10.3.3—Installation

The modules slide into card guides in the control's chassis and plug into the motherboard. The modules are held in place by two screws, one at the top and one at the bottom of the front panel. Also at the top and bottom of the module are two handles which, when toggled (pushed outward), move the modules out just far enough for the boards to disengage the motherboard connectors.

10.3.4—FTM Reference

See Chapter 13 for complete field wiring information for the Four Channel Actuator Module FTM. See Appendix A for part number cross reference for modules, FTMs, and cables.

10.3.5—Troubleshooting

Each I/O module has a red fault LED, which indicates the status of the module. This LED will help with troubleshooting if the module should have a problem. A solid red LED indicates that the actuator controller is not communicating with the CPU module. Flashing red LEDs indicate an internal problem with the module, and module replacement is recommended.

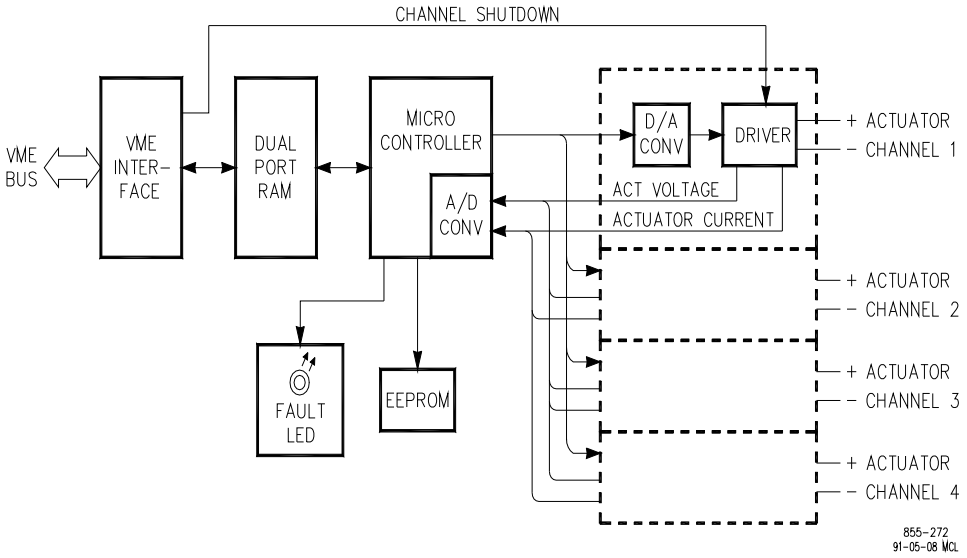

Figure 10-6—Four Channel Actuator Driver Module Block Diagram

10.4—Simplex Real Time SIO

10.4.1—Module Description

Each Real Time SIO Module contains the circuitry for three RS-485 ports. Each port is designed to communicate with EM or GS/LQ Digital Actuator Drivers. For each port, one driver is allowed for every 5 ms. Each driver is identified by its address switches, which must match the driver number in the GAP application program. The RS-485 communications to the Universal Digital Drivers can be used for monitoring or control purposes.

The Real Time SIO Module features:

- 5 ms update rate for critical parameters, with one driver per port
- Digital Actuator Driver interface

- Each RS-485 port may run in a different rate group
- Communication fault detection for each driver, drivers with comm faults are disabled
- Monitoring of driver parameters remotely
- Configuration of driver parameters remotely
- Allows a fast and very accurate position command (16 bits, no noise) for the drivers

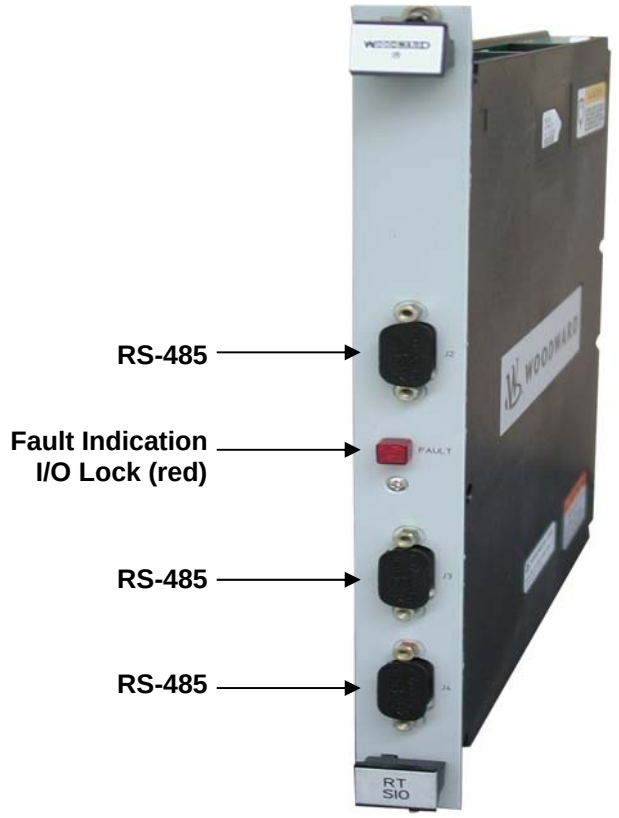

Figure 10-7—Real Time SIO Module

10.4.2—Module Specification

RS-485 Ports	
Rate Group	One driver per port, 5 milliseconds
Protocol	RS-485 UART, Woodward proprietary protocol
Baud Rate	417 kbaud
Parity	None
Data Bits	8
Stop Bit	1

10.4.3—Module Application

This module is designed to be used with Digital Drivers. Each Real Time SIO module contains three RS-485 ports. The units should have their termination resistors installed, to prevent reflections.

The RS-485 interface may be used in one of three ways:

- It can be used to send the position demand and configuration information to the driver, as well as monitor the driver status outputs.

- It can be used to configure the driver and monitor the status outputs, but not to send a position demand. The driver position demand would be from a 4–20 mA input or the CAN bus interface.
- It can be used to monitor the driver status outputs, but not configure the driver or send a position demand to the driver. The driver position demand could be from a 4–20 mA input or from the CAN bus interface, and the configuration input could be from RS-232 or from the CAN bus interface.

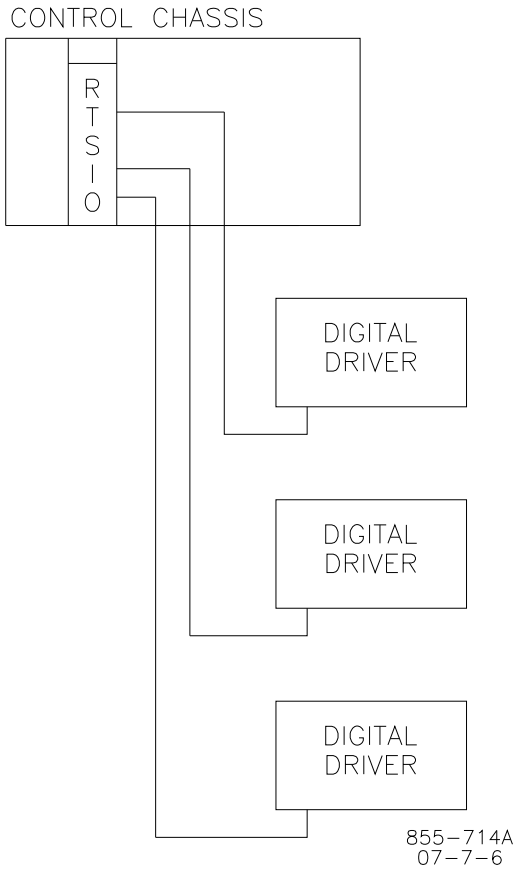

Figure 10-8—Sample System Configuration

10.4.4—Installation

The modules slide into card guides in the control's chassis and plug into the motherboard. The modules are held in place by two screws, one at the top and one at the bottom of the module. Also at the top and bottom are two handles which, when toggled, move the modules out just far enough for the boards to disengage the motherboard connectors.

The drivers have address switches on the control circuit board. These switches allow up to 99 drivers, although the Real Time SIO module can support a maximum of one driver per channel. During initialization, the driver reads these switches, and this becomes its address. It responds to data to this address and sends data with this driver address. The GAP application has an input field for address, which should be configured by the customer or application engineer to match the driver address switches.

The Real Time SIO Module and the Digital Driver contain optional termination resistors, which should be installed in the module.

10.4.5—Field Wiring

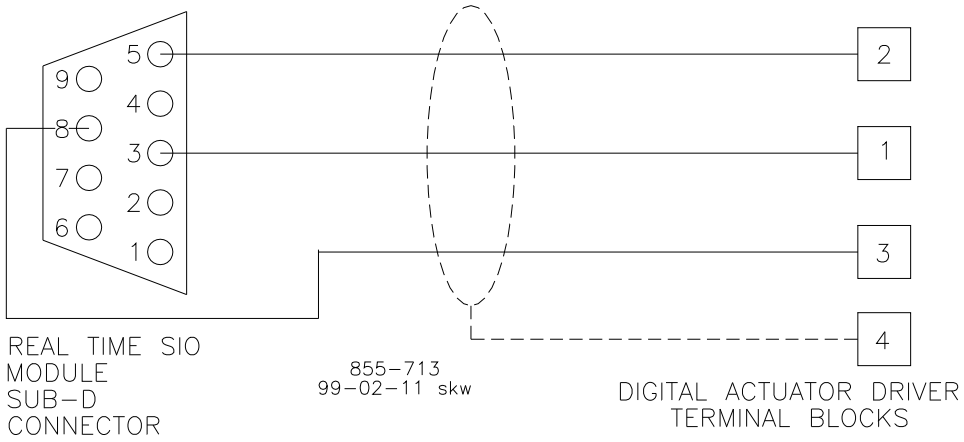

Figure 10-9—Wiring Diagram for the Real Time SIO Module

- Shields should be connected to earth ground at all intermediate terminal blocks, as well as terminated at the control terminal block. The exposed wire length beyond the shield should be limited to 25 mm (1 inch).
- Do not place shielded wires in the same cable conduit with high-voltage or large-current-carrying cables.
- Cable shields must be electrically continuous from the signal source to the point the signal wire enters the field terminal module.
- The address switches on the Digital Drivers should be set to match the addresses in the GAP application program.

The termination resistors should be installed on the last unit on each end of the network. On the Real Time SIO module, the termination resistor is installed by closing switches 3 and 4, and leaving switches 1 and 2 open, for each channel. On the Digital Driver, the termination resistor is installed by moving the RS-485 termination jumpers to the “IN” position.

Wiring Specifications	The RS-485 wiring should meet the requirements in the EIA RS-485 standard document for a 500 kbps network.

Table 10-1-Cable Specifications

Cable Specifications:	
0.2 mm² (24 AWG) or larger standard, shielded, twisted-pair cable	30 m (100 ft.) absolute maximum
0.3 mm² (22 AWG), low-capacitance cable (36 pF/m or 11 pF/ft.)	120 m (400 ft.) absolute maximum
0.5 mm² (20 AWG), low-capacitance cable (46 pF/m or 14 pF/ft.)	150 m (500 ft.) absolute maximum
For cable lengths longer than 150 m (500 ft.), optical repeaters and fiber optic cable should be used.	up to limits of fiber optic cables/transceivers

NOTICE

To assure reliable communications when using copper RS-485 cable, do not use any intervening devices such as relays or terminal blocks. The cable should run directly from one RS-485 device to the next device.

All cable lengths are calculated based on ideal conditions. It is recommended that installations attempt to minimize network problems due to harsh conditions and unforeseen circumstances by keeping the network length under 50% of the absolute maximum ratings.

10.4.6—Shields and Grounding

If the panel that the control chassis is mounted on is not at earth ground potential, connect it to earth ground via a 3.0 mm² (12 AWG) green/yellow wire or braid, keeping the braid or wire as short as possible.

The RS-485 wiring should be shielded, and the shield should be directly grounded to earth at the Digital Driver end of the cable. The shield should be AC coupled to earth at the MicroNet chassis and the entry point into the cabinet. If the shield is not directly grounded at the Digital Driver end of the cable, it should be connected directly to earth at the MicroNet chassis and the entry point into the cabinet. The shield should be continuous through the intermediate terminal blocks and not connected directly to earth at the intermediate terminal blocks. The exposed wire length, beyond the shield, should be limited to 25 mm (1 inch).

For compliance with EMC standards, it is required that all communications wiring be separated from all power wiring.

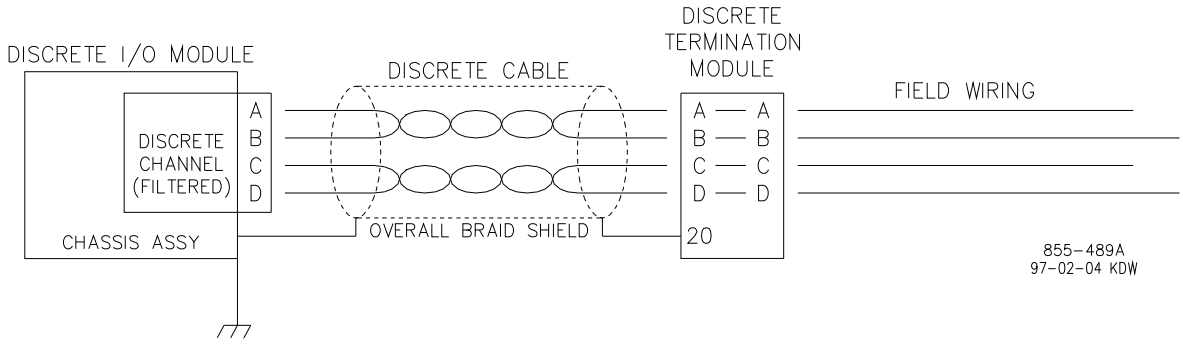

Figure 10-10—Shield Termination Diagram

10.4.7—Troubleshooting

Each I/O module has a red Fault LED controlled by the CPU, which is turned on when the system is reset. During initialization of a Real Time SIO Module, which occurs after every CPU reset, the CPU turns the Fault LED on. The CPU then tests the module using diagnostic routines built into software. If the diagnostic test is not passed, the LED remains on or blinks. If the test is successful, the LED turns off. If the Fault LED on a Real Time SIO Module is illuminated after the diagnostics and initialization have been run, the module may be faulty or in the wrong slot.