200 VME card requires a single 6U VME or VME64x backplane slot and interfaces directly to a fiber-optic cable.

To install a GT200 VME card, follow the steps below:

1. Unpack the card.
2. Inspect the card.
3. Configure the card.
4. Install the card.
5. Connect the cables.

3.2 Unpack the Card

CAUTION: Exercise care regarding the static environment. Use an anti-static mat connected to a wristband when handling or installing the GT200 card. Failure to do this may cause permanent damage to the components on the card.

Follow the steps below to unpack the card:

1. Put on the wristband attached to an anti-static mat.
2. Remove the card and anti-static bag from the carton.
3. Place the bag on the anti-static mat.
4. Open the anti-static bag and remove the card.
5. In the unlikely event that you should need to return your GT200 VME, please keep the original shipping materials for this purpose.

Any optional equipment is shipped in separate cartons.

3.3 Inspect the Card

The GT200 VME consists of a VME64x carrier card with a GT200 PMC installed. If the assembly was damaged in shipping, notify Curtiss-Wright Controls, Inc. or your supplier immediately.

3.4 Configure the GT200 VME Card

3.4.1 Configuration Switch (S2)

Position 1: VME System Failure Enable (SFAILEN, must be in the CLOSED position if switch Position 3 is in the OPEN position)

OPEN: VME SYSFAIL* signal is asserted at system reset and de-asserted by the on-board GT200 VME processor after the card is fully initialized.

CLOSED: VME SYSFAIL* signal is not asserted unless AUTO Slot ID feature is enabled (ASIDEN). See switch position 3 description below (default).

Position 2: VME System Failure AUTO Slot ID Clear (SFAILAI_AC)

OPEN: If AUTO Slot ID feature is enabled, VME SYSFAIL* is asserted and then automatically cleared by hardware in the Tsi148.

CLOSED: VME SYSFAIL* is de-asserted by the on-board GT200 VME processor after the card is initialized (default).

Position 3: VME AUTO Slot Enable (ASIDEN) and **Position 4**: Geographical Slot ID Enable (GSIDEN) – Controls base address initialization of the GT-VME's Tsi148 CR/CSR registers according to Table 3-1 below:

Table 3-1 Slot Configuration Switches

Position 3 (ASIDEN)	Position 4 (GSIDEN)	Description
CLOSED	CLOSED	CR/CSR disabled.
OPEN	CLOSED	AUTO Slot ID enabled
CLOSED	OPEN	Geographical Address enabled (default)
OPEN	OPEN	Geographical Address defaults to AUTO Slot ID if GA (4:0)* pins are all high.

Position 5: VME System Controller Disable (SCONDIS#) and **Position 6**: VME System Controller Enable (SCONEN#) – Controls the VME System Controller feature of the GT200 VME Card according to Table 3-2 below:

Table 3-2 System Control Switches

Position 5 (SCONDIS#)	Position 6 (SCONEN#)	Description
CLOSED	CLOSED	Not valid.
OPEN	CLOSED	System Controller feature enabled.
CLOSED	OPEN	System Controller feature disabled. (Default)
OPEN	OPEN	AUTO System Controller detect enabled.

Position 7: Factory set to CLOSED. Do not change.

Position 8: Factory set to CLOSED. Do not change.

Position 9: Factory set to OPEN. Do not change.

Position 10: Reserved.

3.5 Configure the GT200 PMC Card

3.5.1 Installing SFP Modules

The physical media interface of the GT200 VME design uses SFP transceiver modules. These modules are hot swappable, providing an efficient way to modify the media interface configuration as needed. Always take the usual precautions against electrostatic discharge when handling SFP modules.

The SFP module contains a printed circuit board (PCB) that mates to an SFP electrical connector, located within the metal SFP receptacle cage on the GT200 VME card (last two connectors on the right of Figure 2-3). The SFP PCB is exposed through a cutout on the back end of the SFP module. The orientation of the SFP must be correct to insert it successfully into the receptacle cage.

To insert an SFP module, hold the module with the PCB cutout facing downward toward the GT200 VME card and slide it into the receptacle cage on the card. There will be a small click as the module latches into place. The SFP module is designed to only fit into the receptacle cage a certain way. If the SFP module is inserted wrong, it will not fully slide into the receptacle cage. If this happens, remove the module and reinsert it correctly.

To remove an SFP module, press or slide the latch release on the module. This is usually a button or tab on the bottom side of the module that moves toward the rear of the card. The module will pop out slightly as the latch releases. Pull the module out of the receptacle cage.

The GT200 VME cards are shipped with a Dust/EMI plug for each SFP transceiver receptacle. Install these in empty receptacles to prevent contamination of internal components and to optimize EMI performance.

3.6 Install the Cards

STOP

WARNING: Turn off power to your VME chassis before attempting to install the GT200 VME Card.

The GT200 VME occupies one 6U VME slot. Install the card as you would any other VME card. Ensure the backplane connectors are fully seated, and tighten the screws located at the each end of the front panel.

3.7 Connect the Fiber Optic Cables

The two factors to consider when connecting the cables are the topology and the transmission media used. The cards can be connected in several different topologies depending on your application. See section 2.3 Topologies, for more detailed examples.

Fiber-optic Cable Precautions

CAUTION: Fiber-optic cables are made of glass and may break if crushed or bent in a loop with less than a 2-inch radius.

Look at the cable ends closely before inserting them into the connector. If debris is inserted into the transmitter/receiver connector, it may not be possible to clean the connector out and could result in damage to the transmitter or receiver lens. Hair, dirt, and dust can interfere with the light signal transmission.

Use an alcohol-based wipe to clean the cable ends.

For short wavelength modules, either 50 µm or 62.5 µm core diameter cable should be used. For distances up to 125 meters, 62.5 µm core cable can be used, and for distances up to 250 meters, 50 µm core cables are required. For distances greater than 250 meters (up to 10 kilometers), long wavelength modules with 9 µm core cables must be used.

The optional fiber-optic cables may be shipped in a separate carton. Remove the rubber boots on the fiber-optic transmitters and receivers as well as those on the fiber-optic cables. Replace these rubber boots when cables are not in use or if the node must be returned to the factory. Attach the fiber-optic cables to the connectors on the GT200 card.

Figure 3-1 and Figure 3-2 depict the types of fiber-optic connectors needed for the GT200 VME card.

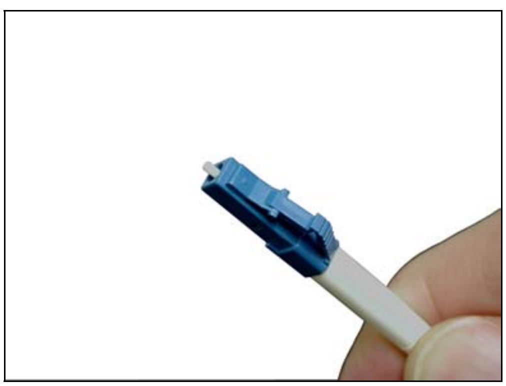


Figure 3-1 Fiber-optic Simplex LC Connector

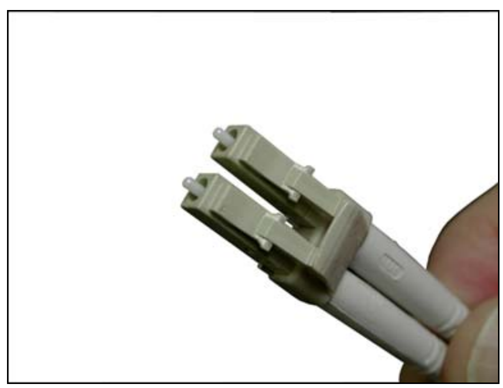


Figure 3-2 Fiber-optic Duplex LC Connector

3.8 Troubleshooting

If the system does not boot correctly, power down the machine, reseat the card, double-check cable connections, and turn the system back on. If problems persist, contact Curtiss-Wright Controls, Inc. Technical Support at **(800) 252-5601** or **DTN_support@curtisswright.com** for assistance.

Please be prepared to supply the following information:

Card Type:	______________________
Firmware Version*:	______________________
Configuration/Status Info*:	______________________
S2 Switch Settings:	______________________
Problem Reproducibility:	______________________
Problem Description:	______________________

* This information is available through the GT200 VME menu system see section 4.4.5 GT200 VME Configuration.

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4. OPERATION

4.1 Overview

This section details the GT200 VME's features, functionality, and operation.

4.2 Functional Description

The GT200 VME product is a VME64x carrier card with a GT200 PMC card installed. The GT200 VME appears simply as a block of GT200 memory mapped as a VME slave device. The memory is accessible by VME master devices using a variety of slave access modes.

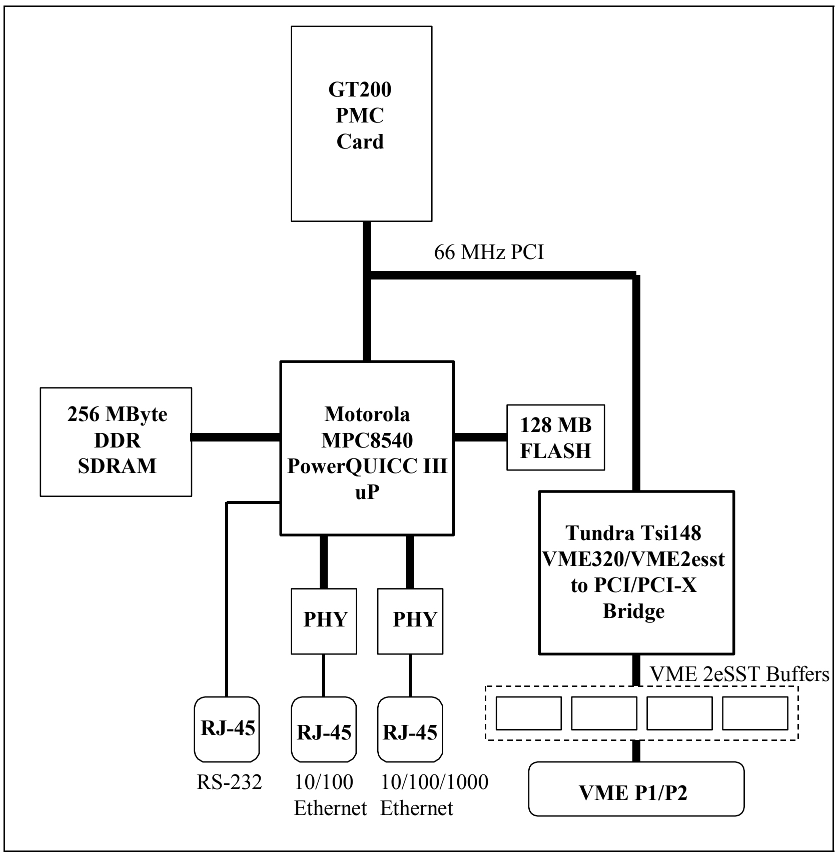


Figure 4-1 GT200 VME Block Diagram

4.2.1 Network Paradigm

The GT200 Network is a connectionless-broadcast shared-memory network. Each host processor on the network has access to its own local copy of shared memory that is updated over a high-speed, serial-ring network. The network is optimized for the high-speed transfer of data among multiple, real-time computers that are all solving portions of the same real-time problem.

4.2.2 Ring Topology

The GT200 Network is a ring topology network. The ring topology supports circuit-switch operation for topology reconfiguration and fault isolation. Ring protocol is register insertion with source message removal.

Data is transmitted at a maximum of 2.5 Gbps over fiber-optic cables. There is an approximate 0.4µs (minimum) latency at each node as the frame works its way around the ring. Delay can be imposed when a node must complete the transmission of a native message packet before retransmitting a foreign message packet. A GT200 Network can accommodate up to 255 nodes per network ring.

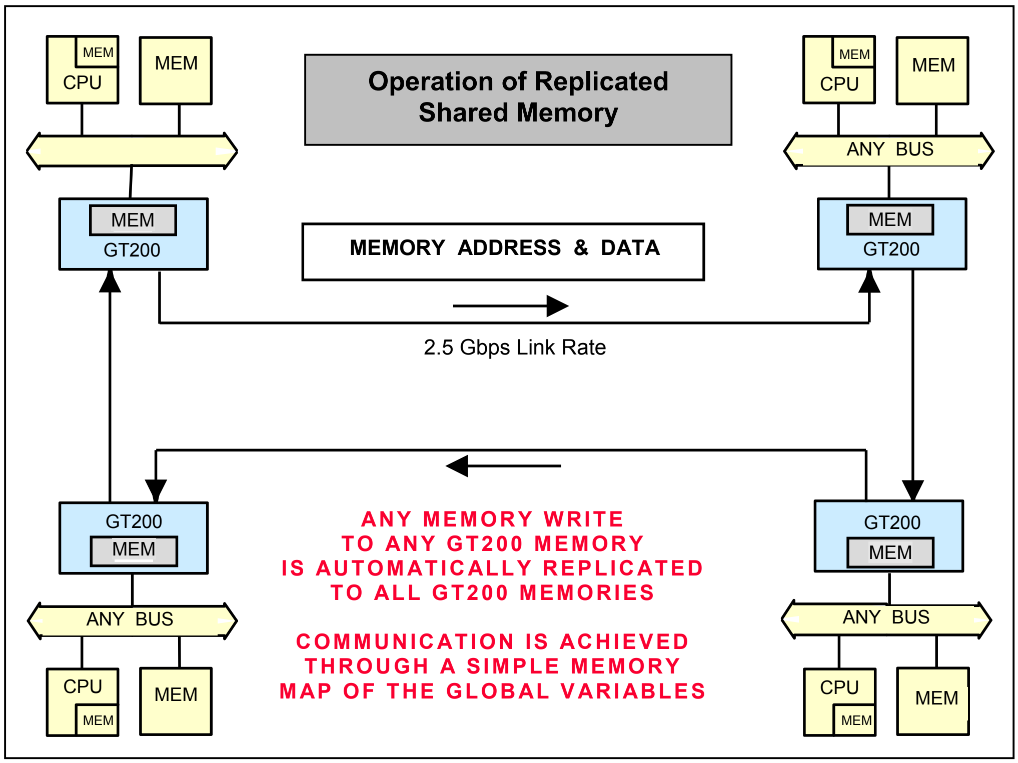


Figure 4-2 Replicated Shared Memory

4.2.3 Physical Interface

Fiber Optic Short Wavelength (850 nm)—2.5 Gbps
Fiber Optic Long Wavelength (1300 nm)—2.5 Gbps

4.2.4 Network Size

The network supports up to 255 nodes. Each node on the GT network has an associated node ID. When a node transmits a native packet, it sends its node ID as part of the packet header. When a node receives a data packet, it compares its own node ID with the node ID in the received packet header. If the node IDs match, the packet is identified as a native packet and is not retransmitted. If they do not match, the packet is identified as a foreign packet and is retransmitted without modification. This packet removal mechanism prevents traffic from circulating around the ring more than once.

It follows from above, that if two nodes on a ring share the same node ID, they will remove non-native packets from the ring.

Valid node IDs range from 0 to 255. However, node ID 0 is used by default when boards are first powered on, using ID 0 is not recommended. The node ID is software programmable.

NOTE: It is possible the architecture will treat network traffic originating from node ID 0x00 differently to reduce effects from improperly initialized nodes. Consequently, the number of nodes supported is 255.

The maximum fiber length supported is 10 km based on the ring size, media used, and status messaging.

4.2.5 Interface Standards

The GT200 interface is a proprietary interface running at 2.5Gbps. The interface uses both 8B/10B encoding and CRC32 error checking.

4.2.6 Network Framing

Frame types include:

- Variable length data frame
- Sub-length data frame (for transactions less than 32-bits)

Frames are of variable-length with support for payload sizes as integer multiples of four bytes. Payload size can range from a 4-byte minimum to a 128-byte maximum. Network logic transparently handles appropriate generation of framing, including length selection. Framing overhead includes delimiters, source node ID, age, address, and other control functions.

Sub-length data frames include 32-bits of data with four independent byte enables to support transfer sizes less than 32 bits, preserving the concept of memory transparency.

4.2.7 Link Interface

- Laser Enable (one per link)
- Link Select-Link Up
- Laser Signal Detect (one per link)

4.2.8 Network Throughput

The maximum network write throughput is approximately 205 MBps (base10).

4.2.9 Error Detection

All network frames include a Cyclical Redundancy Check (CRC) to facilitate error detection in the network receiver interface.

The CRC is automatically verified by network hardware without user intervention. In addition, the end of frame delimiter incorporates flags for CRC errors such that a detected CRC error on one node is detectable on other downstream nodes, even though the frame may have been modified (corrected) in the retransmission process. The network also includes other error detection mechanisms, such as an invalid transmission word encountered during the decoding process. Network errors include CRC error, encoding error, framing error, and expired message error.

4.2.10 Latency

Latency is the delay that a frame accumulates when passing through nodes and cables. Each node contributes approximately 0.45 µs to a frame's latency, and each meter of fiber-optic cable contributes 5 ns to a frame's latency. A complete discussion of GT200 network latency is beyond the scope of this manual. For more information, see Curtiss-Wright Controls Technote G-T-ST-SCTN0138-A-0-A1, or consult with our Tech Support staff.

4.2.11 Message Ordering

Host writes to the network progress in-order; message priorities are not used. Once on the network, messages are not reordered. However, new messages from other nodes may be inserted between messages that are in progress.

4.2.12 Memory

In its simplest form, the GT200 Network system appears as general-purpose memory. The use of this memory depends on the nature of the data stored and conventions and limitations imposed by the specific host computer system and operating system. On most processors, this means that the application program can use this memory in the same way as any other data-storage area of memory. The memory cannot be used as instruction space.

The major difference between GT200 memory and system memory is that any data written into GT200 memory is automatically sent to the same GT200 memory location in all nodes on the network. This is why it is also referred to as replicated shared memory.

When a host computer writes to the shared memory, the GT200 node host adapter supplies the proper handshaking logic. The shared memory behaves somewhat like resident or local memory.

4.2.13 FIFO Buffers

The GT200 card contains various FIFO buffers used for temporarily storing information during normal send and receive operation of the node.

4.2.13.1 Retransmit FIFO

This buffer is used to receive foreign messages from the network, and send them on, or to hold received foreign messages while inserting a native message from the host onto the network.

Each node is responsible for receiving foreign messages, writing them to its copy of shared memory, and re-transmitting the message to the next node.

4.2.13.2 Receive FIFO

The Receive FIFO is designed as a temporary holding place for incoming foreign messages while the shared memory is busy servicing a host request. This FIFO is designed so it can never be overrun.

4.2.14 Network Status Messaging

The network logic in each node deploys a timer in the transmission logic that identifies when a local network status-messaging interval has expired. This interval of approximately 1µs is chosen based on maximum media transmission delays, fidelity of status updates, and impacts to network throughput. When the status message interval expires, the node generates a network status message automatically (with no software overhead).

Priority for transmitted traffic is first given to retransmitted traffic (from the insertion buffer), then to network status messages, and finally to locally generated traffic (from the transmit buffer). When the network status message is generated, it includes the local node ID and applicable status/control information (local age determined by the local receive logic, information regarding the local node such as RX_EN, TX_EN, RT_EN, link up, signal detects and enables for applicable link interfaces, etc.).

4.2.14.1 Shared Information

- Node ID
- Upstream Node ID
- Laser Enable (one per link)
- Link Select
- Redundant Link Capable
- Transmit Enable
- Receive Enable
- Retransmit Enable
- Write Me Last
- Link Up
- Laser Signal Detect (one per link)

4.2.15 Modes of Operation

The Figure 4-3 shows a diagram of configuration switches accessible through the menu system for each mode of operation.

4.2.15.1 Write-Me-Last Mode

The Write-Me-Last mode of operation allows the originating node to be the last node in the ring to have the data deposited to its memory. This can be useful for synchronization. This means that when the host performs a write to the GT200 shared memory, this data is not immediately written to the host node’s memory, but is first sent to the other nodes on the network. When the message returns to the originating node, it is written to shared memory, and is then removed from the network ring.

Therefore, host-originated data written to shared memory travels the ring updating the GT200 node memories on the ring and, upon returning to the originating node, that node writes the data to its own shared memory as the last node on the ring. This guarantees that the data is available on all other nodes.

WARNING: This mode is not recommended for applications that use duplicate node IDs or for open-ring topologies.

4.2.15.2 TX Enable

Transmit enable mode allows data to be transmitted to the network. The default condition is on.

4.2.15.3 RX Enable

Receive enable mode allows data to be received from the network. The default condition is on.

4.2.15.4 RT Enable

Retransmit mode allows received data to be retransmitted to the network. The default condition is on.

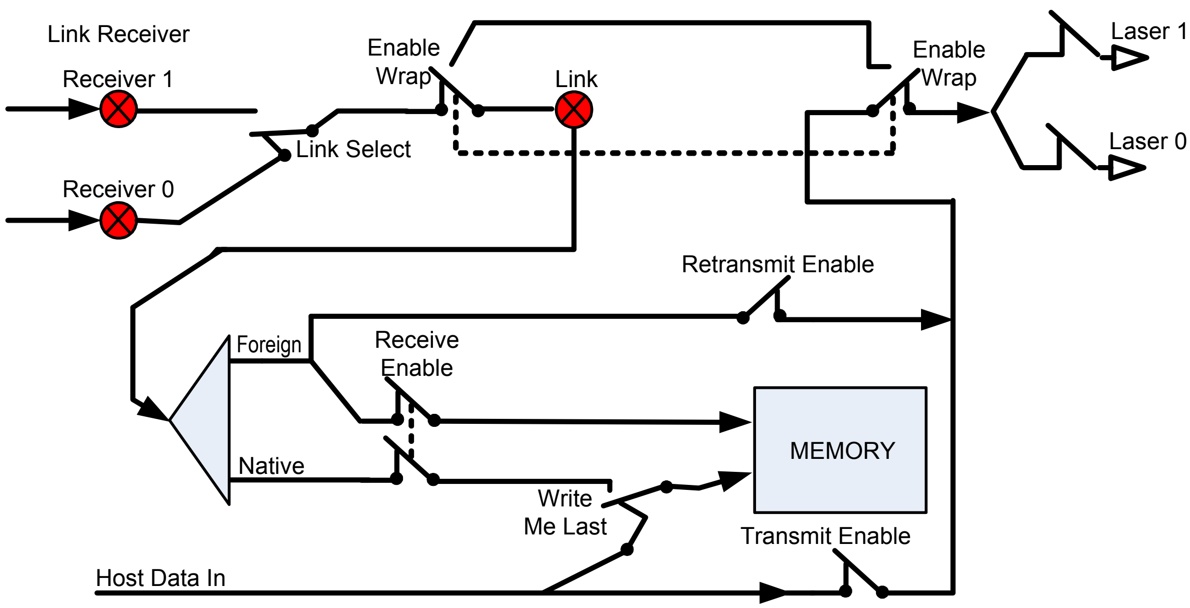


Figure 4-3 Configuration Switch Diagram

4.3 GT200 Block PMC Diagram

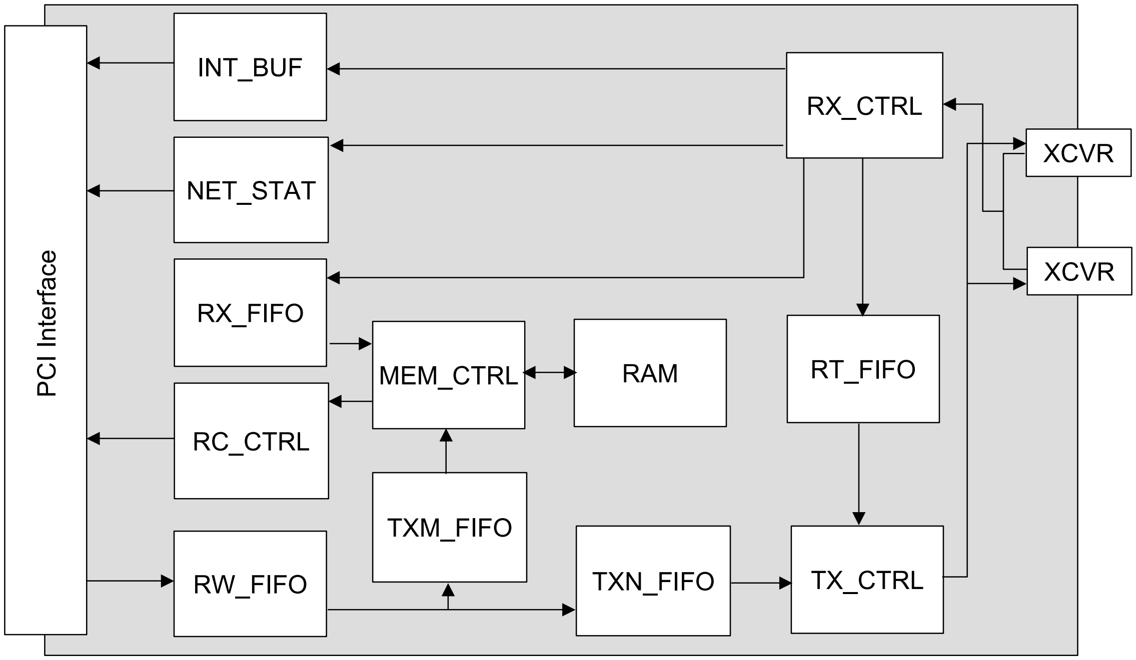


Figure 4-4 GT200 PMC Block Diagram

4.3.1 Network Logic

XVCR.....................SFP 2.5 Gbps fiber optic transceiver.
RX_CTRL ....Receive control logic. Decodes receive framing protocol
RT_FIFO ....Retransmit FIFO. Buffers retransmitted link data
TXN_FIFO ....Transmit to Network FIFO. Buffers network transmit data
TX_CTRL ....Transmit control logic. Handles transmit framing protocol

4.3.2 Host Logic

INT_BUF ....Network to Host Interrupt Queue. Buffers received network interrupts
NET_STAT ....Network Status Look Up Table
RX_FIFO................Receive FIFO. Buffers received data
MEM_CTRL ....Memory Controller
RAM.......................Memory. 125 MHz 32-bit DDR SDRAM
TXM_FIFO ....Transmit to Memory FIFO. Buffers transmit data
RW_FIFO...............Read/Write FIFO
RC_CTRL ....Read Cache Controller

4.4 User Interfaces

4.4.1 VME Interface

4.4.1.1 VME Slave

The GT200 VME memory appears as a 128 MB VME slave window and supports the following types of accesses:

- Address: A16, A24, A32, or A64
- Data: D8, D16, and D32 Single Cycle Transaction (SCT)
- Data: D8, D16, and D32 Block Transfers (BLT)
- Data: D64 Multiple Block Transaction (MBLT)
- Data: D64 2eVME Asynchronous 2 edge Handshake
- Data: D64 2eSST Synchronous No Handshake

4.4.1.2 VME System Controller

GT200 VME is configurable to be a VME System Controller by the DIP switches described in chapter 3. The following System Controller features are supported:

- VMEbus Arbiter (PRI, RRS, and SGL)
- IACK Daisy-Chain Driver
- SYSRESET Driver
- Global VMEbus Timer – generates BERR* upon bus timeout detection
- 16 MHz System Clock Driver

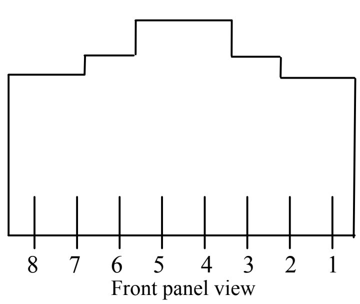
4.4.1.3 VME CR/CSR

GT200 VME supports accesses to the 512 kilobyte CR/CSR space as defined by the ANSI/VITA standards for VME64 and VME64x. Only the upper 4 kilobytes are supported at this time (These are the internal Tsi148 control registers). Accesses to the lower 508 kilobytes are not supported and will produce a VME Bus Error. The CR/CSR space is accessible using the A24 CR/CSR Address Modifier (AM) code. The base address for the CR/CSR space is configurable using either the Geographical Address or by the AUTO Slot ID option. These options are selected by the S2 DIP switches previously described in Chapter 3.

4.4.2 RS-232 Interface

One RS-232 port is provided on an 8-pin RJ-45 connector with the following pin-out:

1. DCD
2. RTS
3. GND
4. Tx Data
5. Rx Data
6. GND
7. CTS
8. DTR



The settings are as follows:

- Baud Rate: 19,200
- Data Bits: 8
- Parity: None
- Stop Bits: 1
- Hardware Handshaking: None

The RS-232 port is not used during normal operation, but may be used to access utilities to configure the card.

4.4.3 10/100 Ethernet Interface

One 10/100 Mbps Ethernet port is provided on an 8-pin RJ-45 connector. The 10/100 Ethernet port is not used during normal operation, but may be used to access utilities to configure the card.

4.4.4 10/100/1000 Ethernet Interface

One 10/100/1000 Mbps Ethernet port is provided on an 8-pin RJ-45 connector. The 10/100/1000 Ethernet port is not used during normal operation, but may be used to access utilities to configure the card.

4.4.5 GT200 VME Configuration

4.4.5.1 Configuring GT200 VME Via RS-232 (Serial) Console

Initial configuration of GT200 VME should be performed through the RS-232 interface. Connect to this interface using terminal emulation software (e.g. HyperTerminal or Minicom) configured with the settings described in section 4.4.2 RS-232 Interface. After boot-up has completed, a "login" prompt will appear (if connecting after boot-up, press <ENTER> a few times to reach the login prompt). Log in with username, '**user', **no password is required. A simple menu system will appear which allows numerical selection from several options. This menu system can be used to configure and view GT200 VME settings including:

- VME windows and VME slot number
- GT200 options
- Ethernet / IP interface settings

The menu system can also be used to restore factory default configurations.

Configuration changes made using the menu system are stored in flash memory, and will be retrieved and restored each time GT200 VME is powered up. Changes also take effect real-time after the user gives confirmation, unless otherwise noted. For example, changes to the IP settings will be delayed until boot-up unless forced into effect when prompted.

4.4.5.2 Configuring GT200 VME Via Ethernet

Configuration changes can also be made through the Ethernet interfaces. Connections can be established using the Telnet protocol. Any Telnet client application should suffice for establishing a connection to GT200 VME. Unlike RS-232 connections, Ethernet connections cannot be established until the board is fully booted. Telnet connections provide the same menu interface as RS-232 connections.

In order to connect, one must know the IP address of GT200 VME on the network. The Ethernet configuration settings, including IP address and MAC address, can be retrieved using an RS-232 connection. Static IP addresses for the Ethernet interfaces can be configured, or DHCP can be used. See section 4.4.6.1 Ethernet Interface Configuration for more information.

4.4.5.3 Factory Default Configuration

The following points are true regarding the GT200 VME factory default configuration:

- All VME windows are disabled, excluding CR/CSR windows.
- VME slot number is auto detected
- Ethernet / IP interfaces use DHCP.

Factory default settings can be restored using the menu system.

4.4.5.4 VME Address Window Configuration

GT200 VME can be configured to respond to seven or fewer different VME address windows (ranges). The factory default settings disable all windows so that GT200 VME will not respond to VME bus accesses. This prevents conflict with other devices prior to configuration by the user.

The user must enable and configure VME windows before the GT200 VME can be accessed from the VME bus. To configure VME windows, select 'VME Configuration Menu' followed by 'Configure VME Interface' from the menu system. Enter the desired window settings when prompted. Note that a window must be enabled when prompted before further settings can be configured.

The following information will be requested when setting up a window:

- **Window Enable** - You must enable a window to be prompted for further window configuration settings. Only enabled windows will be accessible from the VME bus.
- **VME Address Space** - The VME address space (A16, A24, A32, A64) to which GT200 VME responds for this window. Other configuration settings are also restricted based on the selected address space.
- **VME Address** - The base address to which GT200 VME responds on the VME bus. See also the note below regarding granularity.
- **Window Size** - The size of the window. GT200 VME responds to VME addresses in range "VME Address" to "VME Address + Window Size - 1". Window size cannot exceed 0x8000000 (128 MB for the current GT200). See also the note below regarding granularity.

- **GT Memory Offset -** The offset in GT200 VME physical memory to which the VME Address maps. In conjunction with the window size, this option may be used to allow access to restricted portions of the available GT200 VME memory. For the A16 and A24 address spaces, this offset can be used to gain access to portions of GT200 VME memory that are above the VME addressable range (A16 only provides 64 KB of addressable memory and A24 provides 16 MB). See also the note below regarding granularity.

It is not required that more than one window be enabled. All 128 MB of GT200 VME memory can be mapped in a single window using A32 or A64 address spaces.
Also, if two VME address windows overlap within the same address space, the lower numbered window has priority.

> **NOTE:** Each address space has an alignment restriction for the VME address and GT memory offset, and a granularity restriction for the window size. The A64 and A32 address spaces require 64KB (0x10000) alignment and granularity. The A24 and A16 address spaces require 4KB (0x1000) and 16B (0x10) alignment and granularity, respectively.

4.4.5.5 VME Slot Number Configuration

The user may specify the VME slot number of GT200 VME. The factory default setting is to auto-detect the slot number using geographical or auto-slot ID detection features provided by the VME backplane. If your VME backplane does not support geographical or auto-slot ID features, you can configure the slot number by selecting "VME Configuration Menu" followed by "Configure VME Interface" from the menu system. Enter the desired slot number (1-21) when prompted, or zero (0) for auto-detection. You must reset GT200 VME for the slot number to be changed.

4.4.6 GT Network Interface Configuration

GT network interface options may be configured from the menu system by selecting “GT Configuration Menu” followed by “Configure GT Interface.” The available options are:

- **Node ID** – The network identifier of the GT node. The user should configure each node on the network with a unique node ID. The node ID is used in the removal of traffic from the network, and in identifying native traffic.
- **Receive Interface** – Selects the transceiver used for receiving network traffic.
- **Receive Path** – When turned on, allows data received from the network to be written to GT memory. When turned off, data received from the network is not written to GT memory.
- **Transmit Path -** When turned on, allows data written locally to GT memory to also be transmitted to the network. When turned off, prevents locally written data from being transmitted to the network.
- **Retransmit Path** – When turned on, allows non-native data received on the network to be retransmitted to the network. When turned off, prevents retransmission of received data.
- **Write-last** – When turned on, locally written data will be written to local GT memory after it traverses the network and is received at the receive interface.

When turned off, locally written data will be written to local GT memory as it is transmitted to the network.

- **EWRAP Path –** Electronic Wrap. When turned on, the network interface is bypassed, and transmitted data is internally wrapped to the receive interface. This is useful for testing when a network link is unavailable. When turned off, data is transmitted and received from the network.
- **Laser 0 Enable –** When turned on, the interface 0 laser is turned on. When turned off, the interface 0 laser is turned off.
- **Laser 1 Enable –** When turned on, the interface 1 laser is turned on. When turned off, the interface 1 laser is turned off.
- **Byte Swapping** – When turned on, locally written data is byte swapped (the order of four 8-bit bytes within a 32-bit word is reversed) before being written to GT memory or transmitted to the network, and after being read from GT memory. When turned off, byte swapping does not occur.
- **Word Swapping -** When turned on, locally written data is word swapped (the order of two 32-bit words within a 64-bit word is reversed) before being written to GT memory or transmitted to the network, and after being read from GT memory. When turned off, word swapping does not occur.

4.4.6.1 Ethernet Interface Configuration

The Gigabit and 10/100 Ethernet interfaces may be configured from the menu system by selecting "IP Configuration Menu" followed by "Configure Gigabit Ethernet IP Interface" or "Configure 10/100 Ethernet IP Interface." Ethernet configuration changes will not take effect until the next boot up, unless forced into effect when prompted. This is to prevent accidental loss of current Ethernet connections. The available options for each Ethernet interface are:

- **Boot Protocol** – Select "DHCP" to allow the IP address to be dynamically configured at boot time using Dynamic Host Configuration Protocol (DHCP). Select "static" to manually specify a static IP address. If DHCP is selected, further options are not configurable.
- **IP Address** – The static IP address to be used at each boot-up.
- **Network Mask** – Optional IP network mask (netmask). If unspecified, a default netmask will be selected based on the class of the IP address.
- **Gateway Address –** Optional gateway address to other networks.

For static boot protocol, the IP address, network mask, and gateway address should all be entered using dotted decimal notation, e.g. 192.168.1.1. If DHCP is preferable, your network DHCP server may be configured to provide a fixed IP address to GT200 VME based on MAC address, though this is not required.

Contact your network administrator for assistance is selecting valid IP addresses and configurations.

APPENDIX A

SPECIFICATIONS

A.1 Hardware

A.1.1 Specifications

Hardware Compatibility:.. ANSI/VITA 1-1994 VME64 (IEEE STD 1014), ANSI/VITA 1.1-1997 VME64 Extensions, VITA 1.5-199x 2eSST

Physical Dimensions:

VME Card .... 9.187 inches x 6.299 inches (233.3 mm x 159.9 mm)

Weight:

VME Card .... 1.02 lbs. (463 g)

Electrical Requirements:.. +4.75 to +5.25 VDC, 6 Amps (max)

Power Dissipation:... 31.5 Watts (max)

Temperature Range

Storage: .... -40° TO +85° C

Operation:.. 0° to +50° C at 200 LFM air flow

GT200 VME Specifications:

Network Line Transmission Rate:.................... 2.5 Gbps

Message Length: .... Variable

Maximum Nodes on Network Ring: 255

Maximum Node Separation:

Standard Fiber:.. 250 meters

Long Link Fiber: .... 10 kilometers

Shared Memory:

On-board Memory..................................... 128 MB

Effective Network Bandwidth:

4 bytes/packet (random): .... 33 MB/s

128 bytes/packet (sequential): .... 210 MB/s

Node Latency:

Insertion: .... 0.35 µs

Pass Through: .... 0.45 µs

A.1.2 Mean Time Between Failures Specifications (MTBF)

Description	MTBF
H- AS-G6V128SC-00-GT200, No Media	102,238
H- AS-G6V128SC-20-GT200, 850 nm Short Wave Pluggable Transceiver	100,109
H- AS-G6V128SC-22-GT200 , 850 nm Short Wave Pluggable Transceiver (x2)	98,067
H- AS-G6V128SC-23-GT200, (x1) 850 & 1300 nm (x1) Pluggable Transceivers	96,720
H- AS-G6V128SC-30-GT200, 1300 nm Long Wave Pluggable Transceiver	98,607
H- AS-G6V128SC-33-GT200, 1300 nm Long Wave Pluggable Transceiver (x2)	95,410

The MTBF numbers are based on calculations using MIL-HDBK-217F, Appendix A, for a ground-benign environment at 85° C.

A.2 Media Interface Specifications

A.2.1 Fiber-Optic Media Interface Specifications

Connector:.................................. Duplex LC

850 nm:

Media.................................. 50 µm or 62.5 µm multimode fiber

Maximum Fiber Length: ..... 250 meters with 50 µm fiber
125 meters with 62.5 µm fiber

Transmit Wavelength: .... 830 to 860 nm
Transmit Power: .... -10 to -1 dBm
Receive Wavelength:........... 770 to 860 nm
Receive Sensitivity:............ -15.5 to 0 dBm

1300 nm:

Media.................................. 9 µm single-mode fiber

Maximum Fiber Length: ..... 10 km
Transmit Wavelength: .... 1285 to 1330 nm
Transmit Power: .... -9.5 to 0 dBm
Receive Wavelength:........... 1100 to 1600 nm
Receive Sensitivity: .... -19 to -3 dBm

APPENDIX B

ORDERING INFORMATION

B.1 Part Number Ordering Information

B.1.1 GT200 VME PMC Ordering Information

Table B-1 -GT200 VME

Order Number	Description
H- AS-G6V128SC-00	GT200, No Media
H- AS-G6V128SC-20	GT200, 850 nm Short Wave Pluggable Transceiver
H- AS-G6V128SC-22	GT200 , 850 nm Short Wave Pluggable Transceiver (x2)
H- AS-G6V128SC-23	GT200, (x1) 850 & 1300 nm (x1) Pluggable Transceivers
H- AS-G6V128SC-30	GT200, 1300 nm Long Wave Pluggable Transceiver
H- AS-G6V128SC-33	GT200, 1300 nm Long Wave Pluggable Transceiver (x2)

B.1.2 Short Wavelength: Multimode Fiber-Optic Cables

The following table lists the order numbers for the simplex and duplex, 50/125 µm multimode fiber-optic cables, for use with the short wavelength laser media interface.

Table B-2 LC to LC

Simplex Part Number	Duplex Part Number	Length	Cable End 1	Cable End 2
FHAC-M1LC3000-00	FHAC-M2LC3000-00	3 meters	LC	LC
FHAC-M1LC5000-00	FHAC-M2LC5000-00	5 meters	LC	LC
FHAC-M1LC1001-00	FHAC-M2LC1001-00	10 meters	LC	LC
FHAC-M1LC2001-00	FHAC-M2LC2001-00	20 meters	LC	LC
FHAC-M1LC3001-00	FHAC-M2LC3001-00	30 meters	LC	LC
FHAC-M1LCxxxx-00	FHAC-M2LCxxxx-00	Custom	LC	LC

Table B-3 LC to ST

Simplex Part Number	Duplex Part Number	Length	Cable End 1	Cable End 2
FHAC-M1LCST03-00	FHAC-M2LCST03-00	3 meters	LC	ST
FHAC-M1LCST05-00	FHAC-M2LCST05-00	5 meters	LC	ST
FHAC-M1LCST10-00	FHAC-M2LCST10-00	10 meters	LC	ST
FHAC-M1LCST20-00	FHAC-M2LCST20-00	20 meters	LC	ST
FHAC-M1LCST30-00	FHAC-M2LCST30-00	30 meters	LC	ST
FHAC-M1LCSTxx-00	FHAC-M2LCSTxx-00	Custom	LC	ST

Table B-4 SC to LC

Simplex Part Number	Duplex Part Number	Length	Cable End 1	Cable End 2
FHAC-M1SCLC01-00	FHAC-M2SCLC01-00	1 meter	SC	LC
FHAC-M1SCLC03-00	FHAC-M2SCLC03-00	3 meters	SC	LC
FHAC-M1SCLC05-00	FHAC-M2SCLC05-00	5 meters	SC	LC
FHAC-M1SCLC10-00	FHAC-M2SCLC10-00	10 meters	SC	LC
FHAC-M1SCLC20-00	FHAC-M2SCLC20-00	20 meters	SC	LC
FHAC-M1SCLC30-00	FHAC-M2SCLC30-00	30 meters	SC	LC
FHAC-M1SCLCxx-00	FHAC-M2SCLCxx-00	Custom	SC	FC

B.1.3 Long Wavelength: Single-mode Fiber-Optic Cables

The following table lists the order numbers for the simplex and duplex, 9/125 µm single-mode fiber-optic cables, for use with the long wavelength laser media interface.

Table B-5 LC to LC

Simplex Part Number	Duplex Part Number	Length	Cable End 1	Cable End 2
FHAC-S1LC3000-00	FHAC-S2LC3000-00	3 meters	LC	LC
FHAC-S1LC5000-00	FHAC-S2LC5000-00	5 meters	LC	LC
FHAC-S1LC1001-00	FHAC-S2LC1001-00	10 meters	LC	LC
FHAC-S1LC2001-00	FHAC-S2LC2001-00	20 meters	LC	LC
FHAC-S1LC3001-00	FHAC-S2LC3001-00	30 meters	LC	LC
FHAC-S1LCxxxx-00	FHAC-S2LCxxxx-00	Custom	LC	LC

Table B-6 SC to LC

Simplex Part Number	Duplex Part Number	Length	Cable End 1	Cable End 2
FHAC-S1SCLC01-00	FHAC-S2SCLC01-00	1 meter	SC	LC
FHAC-S1SCLC03-00	FHAC-S2SCLC03-00	3 meters	SC	LC
FHAC-S1SCLC05-00	FHAC-S2SCLC05-00	5 meters	SC	LC
FHAC-S1SCLC10-00	FHAC-S2SCLC10-00	10 meters	SC	LC
FHAC-S1SCLC20-00	FHAC-S2SCLC20-00	20 meters	SC	LC
FHAC-S1SCLC30-00	FHAC-S2SCLC30-00	30 meters	SC	LC
FHAC-S1SCLCxx-00	FHAC-S2SCLCxx-00	Custom	SC	LC

GLOSSARY

2eVME ------------------------------An asynchronous VME protocol. This protocol used both edges of the DA0*, DA1*, and DTACK* to qualify data thereby doubling throughput.

2eSST------------------------------ A source synchronous VME protocol. This protocol sends the data and strobe and does not wait for any acknowledgments, allowing data to be sent at much higher bandwidth. Both strobe edges are used; falling edges are used for odd data beats and rising edge for even data beats. This protocol increases the VME bandwidth to 320MBps.

block write cycle ----------------- A DTB cycle used to transfer a block of 1 to 256 bytes from a master to a slave. The block write cycle is very similar to the block read cycle. It uses a string of 1-, 2-, or 4-byte data transfers and the master does not release the DTB until all of the bytes have been transferred. It differs from a string of write cycles in that the master broadcasts only one address and address modifier (at the beginning of the cycle). Then the slave increments this address on each transfer so that the next transfer is stored in the next higher location.

bus timer--------------------------- A functional module that measures the time each data transfer takes on the DTB and terminates the DTB cycle if a transfer takes too long. Without this module, it could wait forever for a slave to respond if the master tries to transfer data to or from a nonexistent slave location. The bus timer prevents this by terminating the cycle.

CSR -------------------------------- Control/Status Register. These registers are used for configuration and control.

CTS-------------------------------- Rs-232 line indicating, Clear To Send data.

daisy chain topology------------- A configuration in which devices are connected to each other in sequence

DCD------------------------------- RS-232 line indicating. Data Carrier Detect

deterministic ---------------------- Completely predictable message transit time from application to application.

DHCP------------------------------ Dynamic Host Configuration Protocol. A protocol for assigning dynamic IP addresses to devices connected to the network.

DMA ------------------------------- Direct Memory Access transfer. An I/O transfer conducted by a device controller which accesses memory directly and, as a result, can transfer a large volume of data without requesting a processor interrupt after each unit amount. Contrast with programmed I/O (PIO) transfer.

DTB------------------------------- Data Transfer Bus. The lines on a VME backplane that control and transfer data throughout the backplane.

DTR-------------------------------- RS-232 line indicating, Data Terminal Ready

FIFO ------------------------------- A data storage method; First In First Out. Also refers to the specific storage area; Transmit FIFO, Interrupt FIFO, etc.

foreign message ------------------ A message that is in (passing through) a node other than the one of origin.

frame------------------------------ An organized finite stream of data moving through a network that includes pertinent and overhead transmission control and management data. Frame length is dynamically sized from 4 to 128 bytes.

GND------------------------------- RS-232 Ground line.

insertion latency ------------------ The time required for a GT200 card to insert data values into outgoing frames and remove data values from incoming frames.

loopback --------------------------- A method of transmitting to the same node's receivers for testing purposes. Applies to both fiber optic and wire media. Also, a test that loops the outgoing signal back to its source.

MAC------------------------------- Media Access Control. A hardware address that uniquely identifies each node of a network.

master ------------------------------ A functional module that initiates VME cycles to transfer data between itself and a slave module.

native message-------------------- A message that is received by the node of origin.

pass-through latency ------------- The time required for a GT200 card to process an incoming frame and retransmit it on the network.

point-to-point topology---------- A network topology in which one node connects directly to another node.

PIO --------------------------------- Programmed I/O transfer. An I/O transfer, primarily conducted by a driver program, that requires processor intervention after each byte or word is transferred. Contrast with Direct Memory Access (DMA) transfer.

ring topology---------------------- A network topology in which every node has exactly two branches connected to it.

RTS-------------------------------- RS-232 line indicating a Request To Send data.

Rx ---------------------------------- Abbreviation for receive or receiver.

RxData---------------------------- RS-232 Receive Data line.

SFP --------------------------------- Small form factor pluggable transceiver.

shared memory (SM) ------------ GT200 memory physically located on the network board. This dual-ported memory is accessible by the host and the network. A host write to shared memory results in a transmitted write to all GT200 nodes at the same relative location.

slave-------------------------------- A functional module that detects DTB cycles initiated by a master, and when those cycles specify its participation, transfers data between itself and the master.

slot --------------------------------- A position where a board can be inserted into a backplane. If the system has both a J1 and a J2 backplane (or a combination J1/J2 backplane) each slot provides a pair of 96-pin connectors. If the system has only a J1 backplane, then each slot provides a single 96-pin connector.

system clock driver -------------- A functional module that provides a 16 MHz timing signal on the utility bus.

Tx ---------------------------------- Abbreviation for transmit or transmitter.

TxData----------------------------- RS-232 Transmission Data line

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