SMART TRAC™ *Genius PCIM Card*

Contents

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Warnings, Cautions and Notes

	WARNING
⚠	A statement of conditions which MUST BE OBSERVED to prevent personal injury or death.

	WARNING - ESD
⚡	A statement of conditions which must be observed to prevent damage to components due to ESD (ElectroStatic Discharge) and to prevent personal injury or death.

	CAUTION
❗	A statement of conditions which must be observed to prevent undesired equipment faults, Smart Trac AC1 system degradation and damage to equipment.

IMPORTANT

A statement of conditions which should be observed during Smart Trac AC setup or operation to ensure dependable service.

NOTE: Notes indicate information that is in addition to a discussion of the topic in adjoining text. Alternatively, it may limit or restrict the paragraph(s) that follow(s) to specific models or conditions.

TIP - Tips indicate information that should make a procedure easier or more efficient.

General Safety Precautions - Warnings

Important safety information follows. Please *read and understand* all precautions listed below before proceeding with the specification, installation, set-up or operation of your Smart Trac AC1. Failure to follow any of the following precautions may result in personal injury or death, or damage to the equipment.

WARNING - ESD

The Control Printed Circuit Board (PCB) employs CMOS Integrated Circuits that are easily damaged by static electricity. Use proper ElectroStatic Discharge (ESD) procedures when handling the Control PCB. See Smart Trac AC1 Technical Manual for details. Failure to comply may result in damage to equipment and/or personal injury.

Important Warranty Information.

Do not modify your Smart Trac AC1, its components, or any of the procedures contained in the technical documentation supplied by MagneTek. Any modification of this product by the user is not the responsibility of MagneTek and will void the warranty.

Smart Trac Genius PCIM Card

Capabilities

The Genius Card Option consists of a Smart Trac Genius PCIM card with mounting hardware. The card supports Genius network communications using the GE Fanuc Genius LAN Communications Protocol # 91.

Specifications

- Genius serial bus compatible connector

- Configurable for interrupts 5, 7, 11 and 12

- Supports baud rates of 153.6 Standard, 153.6 Enhanced, 76.8K and 38.4K

- Operating temperature

- Storage temperature

- Humidity 5% to 95% non-condensing

- Status LEDs indicate card health and network activity

Quick Start

1. Check DIP switch settings on the card against the default settings (see "Default Settings"). You should accept the default settings in all but unusual situations. Your Smart Trac Field Service Engineer can help you if you need assistance.

2. Power OFF your Smart Trac AC1 and tag "Out of Service."

3. Install the card in your Smart Trac AC1 in a PC/104 Option card position (above the Ethernet Card or another PC/104 Option card).

4. Connect the Genius network cable.

5. Test your card installation.

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Genius Basics

Introduction

Developed by General Electric, the Genius network provides an industrial networking scheme with software-configurable fault reporting, input filter time, overload detection, and I/O mix. Programmable inputs and outputs, part of Genius I/O Blocks, allow any circuit to be set up for either input or output. This means that one 8-circuit block is field-configurable to any of 256 distinct combinations of inputs and outputs.

A Genius network passes a token in what are called *bus scans*. The pass starts at the controller, which passes the token to the first node. It is next passed on through consecutively numbered nodes. When it gets the token, a node can send messages. When done sending, it notifies the network that it is done and passes the token to the node with the next highest address. Finally, the token is passed to either node 15 or 31 (the baud rate and cable type determine the maximum number of nodes). The process repeats.

NOTE: Node 31 is generally reserved for a CPU. Nodes 29 and 30 are generally reserved for fault tolerant devices.

In each bus scan, inputs are broadcast to all CPUs on the bus. The CPUs send outputs to specific nodes, as required. Typically, node 31 is the CPU

Information may also be sent using *Datagrams*. Each datagram includes source-to-destination routing information. During each bus scan, one datagram may be automatically sent from one node to another, specific node. It may also be sent from the PLC or computer to I/O blocks. Each datagram may contain up to 128 bytes of data.

Nodes in a Genius network may automatically broadcast up to 128 bytes of *global data* with each bus scan. All CPUs on the bus receive all broadcasts of global data. The receiving nodes do not acknowledge receipt of global data.

Upon receipt of data, the receiving node performs a cyclic redundancy check (CRC) to ensure data integrity.

Two or more buses may be used, for example, to split activity to I/O information on one bus and communications information on another.

Genius Network Topology

Configured in a bus topology, Genius networks require no special equipment to amplify or regenerate the signal. Transfer of information occurs across cables via RS-485 serial modems. You must terminate each end of the bus. A Genius network will support up to 32 devices at 153.6 Kbaud standard, 153.6 Kbaud extended, or 76.8 Kbaud and up to 16 devices at 38.4 Kbaud.

You may arrange devices on a Genius network in any physical sequence on the bus. For efficient communications, however, arrange devices in the same sequence as their Node (Block) Numbers.

Cabling

Cabling a Genius network consists of single twisted pair shielded cable, daisy-chained bus cable or fiber optic cable. RS-485 serial modems transmit and receive data node to node. With simple field wiring to and from a Terminal Assembly, the cost of wiring and cabling a Genius network is relatively low.

Network Length and Cabling

The maximum bus length depends, in part, on baud rate. The maximums are:

- 7500 feet at 38.4 Kbaud.
- 4500 feet at 76.8 Kbaud.
- 3500 feet at 153.6 Kbaud extended.
- 2000 feet at 153.6 Kbaud, standard.

The maximum length at each baud rate also depends on cable type. See references in the Appendices for a complete list of cable types, showing corresponding bus lengths and baud rates.

Greater bus lengths are possible using sections of fiber optics cable with modems.

Terminating Resistor Specifications

You must install 75, 100, 120, or 150 ohm, 1/4 watt resistors at both ends of the electrical bus cable. Resistors must have a tolerance of -10% to +20%

Installing the Smart Trac Genius PCIM Card

Unpacking

WARNING - ESD

Keep electronic circuit boards in Electrostatic Discharge (ESD) protective bags when not being handled. Use proper ESD procedures (including an ESD wrist strap) when handling circuit boards. Failure to comply may result in damage to equipment

Electrostatic Discharge (ESD) Procedures

When working with an electrostatic discharge (ESD) sensitive device, you should be grounded at all times. The easiest and most common way to provide this ground is to use an approved ESD wrist strap. The strap is secured to your wrist with a wire attached to the strap and clipped or taped to the chassis of the unit being worked on. Any static is dissipated through the wire to ground, greatly reducing the possibility of damage to the device.

It is a good idea to touch the chassis with your finger before handling any electrostatic sensitive device. Any static electricity will be discharged to chassis ground and will not be transferred to the device.

Always store devices (cards, other electronic components) in ESD protective bags when not being handled.

Unpacking Procedure

Remove the protective shipping and packing material from the card. Ensure contact wedges and other shipping devices have been removed.

Installing the Smart Trac Genius Card

The Smart Trac Genius Card is PC/104 compatible, so it may be positioned in one of the PC/104 Option Card positions at the top of the Smart Trac card stack.

NOTE: If replacing or adding a Smart Trac Genius PCIM card to an existing Smart Trac card stack, see "Appendix C – Removing the Smart Trac Card Stack" before continuing.

Standoffs (4 places on top of each card)

Smart Trac Genius PCIM Card

Optional PC/104 Card

Smart Trac Ethernet Card

Smart Trac PS Card

4CN Connector

Smart Trac PG Card

2CN Connector

Smart Trac CPU Card

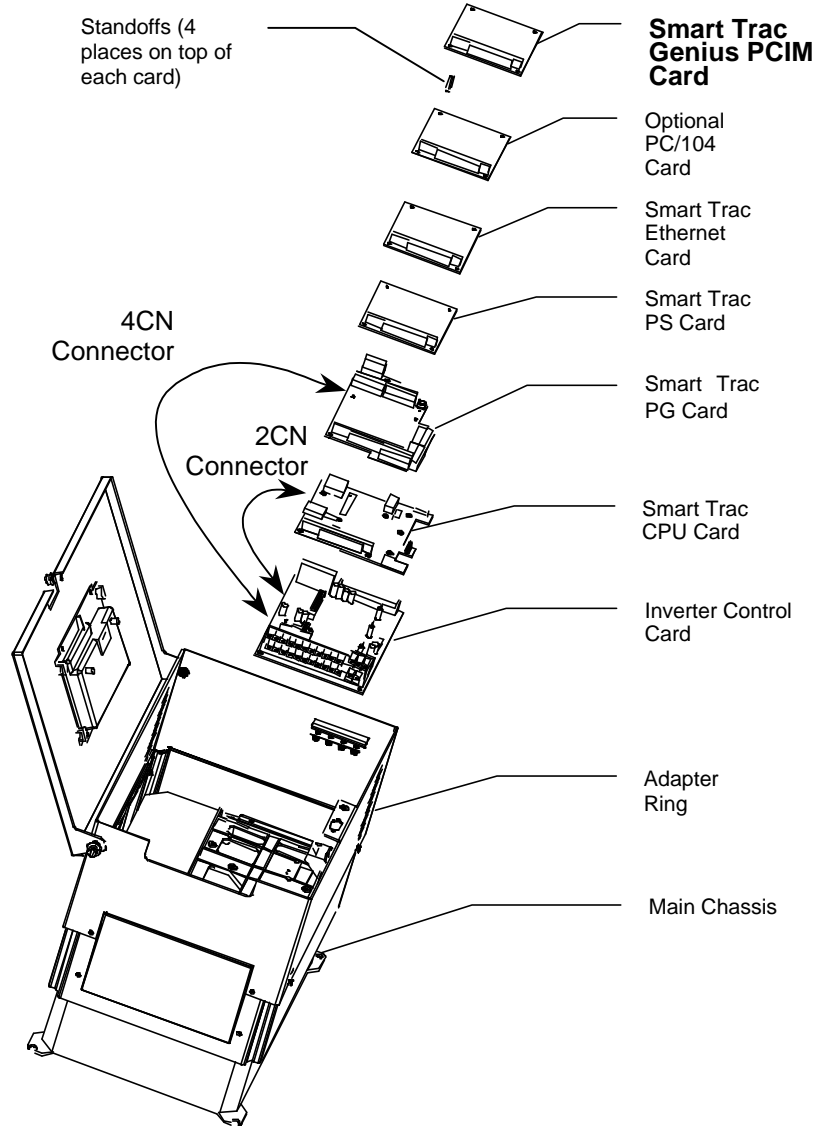Inverter Control Card

Adapter Ring

Main Chassis

Figure 1. Smart Trac Genius PCIM Card Stack Position

WARNING

Turn off and disconnect the main power to the Smart Trac AC1 before opening the door and removing the PC/104 card from the unit. This avoids a risk of electric shock. Failure to comply may result in personal injury or death.

WARNING - ESD

To avoid damage from electrostatic discharge, adhere to the following precautions when performing this procedure:

- The card is packaged in a static-safe bag which protects the product during shipping. Before removing the card from this bag, be prepared to handle it in a static-safe environment.

- Wear a properly functioning antistatic strap and be sure that you are fully grounded. Never touch the card unless you are wearing an antistatic strap.

- Any surface upon which you place the unprotected Genius card should be static-safe, facilitated by antistatic mats, if possible.

- Extra caution should be taken in cold, dry weather, when static charges can easily build up.

NOTE: It is not necessary to remove any card from the stack to install the Smart Trac Genius PCIM card. The card can be placed on the very top of the card stack.

1. Remove the Smart Trac Genius card from its static guard package.

2. Before installing the Smart Trac Genius card, make the proper Jumper (Link) and Switch settings. A serial bus address of 28 (1Ch) is set as the default. This can be changed according to your network requirements.

NOTE: a switch setting of 0 is a logical 1. The Outputs, I/O Port Address, and Watchdog Timer settings are default and should not be changed.

3. Make sure that a terminating resistor is installed at both ends of the Genius network.

4. Install the four metal standoffs on the Smart Trac stack.

NOTE: Four metal standoffs are shipped with the Smart Trac Genius card. These four standoffs are longer than those originally shipped with your Smart Trac AC1. To provide adequate clearance for components on the Smart Trac Genius card and those on the card below, use the standoffs provided with the Smart Trac Genius card to attach the Genius card to the card below it in the card stack.

5. Orient the Smart Trac Genius card so that the connector pins are aligned with the PC/104 connector on the board below, and press it carefully into place until it comes to rest on the four metal standoffs.

6. Secure the Smart Trac Genius card by installing the four 16mm M/F brass standoffs included in the Smart Trac Genius accessory package Tighten them down to secure, but *DO NOT* over tighten.

7. Connect the network cable.

8. Replace the option cards by reversing the above instructions. See "Smart Trac AC1 Technical Manual" for details.

Connecting the Smart Trac Genius Card to a Genius Network

The Smart Trac Genius card connects to the Genius serial bus via a cable installed at its 4-terminal connector (see Figure 1). Terminals are labeled Serial 1, Serial 2, Shield In, and Shield Out.

You connect the Serial 1 and Serial 2 terminals of each Smart Trac Genius card to the corresponding Serial 1 and Serial 2 terminals of the next device.

You connect the Shield In of each block to Shield Out of the preceding device. You may leave the Shield In of first device and the Shield Out of the last device disconnected.

When making bus connections, leave no more than two inches of exposed bare wire. Insultate each drain wire with shrink tube to prevent the Shield In and Shield Out wires from touching each other.

Installation must conform to Genius I/O product guidelines for the screening of cables and components for the Genius serial bus. Cable construction must conform to the pinout below :

Table 1. Pinout for Genius Network Cable.

| Pin	Connect to:	Comments
1	Serial 1 of next block	By doing this, each device connects to the previous and next devices.
2	Serial 2 of next block	By doing this, each device connects to the previous and next devices.
3	Shield Out of previous block	By doing this, Shield Out of one device connects to Shield In of the next device.
4	Shield In of next block	Not required if Smart Trac Genius card is last device on Genius block.
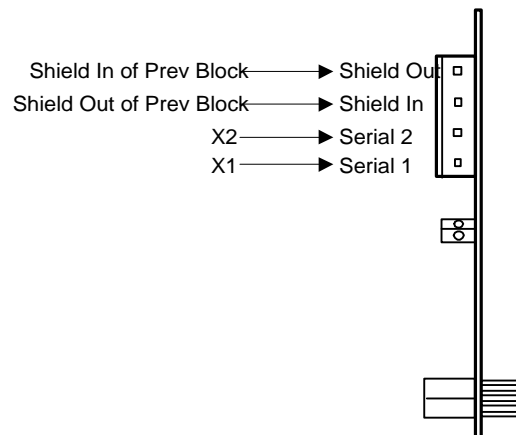
Figure 2. Genius Network Connector.

Configuring the Smart Trac Genius Card

Configuration

You configure the Smart Trac Genius card for the Genius serial bus by either accepting default values or changing them to suit your unique situation. The values chosen at installation of the Smart Trac Genius card software driver must match those set on the card.

Two switches on the Smart Trac Genius card allow user configuration of the serial bus, memory locations, I/O Base Address, and enabling or disabling of outputs.

Default Settings

The Smart Trac Genius card is shipped from the factory already configured for the typical installation. Default Switch settings for SW1 and SW2 are described below. Generally, you should accept these defaults and ensure the switches are set correctly before installing your card.

Bus Termination (LNK1)   A terminating resistor must be installed across Serial 1 and Serial 2 at both ends of a Genius serial bus. Depending on the type of cable you use, you will need to terminate with 75 ohm, 100 ohm, 120 ohm or 150 ohm resistors. When you're connecting one end of the card to a 150 ohm serial bus, you use the 150 ohm terminating resistor located onboard the Smart Trac Genius card.
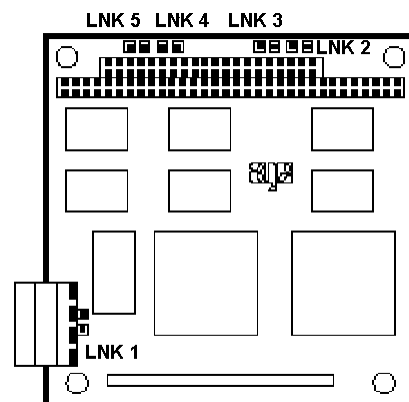

Figure 3. Genius Card Jumpers.

Interrupt

Five jumpers on the Smart Trac Genius card, labeled LNK 1 through LNK 5, determine the interrupt (IRQ) level. Make sure the IRQ of the Genius card does not conflict with any of the other cards in the Smart Trac card stack.

NOTE: For the Genius card, use of IRQ 11 is highly recommended. IRQ may be used if IRQ 11 cannot be used. IRQ 5 is the default Ethernet card setting. IRQ 7 is the default DeviceNet card setting. The card supports IRQ 5, 7, 11 and 12.

To set the IRQ for the Genius card, install a jumper in one of four positions (LNK2, LNK3, LNK4 or LNK 5).

Table 2. Smart Trac Genius card Jumper Settings.

	Jumper	Jumper or IRQ	Termination Requirements
A	LNK 1	Jumper on	150 ohm terminaltion on board.
		No jumper	Add 120, 100, or 75-ohm termination.
B	LNK 2	IRQ 11	Default (Highly recommended)
	LNK 3	IRQ 12	Recommended
	LNK 4	IRQ 7	(default for Smart Trac DeviceNet card)
	LNK 5	IRQ 5	(default for Smart Trac Ethernet card)

Switch SW1 (Serial Bus Address, Baud Rate and Outputs)

Switch SW1 allows setting the Smart Trac Genius card to match the parameters of the Genius serial bus. The Standard Serial Bus Baud Rate of 153.6 should be accepted when connecting the card to a bus on which Phase A devices are used.

0 = OFF   1 = ON

SW1 Default Settings							
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Serial Bus Addressing Address 1 Ch (Default)					Serial Bus Baud Rate 153.6 Standard (4 bit skip time)		Outputs Disabled
1	1	0	0	0	0	0	0
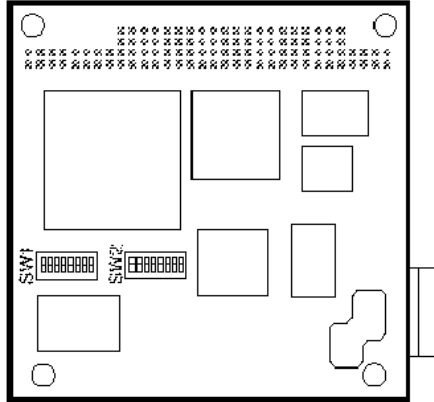
Figure 4. Genius Card Switch Locations (back of PCIM Card)

Switch SW2 (Memory Address, I/O Base Address, Watchdog Timer)

Switch SW2 positions 1-4 determine a 16 kilobyte Memory location used by the Smart Trac Genius card.

Switch SW2 positions 5-7 determine the I/O Base Address for the application software.

Switch SW2 position 8 determines whether the Watchog Timer is disabled (default) or enabled.

0 = OFF   1 = ON

SW2 Default Settings							
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Serial Bus Addressing Address CC00h (Default)					I/O Port Address 3E0h (Default)		Watchdog Timer (Disabled)
0	1	1	0	0	0	1	1

Non-Default Settings for Switch SW1

Your particular situation may demands setting switches to different values than the defaults.

Serial Bus Address

The Bus Address may be set from 00 to 1F hexadecimal (0 to 31 decimal) using SW1, Positions 1-5.

Positions 1-5 = Node Address (Position 1 = LSB or 1's digit, Position 5 = MSB or 16's digit)

0 = Off   1 = On

SW1 Optional Settings – Positions 1-5											
Value	**Position**						**Value**	**Position**				
	1	**2**	**3**	**4**	**5**			**1**	**2**	**3**	**4**	**5**
SBA=0	1	1	1	1	1		SBA=16	1	1	1	1	0
SBA=1	0	1	1	1	1		SBA=17	0	1	1	1	0
SBA=2	1	0	1	1	1		SBA=18	1	0	1	1	0
SBA=3	0	0	1	1	1		SBA=19	0	0	1	1	0
SBA=4	1	1	0	1	1		SBA=20	1	1	0	1	0
SBA=5	0	1	0	1	1		SBA=21	0	1	0	1	0
SBA=6	1	0	0	1	1		SBA=22	1	0	0	1	0
SBA=7	0	0	0	1	1		SBA=23	0	0	0	1	0
SBA=8	1	1	1	0	1		SBA=24	1	1	1	0	0
SBA=9	0	1	1	0	1		SBA=25	0	1	1	0	0
SBA=10	1	0	1	0	1		SBA=26	1	0	1	0	0
SBA=11	0	0	1	0	1		SBA=27	0	0	1	0	0
SBA=12	1	1	0	0	1		SBA=28	1	1	0	0	0
SBA=13	0	1	0	0	1		SBA=29	0	1	0	0	0
SBA=14	1	0	0	0	1		SBA=30	1	0	0	0	0
SBA=15	0	0	0	0	1		SBA=31	0	0	0	0	0

Serial Bus Baud Rate

The Smart Trac Genius card can be set to communicate at four different baud rates: 153.6 Standard, 153.6K Extended, 38.4K and 76.8K. Use SW1, positions 6 and 7 to set the baud rate.

0 = Off   1 = On\

SW1 Optional Settings – Positions 6-7 (serial bus baud rate)		
Baud Rate	**Position 6**	**Position 7**
153.6K Std (default)	0	0
76.8K	1	0
38.4	0	1
153.6K Extended	1	1

Outputs

The Smart Trac Genius card may be set to either enable or disable outputs.

SW1 Optional Settings – Position 8 (Outputs)	
Outputs	Position 8
Outputs Disabled (default)	0
Outputs Enabled	1

Non-Default Settings for Switch SW2

Memory Location

The Smart Trac Genius card uses two consecutive bytes of I/O space and 16 Kbytes of memory in the host system. I/O and memory locations must not conflict with any other with other memory or device addresses in use. The Smart Trac Genius card's switch SW2, positions 1-4, determine the starting address for 16 kbytes of memory that is used to store I/O data, for communications buffers, and other information.

0 = Off   1 = On

SW2 Optional Settings – Positions 1-4 (Memory Location)				
16Kb Data and Comm. I/O Starting Address	1	2	3	4
C800	1	1	1	1
CC00	0	1	0	0
E000	1	0	0	1
E400	0	0	0	1

I/O Base (Port) Address

The I/O registers occupy 2 bytes of space in the host system. The application software on the host system exchanges data with the Smart Trac Genius card by reading and writing to the assigned I/O addresses. The host's I/O Base, or starting, address is set using positions 5, 6 and 7 of SW2.

0 = Off   1 = On

SW2 Non-Default Settings – Positions 5-7 (I/O Base Address)			
4-bytes I/O Memory Address	5	6	7
360	1	1	1
364	0	1	1
368	1	0	1
36C	0	0	1
3E0	1	1	0
3E4	0	1	0
3E8	1	0	0
3EC	0	0	0

Watchdog Timer

The Watchdog Timer monitors the host systemn and resets the Smart Trac Genius card if the host malfunctions. Unless supported by the host system, it should remain disabled. When enabled, the Watchdog Timer requires that the Smart Trac Genius card receive a pulse from the host every 7 milliseconds. If not, it resets the card.

SW2 Non-Default Settings – Position 8 (Outputs)	
Outputs	**Position 8**
Outputs Disabled (default)	0
Outputs Enabled	1

Testing Card Installation

Testing the Network

Once installed, check the on-board indicator lights. Normally, both LEDs should be illuminated.

On-board Indicator Lights

Two LED indicator lights on the Smart Trac Genius PCIM card provide system-related information:

- *GENI 104 Self-test/Health* LED: When ON, indicates that power is available to the card and the card self-test was successful. When OFF, indicates a card failure, improper address assignment, or that the /RST input line is low.

- *Communications* LED: When ON, indicates that power is available to the card and the controller's communications hardware is functional and can send data (receives the token) every serial bus scan. When OFF, indicates that an error has been detected in the communications hardware or while accessing the Genius serial bus.
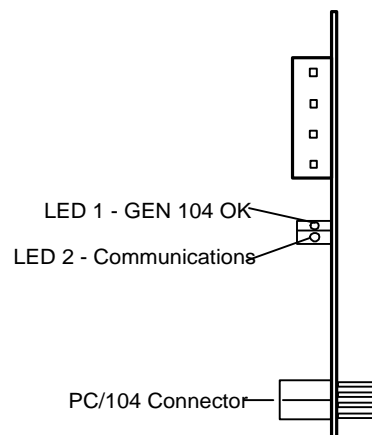
LED 1 - GEN 104 OK

LED 2 - Communications

PC/104 Connector

Figure 5. Genius Card Connectors and LEDs

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Troubleshooting Your Smart Trac Genius PCIM Card

General Troubleshooting Procedures

Most problems with installation occur at startup of a new network. Initial checks include ensuring use of proper cabling and the status of card LEDs. Next, analyze a problem using the "Troubleshooting Table."

Checking Cabling

Check that all cables are connected to the proper terminals and are secure. Make sure that the proper cable has been chosen and length restrictions are not exceeded.

Fault Isolation

Check the condition of the status indicator LEDs (see "On-board Indicator Lights"). Both LEDs should be ON. If either LED is not ON, check the troubleshooting table that follows for diagnosis and corrective action.

Troubleshooting Table

The table below describes symptoms, probable causes and correction action for various problems you may encounter with your Smart Trac PCIM card. For more general Genius network troubleshooting information, see "References." Several actions identified in the table require the use of a Handheld Monitor (HHM). This refers to a type of monitor sold by GE Fanuc. The HHM can force I/O on and off and perform wiring diagnostics with or without the CPU connected.

Genius PCIM Card Troubleshooting		
Symptom	**Probable Cause**	**Corrective Action**
PCIM card installed, Smart Trac powered up, both card LEDs not ON, /RST input HIGH.	Card not seated properly or not receiving power.	Ensure card is seated properly in the correct position in Smart Trac card stack. Ensure power supply to card is working properly.

Genius PCIM Card Troubleshooting		
Symptom	**Probable Cause**	**Corrective Action**
PCIM card installed, Smart Trac powered up, GENI104 Self-test/Health LED OFF and Communications (COMMS) LED ON.	DIP switch SW1 or SW2 or both not set properly.	Check switch settings are correct.
	Hardware failure	Replace card.
PCIM card installed, Smart Trac powered up, GENI 104 Self-test/Health LED ON and Communications (COMMS) LED OFF.	Improper cable type or lengths exceeded.	Check cable type and lengths, replace or reconfigure as required.
	Jumper LNK1 not set properly.	Change to proper LNK1 setting.
	Serial bus wiring incomplete.	Ensure serial bus wiring completed in a daisy chain fashion.
	High voltage runs interfering with operation.	Ensure cabling is not near high voltage runs.
	Broken cable.	Inspect for broken cable and replace as necessary.
PCIM card installed, Smart Trac powered up, both LEDs flashing together.	Same serial bus number (device number) configured with same address.	Check device numbers and change to unique addresses.
Repeated bus errors.	Shielding improperly installed and/or grounded.	Change to meet proper shielding and grounding specifications.
	Failure of card.	Unplug bus communications cable from Genius PCIM card. Use HHM (handheld monitor) to read configuration and compare device numbers and I/O reference numbers. Ensure they are as planned.
		Replace card as necessary.
System shuts down with parity errors	Input duplicated on same bus or overlapping card I/O references.	Eliminate duplicate input or overlapping card I/O references.
System shuts down with parity errors and bus errors. Can't make Genius PCIM card operable, despite repeated attempts.	Serial 1 and Serial 2 connections crossed.	Eliminate crossing of Serial 1 and Serial 2.
Smart Trac AC1 will not boot with Genius PCIM card installed.	Short between regulator U33 on main card and bottom of option card.	Bend over the three (3)-pin regulator U33, so its metal tab does not contact the option card.

Appendix A - Technical Support

Getting Help

Should you need technical assistance with installation or troubleshooting of your Smart Trac AC1, you can phone our Help Desk at either (800)-541-0939 or (262)-782-0200. Alternatively, you may copy the *Problem Report* form, found on the next page, and fax it to us at (262)-782-3418.

References

MagneTek Drives and Systems

For more information about MagneTek drives and systems, training programs and contacts, visit:

http://www.magnetekdrives.com

PC/104 Specification, Version 2.1

PC/104 Consortium. An overview and the specification may be obtained at the web site address:

 http://www.controlled.com/pc104/index.html

Publication GEK-90486-1, "I/O System and Communications"

GE Fanuc Technical Support. For more information about Genius networks, design, architecture and troubleshooting, visit:

http://www.gefanuc.com/infolink/manuals

Problem Report

Name:

Address:

City: State: Zip

Serial Number: Smart Trac PG Card

Occurrence: ☐ Frequently   ☐ Intermittantly ☐ Rarely

Nature of Problem:

Conditions when problem occurs:

Appendix B – Replaceable Parts Listing

Replaceable Parts Listing

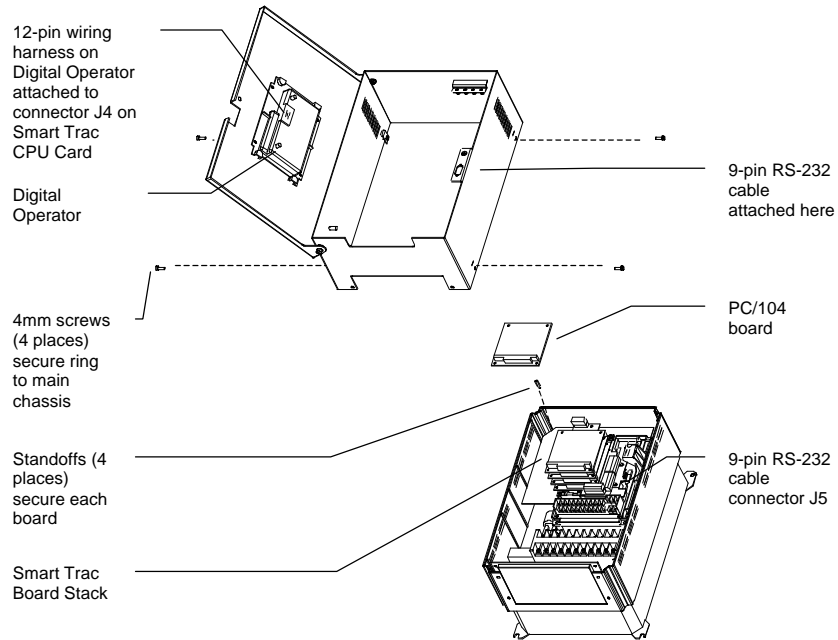| Description	MagneTek Part Number	Qty
Smart Trac PCIM (Genius) Network Interface option kit	46S03643-0080	1
PCB, PCIM, Genius I/O, PC/104	05P00090-0556	1
Standoff, 4.5mm, Hex, Stl, CL ZINC, 16mm, M/F, M3, M3	05P00618-0002	4
DOC, DWG, Assembly, Drive SZ 1-20, B, PRO/E	D-61S03554-0080	1
Technical Manual – Smart Trac Genius Card	TM 3554-0080	1
Hardware Tools Kit for Smart Trac AC1	TBD	Option
Card Extraction Tool	(Parvus Corporation) P/N PRV-0760A-01	Option

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Appendix C – Removing the Smart Trac Card Stack

General Procedures

1. Power off the Smart Trac AC1. Disconnect it and tag "Out of Service".

2. Do one of the following:

   - Open the cover to the Smart Trac AC1 by rotating the spring-loaded, captive screw counterclockwise. Use a large screwdriver if necessary to free the slotted screw.

   OR

   - Loosen the screws holding down the cover.

3. Disconnect the 12-pin wiring harness from connector J4 at the digital operator.

4. Using the Phillips head screwdriver, remove the ground strap from the left inside and the ground strap from the top inside of the Smart Trac AC1 adapter ring.

5. Disconnect the 9-pin RS-232 cable at connector J5 on the Smart Trac CPU card.

12-pin wiring harness on Digital Operator attached to connector J4 on Smart Trac CPU Card

Digital Operator

4mm screws (4 places) secure ring to main chassis

Standoffs (4 places) secure each board

Smart Trac Board Stack

9-pin RS-232 cable attached here

PC/104 board

9-pin RS-232 cable connector J5

6. Using a 4.5mm hex head driver, remove four standoffs from the topmost card.

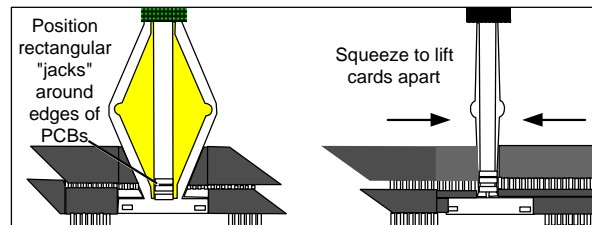7. Using the PC/104 extraction tool, remove the topmost card from the stack.

Position rectangular "jacks" around edges of PCBs

Squeeze to lift cards apart

Figure 6. Using the PC/104 Extraction Tool.

8. Repeat step 8 above until all PC/104 cards have been removed.

9. *To remove the Smart Trac PG card*:

   • Disconnect the 4CN connector on the PG card.

   • Using a tubular extraction tool or pliers, squeeze the plastic, spring-loaded retainer built-in to the long plastic standoff located at the top of the PG card, just above connector J6.

   • Using a PC/104 extraction tool, remove the card.

NOTE: The Smart Trac PG card requires unique handling. Wedge the extracting tool between the PG card and the CPU card. The area between the terminal strip on the CPU card and the serial numbered edge of the PG card can be lifted first, then the opposite side (nearest TB1) on the PG card). Alternate sides until the card is free of the CPU card.

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10. *To remove the Smart Trac CPU card*:

- Disconnect the card at the 2CN connector on the CPU card.

- The CPU card is secured with three plastic standoffs with spring-loaded clips on the end. Squeeze the top of the standoffs (the clips) with the special cylindrical removal tool, your fingers or needle-nosed pliers and lift the CPU card from the Smart Trac Inverter Control Card.

You have removed the entire card stack. The inverter card, considered part of the drive, is in clear view.

Glossary of Terms

Blocks	In a Genius networi, blocks are intelligent, self-contained, and configurable I/O modules. Each block has its own communications capability and microprocessors, and provides a number of circuits for connecting input and/or output devices. Analog, discrete, and special-purpose blocks can be used on the same bus.
Datagram	A fixed length data packet including information to route it from source to destination with no reliance on previous transmissions.
fault tolerant	Resistant to software errors and hardware problems. A fault tolerant LAN keeps running in the event of a power failure, a disk crash or other major events. Redundant backbone cabling provides a degree of fault tolerance, so that if the cable is cut, the network will continue to run.
Topology	The way in which devices on a network are physically connected: star, bus, or mesh. The topology may define transmission media, adapters, and physical design of the network.

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SMART TRAC Genius PCIM Card

MagneTek