SMART TRAC™ AC1

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Important Safety and Warranty Information

This Chapter will enable you to:

❑ *Be aware of warnings, cautions and notes as they appear in the documentation.*

❑ *Learn about important warranty information.*

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.

WARNING

Verify that the rated voltage of the Smart Trac AC1 matches the voltage of the incoming power.

Always ground the Smart Trac AC1 using ground terminal G. See the detailed instructions provided in the *Smart Trac Technical Manual*.

Wiring must be performed only by qualified personnel.

Do not perform a "HIPOT" or withstand voltage test on any part of the Smart Trac AC1. The AC1 uses semi-conductors and is vulnerable to high voltage.

Never connect the main circuit output terminals T1, T2 and T3 to the AC main circuit power supply.

All parameters have been factory set to values commonly used. Do not change their settings without good reason.
Failure to comply with this warning may result in damage to the Smart Trac AC1 and connected equipment along with personal injury and/or death.

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. Failure to comply may result in damage to equipment and/or personal injury.

CAUTION

All parameters have been factory set to values commonly used. Do not change their settings without a full understanding of their impact on Smart Trac AC1 and machine operation. Failure to comply may result in damage to equipment and/or personal injury.

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Implementing Your Smart Trac AC1 System

Determine System Requirements

- Review all functions to be performed by the Smart Trac AC1(s).

- Determine the I/O requirements of each Smart Trac AC1 and the type of I/O interface cards (Arcnet, Ethernet, Profibus, DeviceNet, or other) required for each Smart Trac AC1.

- Determine the number of control nodes in the network and the functions to be performed by each.

Design the System

- Create system schematics.

- Create system Bill of Materials.

- Create Panel Layouts and wiring guides.

Install the Smart Trac AC1(s)

- Review electrostatic discharge procedures.

- Verify that you have all ordered parts.

- Determine the proper location(s) for your Smart Trac AC1(s).

- Select proper wire sizes and make electrical connections.

- Connect auxiliary and power output devices.

- Test your system.

- Connect the vector controlled motor.

- Tune your Smart Trac AC1(s).

- Test the Smart Trac AC1 and the motor together.

MagneTek

Create the Software for each Smart Trac AC1

1. Design the software and review system requirements.

2. Configure the Workstation.

    a. Install the Workstation.

NOTE: Some I/O drivers have a required library of functions. Install these at the time the driver is installed using the I/O Driver Install program.

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    b. Install the required Program Libraries. These may include MagneTek-created function blocks (MAG-CPB and MAG_WIND, for example). The PG card requires library function block PG_SC_CARD.

    c. Install all required I/O Drivers. The DPRAM, Digital Operator and Fault Manager drivers are ALWAYS required, no matter what your system configuration.

3. Create the Smart Trac AC1 system program.

    a. Using Control Manager, create and configure the required control nodes, one per Smart Trac AC1.

    b. Assign the interface cards to be used in each control node (DPRAM, Digital Operator and Fault Manager are always required).

    c. Configure each interface card to make the required I/O points accessible to application programs.

    d. Create Symbol Names for each I/O point.

    e. Write the user program using Relay Ladder Logic, Sequential Function Charts, Function Block Diagrams, Structured Text, or your own Function Blocks written in "C" programming language. Add the user program to the Control Manager in the Program Units subdirectory.

    f. Assign programs to tasks. Use the Task Editor to define task priorities, Define how often your programs should run.

    g. Build the programs (s). Some errors may occur when building. These must be resolved before continuing.

4. Test the system program.

    a. Download the compiled program(s) to the Smart Trac AC1(s).

    b. Monitor all Smart Trac AC1s using the Control Node Monitor.

        • Verify there are no unaccountable faults on each control node and each task of each control node.

        • Verify that the Percent of Available CPU for each control node is within acceptable limits.

        • Verify that the Max Scan Time for each task is within acceptable limits.

    c. Monitor and test the Smart Trac AC1 programs.

- Use the online monitor functions to see "live" program execution. Click the task, then the program from the task's program list. Click the Watch Window icon or step through the menu selection for Watch Window.

5. Save your work. Archive your control node(s) to the network Smart Trac AC1 or any other appropriate backup medium by using the Object Archive menu selection.

Determine System Requirements
- Review drive functions
- Determine I/O requirements & type of interface cards
- Determine no. of control nodes

Design the System
- Create System Schematics
- Create BOM
- Create panel layouts & wiring guides

Install the Drive(s)
- Review ESD procedures
- Verity parts
- Determine drive location
- Select wire sizes, make electrical connections
- Connect aux. & power output
- Test system
- Connect VCM
- Tune drive(s)
- Perform integration test

Create Drive Software
- Design software.
- Configure Workstation
- Create Drive System program
- Test system program
- Save work

Figure 1. Implementing Your Smart Trac AC1(s).

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The Smart Trac AC1

This Chapter will enable you to:

❑ *Describe the capabilities of the AC1*

❑ *Become familiar with the ratings and specifications of the AC1*

Overview

General Capabilities

The Smart Trac AC1 is a high performance, programmable AC motor drive that eliminates the need for an external PLC or PC to control a machine or process. Utilizing the Windows® environment, *Smart Trac Workstation*™ allows the Smart Trac AC1 to be programmed efficiently and easily. Each Smart Trac AC1 can be programmed to fulfill a specific function and purpose using any of the five IEC-61131-3 programming languages. IEC-61131-3 programming languages include Relay Ladder Logic (RLL), Structured Text (ST), Sequential Function Charts (SFC), Function Blocks (FB) or Instruction Lists (IL). Commonly used function blocks may be obtained from MagneTek's *Program Library*. Consult your local MagneTek representative for details.

Smart Trac AC1 offers many means of communications with other computing devices using either the built-in RS-232 port or any of the optional add-on communication cards. A MagneTek ARCNET card may be used to communicate with MicroTrac® LAN systems, providing backward compatibility with existing MagneTek systems. In addition, the Smart Trac AC1 system supports off-the-shelf Ethernet, DeviceNet, Profibus, SDS, Interbus-S, Fiber Optic and local I/O cards conforming to PC/104 specifications for form and fit.

The Smart Trac AC1 provides a sine-coded and pulse width modulated three-phase output with adjustable voltage and frequency. This provides for complete speed and/or torque control of any conventional squirrel cage induction motor. Automatic stall prevention and voltage boost prevents nuisance tripping during load or line side transient conditions. The Smart Trac AC1 will not induce any voltage line notching distortion back to the utility line and will maintain a displacement power factor of not less than 0.98 throughout its speed range.

Specifications

Characteristic	Specification
Ratings:	0.75 to 100 HP at 230 VAC
	1.0 to 1600 HP at 460 VAC
	2.0 to 200 HP at 600 VAC
Amperes	3.2 to 1,600 amps, depending on model
Overload Capacity	150% for 1 minute
Enclosure Types	NEMA 1 Protected Chassis, NEMA 4 , or NEMA 12
Ambient Operating Temp.	0° C to 40° C
Storage Temperature	-20° C to 60° C
Humidity	95% RH non-condensing
Vibration	1G<20Hz, 0.2G 20 to 50 Hz
Location	Indoor, protected from corrosive gases and dust
Elevation	3300 ft (1000 M) or less

Getting Familiar with Your Smart Trac AC1

This Chapter will enable you to:

❑ *Understand what is contained within your Smart Trac AC1 housing.*

❑ *Recognize each of the Option cards in your AC1.*

Looking Inside

Opening the cover of the Smart Trac AC1, you will find several printed circuit boards stacked one on top of another and separated by metal standoffs. The number of boards depends upon the options you purchased (see Figure 2. Inside a typical MagneTek Smart Trac AC1).
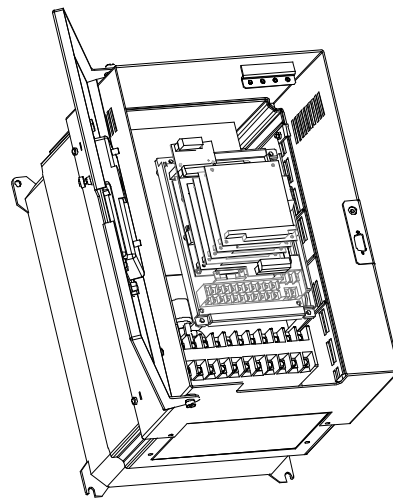
Figure 2. Inside a typical MagneTek Smart Trac AC1

Option Cards

The Smart Trac AC1 control card is the first card of the stack. It is the card on which all others are stacked. The Smart Trac PC card is mounted on top of the Smart Trac Inverter and communicates with it via the connector labeled 2CN.
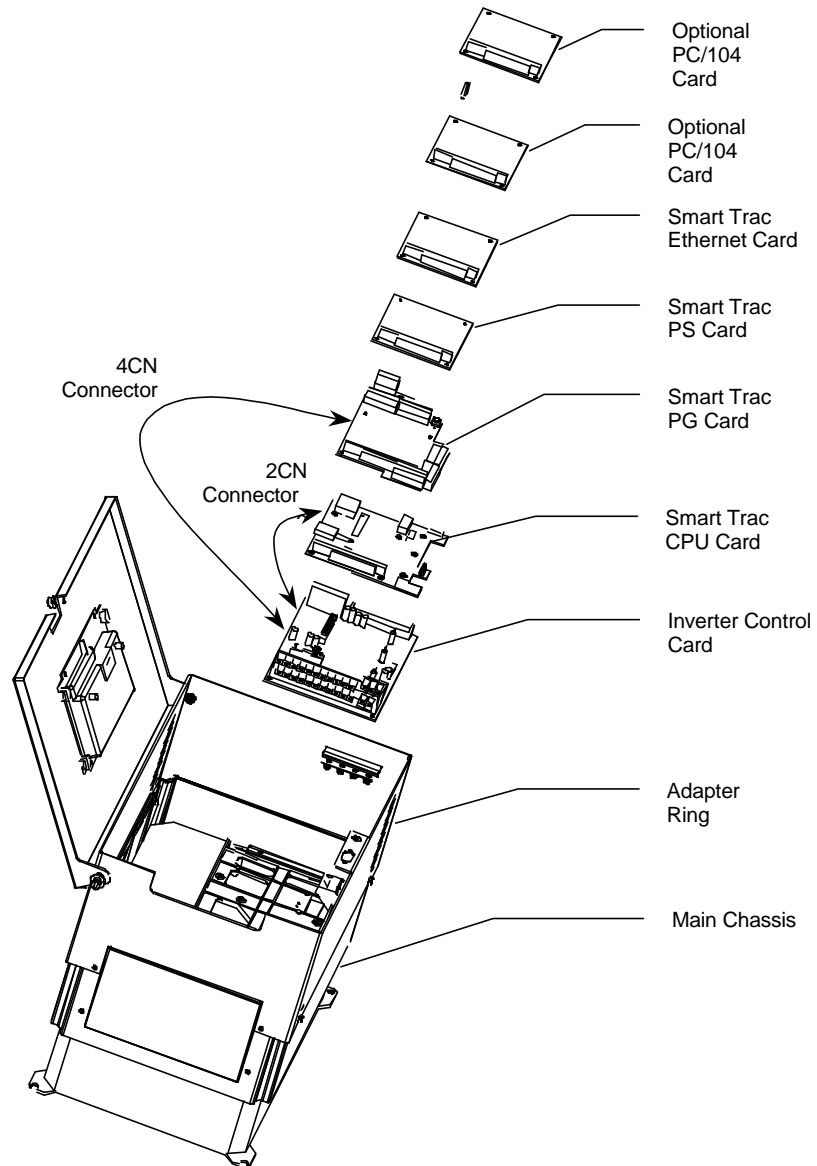
Figure 3. Smart Trac assembly showing option cards.

The Smart Trac PG (Pulse Generator) card is installed on top of the Smart Trac CPU card. It communicates with the Smart Trac Inverter control card via connector 4CN and the Smart Trac PC card's PC/104 connector. The Smart Trac PG card accumulates pulses (A, B and Z) from both master and follower encoders. It has two analog inputs and can accept two proximity switches. It

includes its own +5V power supply rated at 50 ma. 50ma is typically sufficient to power the load cell.

The Smart Trac PS (Power Supply) card is connected to the Smart Trac PG card via the PC/104 connector and supplies all the voltages and power to support the Smart Trac CPU, Smart Trac PG, and all other option cards. If the Smart Trac PG card is not installed, the Smart Trac PS connects to the Smart Trac CPU.

NOTE: Consult the documentation for the Smart Trac PS card along with the documentation for each option card to determine system power requirements. Additional documentation may be obtained from your MagneTek representative.

Several additional PC/104 compliant option cards may be stacked on top of the Smart Trac PG card. Optional cards might include local I/O, ARCNET, ETHERNET, Genius, DeviceNet, Profibus or fiber optic cards for communications and/or additional system I/O. The Smart Trac ARCNET card allows the Smart Trac AC1 to communicate with MagneTek Micro Trac drives, making it fully backward compatible with MagneTek's earlier drive systems. DeviceNet, Profibus and Fiber Optic cards will support master/slave and peer-to-peer communications. See the documentation on the individual option cards for further information.

NOTE: Consult the documentation for the Smart Trac PS card along with the documentation for each option card to determine system power requirements.

DPRAM I/O Driver

The DPRAM I/O Driver (Dual Port Random Access Memory Input/Output) allows programs written with Smart Trac Workstation to read and set parameters in the Smart Trac AC1 Inverter. It contains four sections: High Speed Command Output, High Speed Response Input, High Speed Torque Command Output, and a MODBUS message section. While certain I/O points are recommended for use only by the DPRAM I/O driver to maintain control, even these points may be used for other functions if required by the application program and their normal use can be sacrificed. For details, see the publication *Smart Trac AC1 DPRAM*.

The Smart Trac LAN I/O Driver

The SMART TRAC LAN I/O Driver allows programs written with Smart Trac Workstation to communicate with other drives or devices on a SMART TRAC LAN. It may be used to communicate with previous generation MagneTek drives or communicate information over an ARCNET LAN. One of its key features is the ability to synchronize networked Smart Trac AC1s with zero drift between sections. It also allows communication of logic and numeric data, and program up and downloading.

Uploads, Downloads and Booting Your Smart Trac AC1

This Chapter will enable you to:

❑ *Upload and Download User Programs to and from your Smart Trac AC1*

❑ *Understand the Boot Process*

❑ *Understand the Boot Menu*

Connecting Your PC

To operate and program your Smart Trac AC1, you have several options:

- Serial cable connection - Using an IBM-compatible PC, connect to the serial port on the digital operator of the Smart Trac AC1. This is the most inexpensive, but the slowest, communication method.

- Serial modem (remote) connection – Using an IBM-compatible PC equipped with a modem, call the Smart Trac AC1 via a modem connected to the serial port located on the digital operator of the Smart Trac AC1.

- Arcnet – Add a SMART TRAC LAN I/O card to the Smart Trac card stack. The card provides a BNC T connector to connect with other devices on the network. Arcnet networks can transfer data at 2.5 Mbps or better.

- Ethernet – Connect an ethernet cable between installed Ethernet cards in both the PC and the Smart Trac AC1 to transfer data at 10/100Mbps or higher rates.

Serial Cable Connection

For serial connections the baud rate, parity and stop bits must be set identically in both the PC and Smart Trac Workstation. Your Smart Trac Workstation supports baud rates of 1200, 9600, 19.2K, 57.6K and 115.2K. Communications ports COM1, COM2, COM3 and COM4 may be used on the Workstation PC.

The RS-232 Cable Assembly

If using a serial connection, check to see whether you have a 9-pin or 25-pin connector available. Then provide one of the following cable connections, depending on your computer's configuration:

- Purchase an RS-232 straight through, 9-Pin to 9-Pin (male-to-female) cable.

- Purchase an RS-232 Cable Assembly to convert DB-9 serial ports to DB-25 (male-to-male). The DB-9 male connector mates with the female 9-pin plug on the Smart Trac AC1. The DB-25 male connector mates with the female 25-pin plug on the computer.

ARCNET

For program Downloading and Uploading via ARCNET, see the *Smart Trac LAN Card Technical Manual* and *Smart Trac LAN Card Engineering Manual.*

Ethernet

For program Downloading and Uploading via Ethernet, see the *Smart Trac Ethernet Card Technical Manual* and *Smart Trac Ethernet Card Engineering Manual*.

Booting and Power-on Self-Test

Immediately after power-up of the Smart Trac AC1, the validity of the operating system is checked. The Smart Trac AC1 BIOS (Basic Input Output System) performs a self-test to determine the integrity of RAM, flash memory, system timers and interrupts, among others. Any detected faults appear on the Smart Trac AC1 digital operator. Next, the system loads any installed drivers. It checks the validity of the application program before starting its execution.

Once drivers are installed and the user program is validated, the system performs according to the user program, responding with diagnostics and error handling as necessary.

NOTE: If communication with the Smart Trac processor and its card stack is not established within 7 seconds of power up or within 2 seconds of no data transfers, it will shut down. The LED's on the digital operator will flash, indicating this lack of communications.

The Boot Menu

Several functions are available by pressing the **MENU** key within the first 2 seconds of the boot. . Figure 4 shows the boot menu and the functions available. For more information, including menu functions not described in this section, refer to the *Smart Trac AC1 Technical Manual*.

You may scroll through the menu selections using the Up and Down arrow keys on the Digital Operator. Pressing **DATA/ENTER** while at any one of the menu selections causes the submenu to display. Some submenus contain entries you may scroll through using the Up and Down arrow keys. You may change values of these entries using procedures for those submenus.

To return to the previous menu level, press **ESC**.

To stop the boot menu from displaying and resume starting the Operating System, press **ESC** until a first level menu appears. Scroll using the up and down arrow keys until the message appears "Start System?". Press **DATA/ENTER** and the Operation System should resume loading.

TCP/IP Address

Refer to "Addresses and Subnet Mask" in the *Smart Trac Technical Manual* for information on setting the TCP/IP address through the Boot Menu.

Inverter Type

This function changes the Torque Update parameter from 2 milliseconds to 5 milliseconds. Press **DATA/ENTER**. Use the up and down arrow keys to choose between the 2ms or 5ms update. Press **DATA/ENTER** when at your choice to program the Smart Trac AC1 to use that update value.
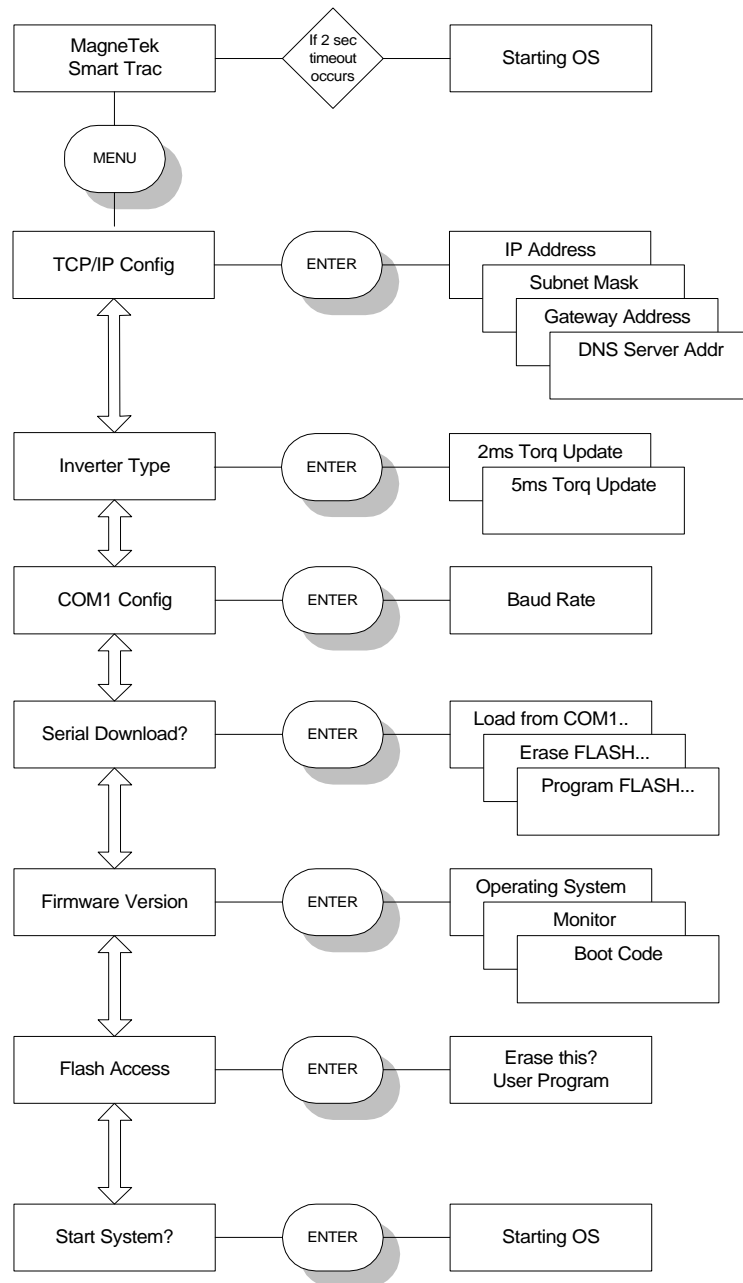
Figure 4. The Smart Trac AC1 Boot Process.

COM1 Config

Using this function enables you to change the baud rate of the RS-232 communications port located on display panel. Normally, this port is only used to download operating system, monitor and boot programs. It should not normally be changed.

1. Scroll to the **COM1 Config** menu item. Press **DATA/ENTER**. The message **Baud Rate** appears.

2. Use the up and down arrow keys to scroll through possible baud rate settings. When at the baud rate you want, press **DATA/ENTER** .

3. Press **ESC** to back up to the main Boot Menu item **Baud Rate**. You may scroll up and down through the main menu.

Serial Download?

This function allows loading data through the RS-232 port, erasing flash ROM, or programming Flash ROM.

1. Scroll to the **Serial Download?** menu item. Press **DATA/ENTER**. The message **Load from COM1** appears.

NOTE: You may use the up and down arrow keys to scroll to choose Erase Flash ROM or **Program Flash ROM** (through the COM1 port).

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2. Press **DATA/ENTER** to load a program through the Smart Trac AC1's communications port 1 (COM1).

3. Press **DATA/ENTER** to erase the program from flash ROM.

4. Press **ESC** to back up to the main Boot Menu item **Flash Access**. You may scroll up and down through the main menu.

Setting the Baud Rate for Serial Communication on COM1

You may set the baud rate for serial communication via the RS-232 port on the Digital Operator:

1. Within the first 2 seconds of power-up, press the **MENU** key on the Digital Operator keypad. Use up and down arrow keys to scroll through menu items until the message on the LCD reads **COM1 Config**.

2. Use the UP and DOWN arrow keys to scroll through allowed baud rate values until you get to the one you desire.

3. Press **DATA/ENTER** to accept the baud rate selected and save it.

Note: Other communications values are always: Parity = None, Stop Bits = 1.

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4. Press **ESC** to back up to the main Boot Menu item **COM1 Config**. You may scroll up and down through the main menu.

Firmware Version

Use this function to check the Operating System, Monitor and Boot Code program versions stored in your Smart Trac AC1.

1. Scroll to the **Firmware Version** menu item. Press **DATA/ENTER**. The Operating System version appears.

2. Press **up** or **down** arrow keys to scroll through to Monitor and Boot Code versions.

3. Press **ESC** to back up to the main Boot Menu item **Firmware Version**. You may scroll up and down through the main menu.

Erasing a User Program from Flash ROM

You may erase a previously loaded program during the boot process:

1. At the Flash Access prompt, press **DATA/ENTER**. You are prompted "Erase this User Program?"

2. Answer YES. Flash ROM is cleared of any program and is ready to accept another.

3. Press **ESC t**o back up to the main Boot Menu item **Flash Access**. You may scroll up and down through the main menu.

Start System?

You must always exit the boot menu through this function. Pressing **DATA/ENTER** starts the operating system of your Smart Trac AC1.

NOTE: The message "Starting OS" can be used as output at the J5 (serial) connector if desired. The message is sent after the initial 2 second timeout as indicated in the "Smart Trac AC1 Boot Process" flow chart.

Setting the System Time

All events occurring in your Smart Trac AC1 are time-stamped with the system date and time.

To set the system clock:

1. Load Smart Trac Workstation.

2. Right click a node.

3. Click the **Set Date/Time** selection. The **Set Date/Time** dialog box appears indicating the system date and time.

4. Enter a new date in the format DD/MM/YY and time in the format hh:mm:ss AM/PM. The dialog box indicates the new date and time.

5. Click **OK** to continue.

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Program Configuration of Your Smart Trac AC1

This Chapter will enable you to:

❑ *Configure Your Smart Trac AC1's Menu*

❑ *Install the DPRAM I/O Driver*

❑ *Make DPRAM I/O Points Available to Function Blocks*

❑ *Navigate and Program the Fault Manager for Your Application*

Program Configuration of Your Smart Trac AC1's Menu

Certain functions, such as *Parameters* and *Feedbacks,* are programmable. Others, including *Basic* and *Special* functions, may not be modified.

Basic Functions (later release)

Basic functions will be added in a later release of the Smart Trac software. These functions cannot be modified by the *Config Widget* program.

Introducing Smart Trac Workstation

NOTE: The following assumes you've installed Smart Trac Workstation.

1. Load Smart Trac Workstation by clicking **Start**, **Programs**, **MAG-300**, **Control Manager**. The main Control Manager screen appears (see Figure 5).

Figure 6. Right click on CONTROL NODES

7. Right click **LIBRARIES**. The **"C" Function Block Editor** appears with a listing of the installed .dll Library files.
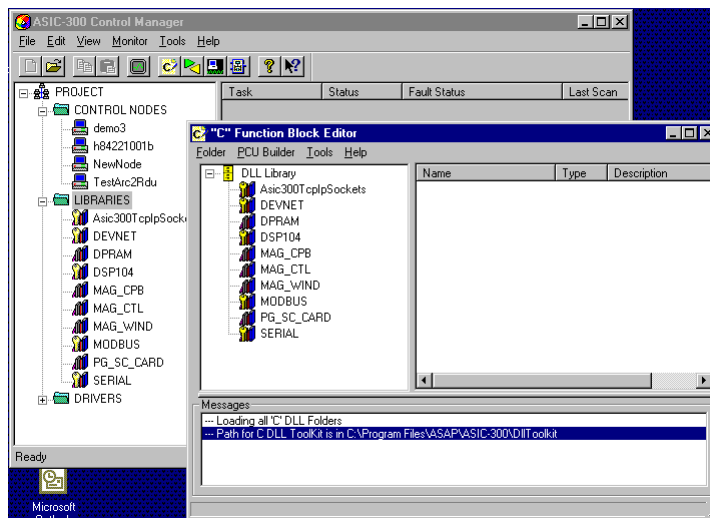
Figure 7.. "C" Function Block Editor

8. Click the "X" in the upper right corner of the **"C" Function Block Editor**. The Editor closes.

9. If the folder is not open, double click **DRIVERS** to open the folder. A listing of all installed drivers appears.
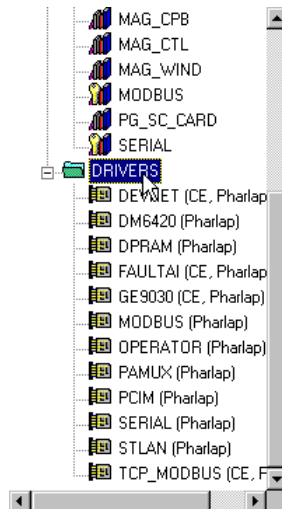
Figure 8. Right click of DRIVERS

10. Double click a specific Control Node. The **Control Studio** program loads.
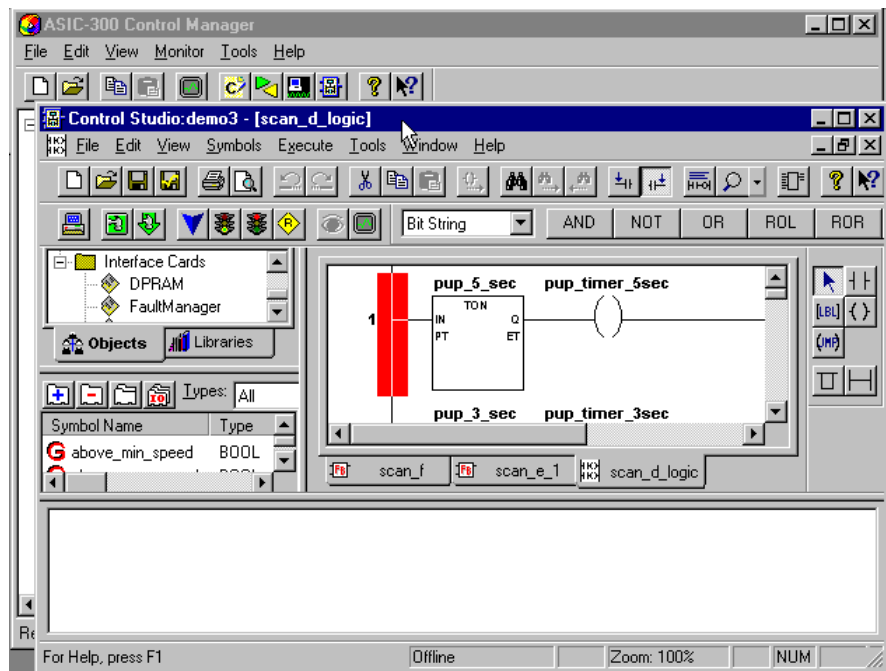
Figure 9. Double click of a control node loads Control Studio

The **Control Studio** main screen is divided into five basic window areas: Toolbar, Objects/Libraries pane, Symbol pane, symbol graphics pane, and Message pane.

11. Scroll up and down using the up and down arrrows of the Objects/Libraries pane (make sure the **Objects** tab is selected). This is the Object Tree. A tree of items associated with the highlighted part of the Object Tree - whether Interface Card, Program Unit, Symbol or Task - appear in the pane.

12. Click the **Libraries** tab. A list of all installed functions from the Smart Trac library is displayed in the Object/Libraries pane.
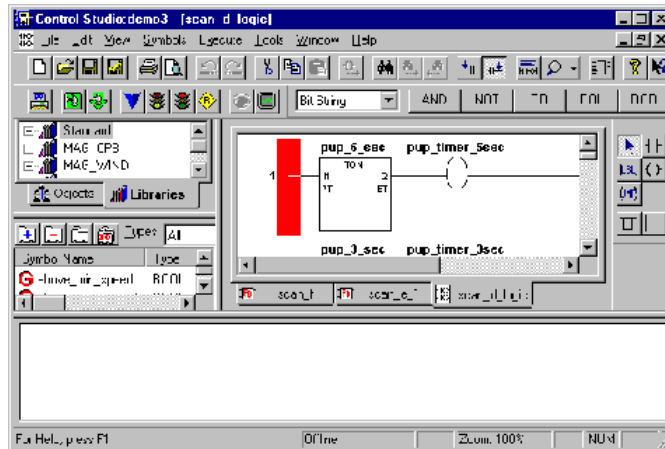
Figure 10. Click Libraries tab in Object/Libraries pane

13. Find the lower message pane. System created messages will appear from time to time in this pane. During a program *build* or *download*, many messages will be displayed.

14. Scroll using the up and down arrows at the right of the Symbol pane. Here you'll see symbol names, displayed in alphabetical order.
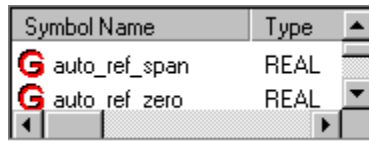
Figure 11.. The Symbol pane of Control Studio

15. Double click one of the symbol names. The **Symbol Details** dialog box appears. The box gives details such as memory space, type, physical address, structure, and initial value, among other information.
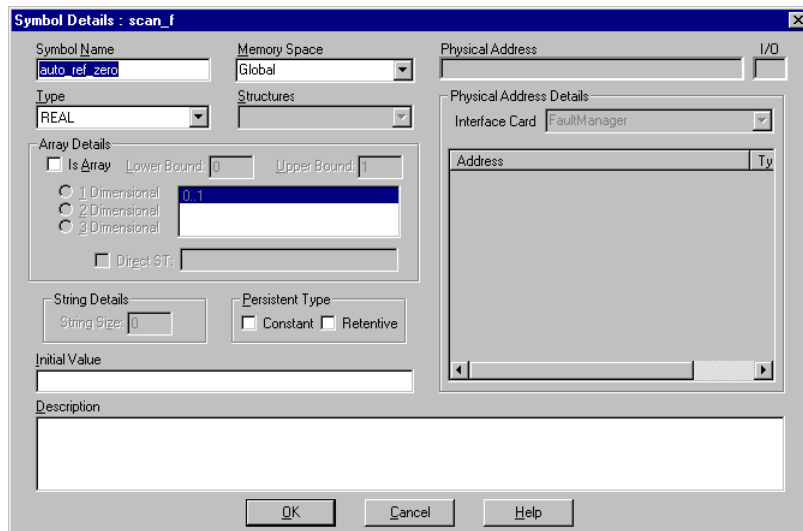
Figure 12. The Symbol Details dialog box

16. Click the "X" in the upper right corner to close the Symbol Details dialog box.

17. Click one of the Task tabs. Click another Task tab. The task area will graphically display each task. You may need to use the up and down arrows and/or the left and right arrows to position the graphics within the viewing area.
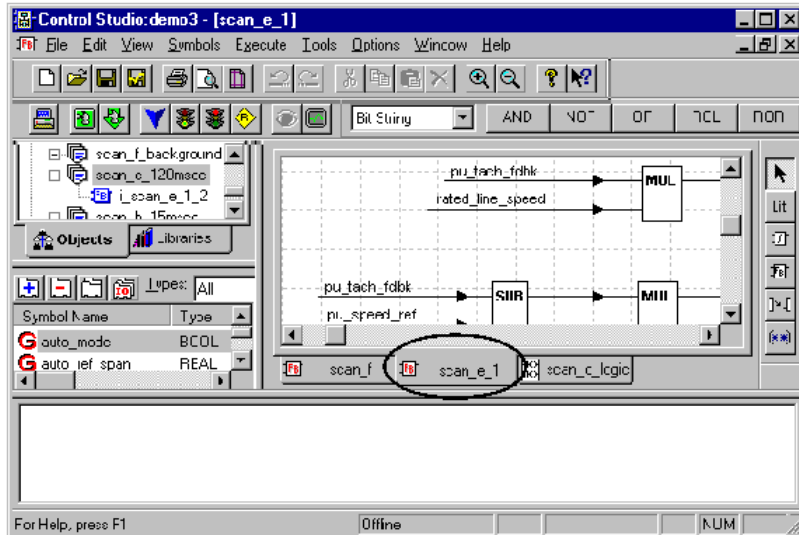
Figure 13. Clicking a Task tab provides a graphics display of the task

18. Try resizing the Control Studio window and various panes within the window using standard windows "drag and drop" features. You can resize panes by moving the cursor over a border until the cursor changes to two parallel lines with arrows. The drag and drop the border to the position you like.

19. Close out of Control Studio by clicking the "X" in the upper right corner. You have just learned the basics of using Smart Trac software.

The Operator Configurator

To establish the menu structure and user-selectable menu items, you run a selection in Smart Trac Workstation called the *Operator Configurator*.

1. Load **Control Studio**.

2. Click the **Objects** tab.

3. Click **Interface Card**, if necessary, to expand the Interface Card object tree to view all installed interface card entries.

4. Right click the Operator object (i.e., OperCard) and click **OPEN** in the dialog box that appears OR double click (two rapid clicks) the Operator object (i.e., OperCard). The **Smart Trac Local Operator Configuration** screen appears (Figure 14).
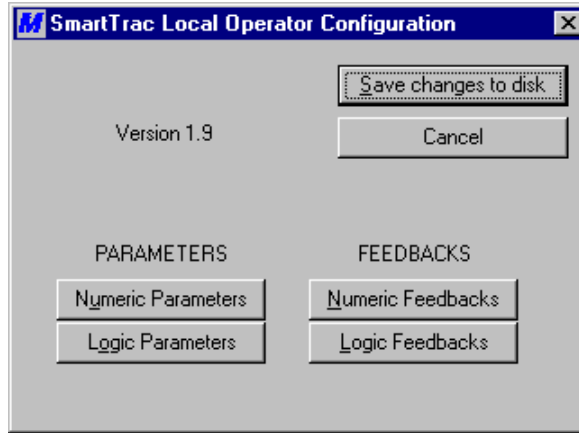
Figure 14. The Operator Configurator

The screen is primarily divided into *Parameters* and *Feedbacks* sections. A third, smaller section, located in the screen's upper right hand corner, permits saving changes to disk or canceling any changes.

Setting Feedbacks

You may choose one of two selections under the *Feedbacks* area of the *Operator Configurator* screen: *Numeric* and *Logic Feedbacks.*

Numeric Feedbacks

The **Numeric Feedbacks** screen establishes legends, units and relative positions in the list of numeric feedbacks by variable name.

Selecting **Numeric Feedbacks** from the **Operator Configurator** screen causes the following screen (Figure 15) to appear.
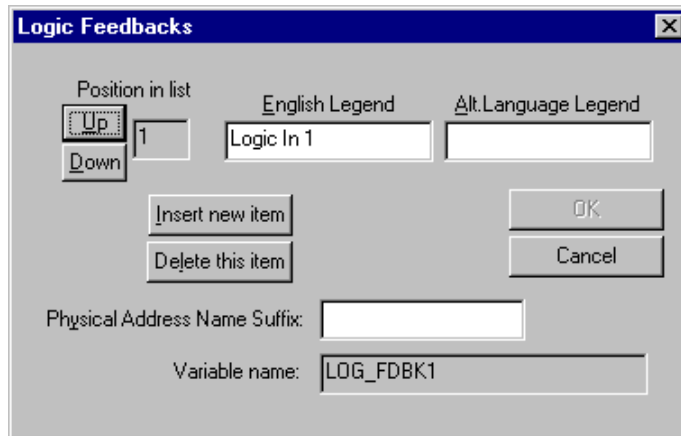
Figure 15. Numeric Feedbacks dialog box.

- **Position in list** indicates the position of a variable name entry in the list relative to all other Numeric Feedbacks entries. You can scroll up or down within the list to get to the position you wish to give the entry. Alternatively, you can highlight the displayed position and enter a new position.

- **English** indicates the English legend given to the displayed **Variable Name**.

- **Alt. Language** indicates a label in an alternate language thay you may assign to the displayed **Variable Name**. If English is the only language used, this entry may be left blank.

- **Units** indicates the label, as it will appear to the user, of the units associated with the primary, or **English** legend.

- **Alt** indicates the label of the non-English units associated with the **Alt Language Legend**.

- **Decimal point location** indicates the number of digits to be displayed to the right of the decimal point when the value of the named variable is displayed. You can scroll up or down, increasing or decreasing the number of digits. Alternatively, you can highlight (by clicking) the displayed number of digits and enter a new value. The chosen number of digits is displayed in the formatting symbol to the right of the number of digits (i.e. XXX.X for a value of "1").

- **Variable Name** is the same system assigned name that appears in the symbol table.

- **Insert new item** allows entry of associated legends, positions and decimal point locations for new variable names. When selected, other fields are cleared.

- **Delete this item** allows deletion of the variable name entry displayed.

Logic Feedbacks

Selecting **Logic Feedbacks** from the **Operator Configurator** screen establishes **English** and **Alt Language** legends, and relative positions in the list of logic feedbacks by **Variable name**. It is shown in Figure 16. Logic Feedbacks screen.
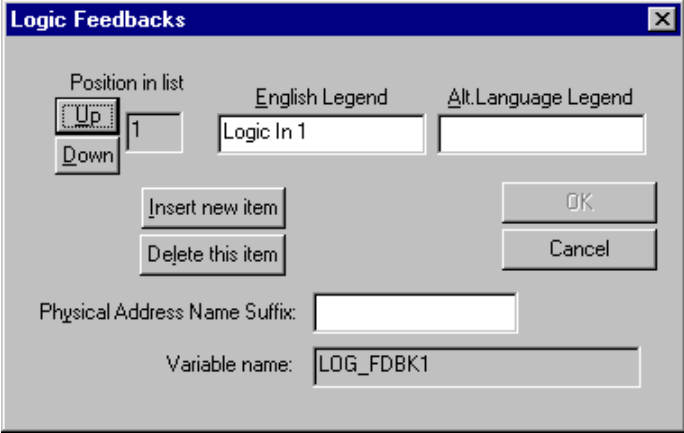
Figure 16. Logic Feedbacks screen

Other fields are identical in function to those listed in Numeric Feedbacks. Information to be entered is identical to that described in Setting Feedbacks above except that **Units**, **Alt Units** and **Digits after decimal point** are not displayed.

Setting Parameters

The **Parameters** section of the initial **Operator Configurator** screen offers a choice of two options: **Numeric Parameters** or **Logic Parameters**.

Numeric Parameters

Entries on the **Numeric Parameters** screen (Figure 17) provide information specific to numeric parameter entries.
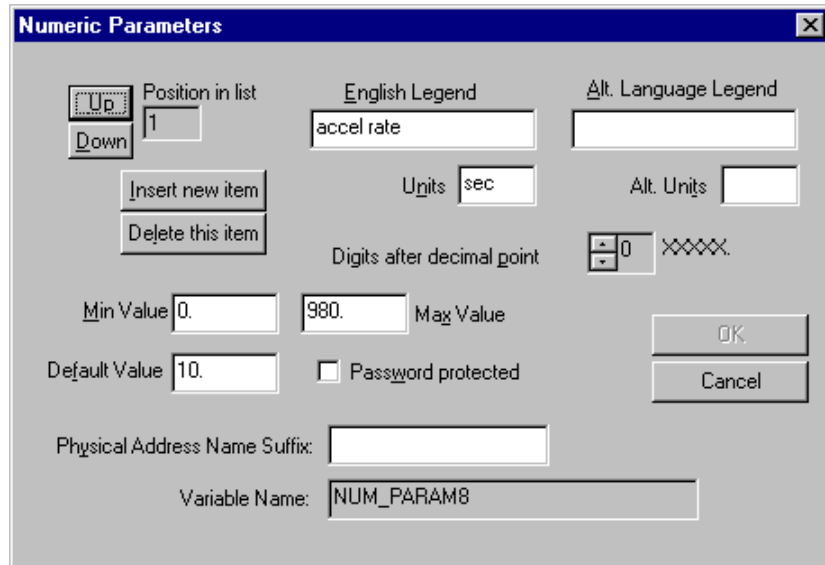
Figure 17. Numeric Parameters dialog box

Information to be entered is identical to that described in Setting Feedbacks above with additional fields **Min. Value**, **Max. Value**, **Default Value** and **Password protected**.

- **Min. Value** is the minimum value allowed for the displayed Variable Name. Entered values must be greater than or equal to this value.

- **Max. Value** is the maximum value allowed for the displayed Variable Name. Entered values must be less than or equal to this value.

- **Default Value** is the value to be used if no value is present for the Variable Name. It is loaded upon entering the Load Defaults command.

- **Password protected** provides control over who can change a parameter if checked.

Logic Parameters

Entries on the **Logic Parameters** screen (Figure 18) provide information specific to logic parameter entries. The information is identical to that described above in "Setting Feedbacks", with additional fields **Default Value (ON)**, and **Default Value (OFF)**.
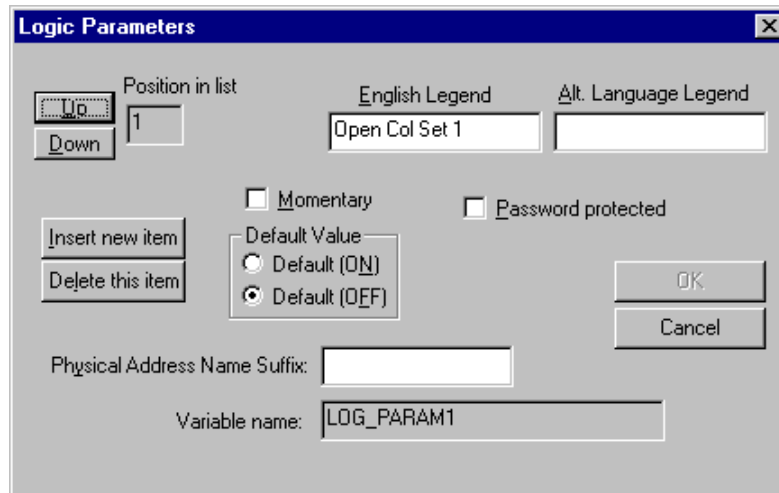
Figure 18. Logic Parameters Dialog Box

- **Default Value (ON)** restricts values of displayed Variable Name to a default value, loaded upon entering the Load Defaults command, unless a specific value is available.

- **Default Value (OFF)** allows values to be entered. If no value is entered, the value associated with Variable Name will not default to some other chosen value. It is loaded upon entering the Load Defaults command.

Special Functions

Special Functions reside on the Smart Trac card. They cannot be modified using the Operator Configurator.

Language Selection

Allows choice of English or a secondary language to be displayed

Fault Handling

Determines minimum and maximum values for the various application faults.

Load Defaults Command (Setting Default Parameters)

Allows setting parameters to factory (default) values.

Changing Numeric or Logic Parameters

From time to time, it will be necessary to change numeric or logic parameters. You may use the following procedures. For details on panel operation, see the publication *Smart Trac Digital Operator Engineer's Guide*.

Changing Numeric Parameters

1. Select **MENU** on the Smart Trac AC1 panel.

2. Using **UP** or **DOWN** keys on the panel, scroll selections until you find the **Numeric Parameters** list.

3. Press **DATA/ENTER**. The leftmost digit will start flashing, indicating that you may change it to a new value by pressing the **UP** (increase value) or **DOWN** (decrease value) keys.

4. To change the next digit, move the cursor by pressing the **>/RESET** (right arrow/reset) key. The digit flashes, ready for entry of another value. (Each time the >RESET key is pressed, the cursor moves right one position and that digit starts flashing).

5. When all digits have been changed to the desired values, press DATA/ENTER to store the new numeric parameter.

NOTE: If the new parameter is outside acceptable limits, the limits will be displayed briefly. After this, the leftmost digit will start flashing, ready for entry of an acceptable value.

Changing Logic Parameters

1. Select **MENU** on the Smart Trac AC1 panel.

2. Using **UP** or **DOWN** keys on the panel, scroll selections until you find the **Logic Parameters** list.

3. Press **DATA ENTER**. This selects the parameter desired, numbered between 0 and 15. Only programmed values (see "Numeric Parameters "above) will be displayed as choices.

DPRAM Installation, Configuration and Menu Tree

See MagneTek publication *Smart Trac DPRAM Engineer's Guide* for up-to-date information on installing the DPRAM driver and configuring DPRAM for your situation. An Appendix in the back shows all options available in a complete DPRAM Menu Tree diagram.

Adding and Editing Symbol Names

Symbol Names are the names of I/O reference names and global symbols you assign using the **Symbol Editor**. I/O reference names are symbolic names for I/O points. In addition, local symbols may be edited using an associated local Symbol Editor. The **Program Control Units** use these global and local symbols, representing variables and constants, within the node on which they are defined.

Certain keywords and reserved system symbol names should not be used in user-defined symbols. (See *Identifiers* in the *Language Reference* subfolder of the *Language Reference* folder within the *Control Studio* on-line help manual). Certain reserved symbol names are used by Smart Trac Workstation. Automatically defined, they provide scan, fault, and other information.

Symbols can be added, edited, copied, and deleted. They can be assigned a data type, or declared as an array, constant, or retentive. They can also be given an intial value. A symbol may be defined as type real, integer, Boolean, string, or date-and time. User-defined types, such as array structures, may be constructed using the User Type Editor.

Adding, Modifying or Copying a Symbol

To add, modify or copy a symbol:

1. Load the **Control Studio** by clicking **Start, Programs, Control Studio**.

2. When prompted, select a previously created node.. The Control Studio main screen appears. The **Symbol Editor** area appears as a pane within the Control Studio window. (See Figure 19). Click and drag the right border of the Symbol Editor pane to uncover the **Initial Value**, **Physical Address**, and **Description** fields. You may also want to resize the fields (by clicking and dragging) to display only what is necessary.
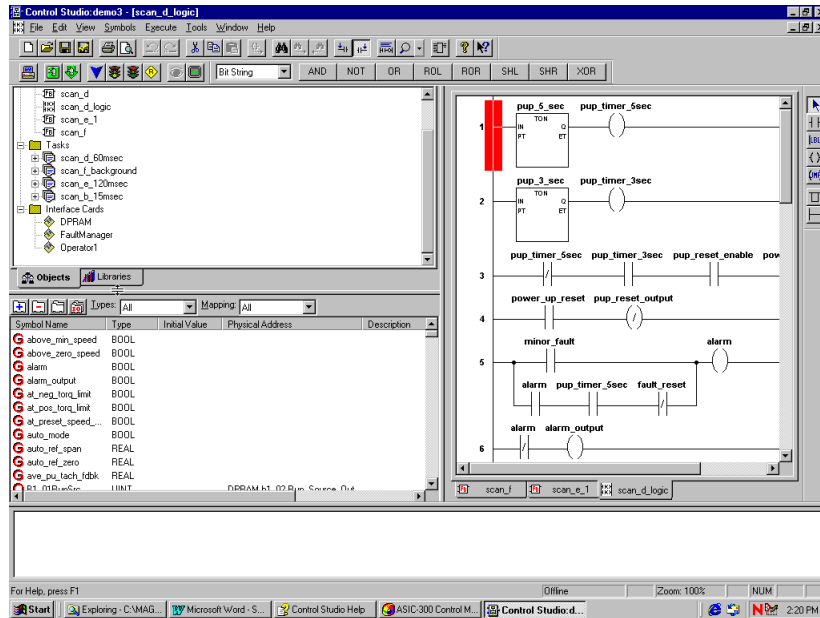
Figure 19. The Symbol Editor

3. *To add a Symbol*, click the icon with a blue plus sign on a white background. The **Symbol Details** dialog box appears.
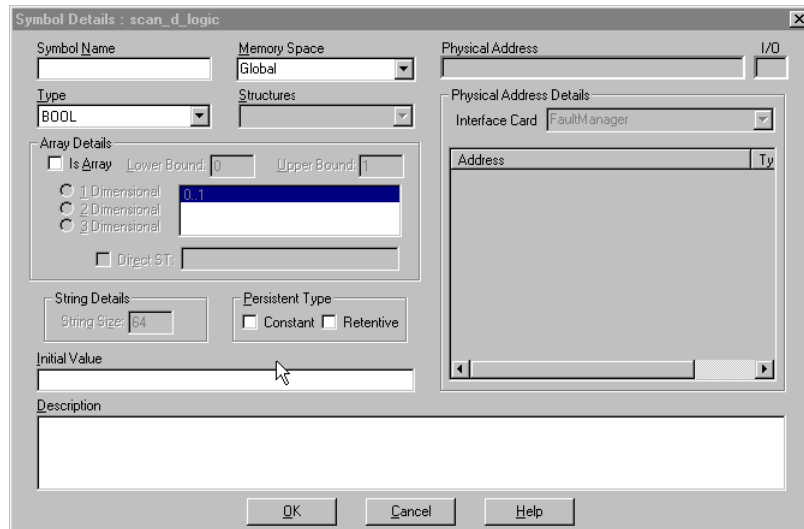
Figure 20. The Symbol Details dialog box for a Global mapping.

4. Define the Symbol you desire according to the following:

    • Enter a symbol name.

NOTE: If no interface card is configured, you can choose only a Global Memory Space.

    • Select the type of **Memory Space**, whether Global, I/O or Local. If **I/O** is selected, the Address, Type and I/O fields are displayed.
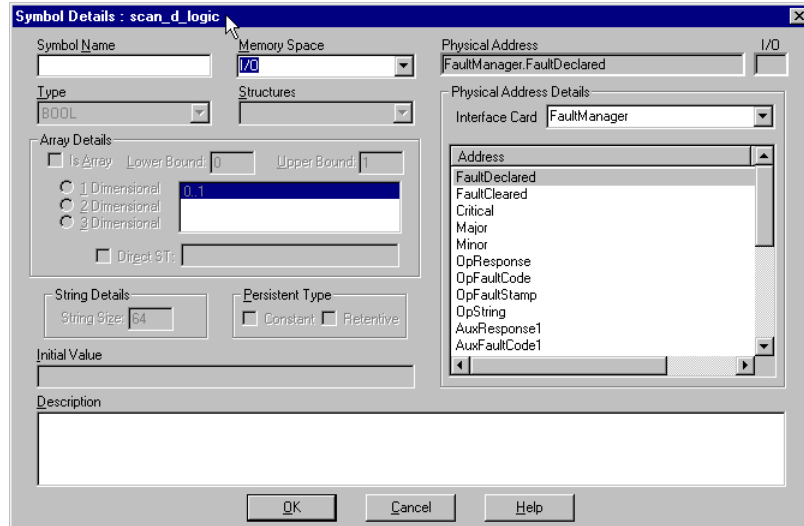
Figure 21. The Symbol Details dialog box for an I/O Mapping.

- Choose a defined **Physical Address** for the I/O Symbol. This could be the network address of the card, rack, or slot and port of the physical I/O point. For most cards, this is defined during configuration of the software driver using its Config Widget.

- You can select the **Interface Card** for which the I/O Symbol is being mapped.

Fault and Error Reporting

Fault Handling

Only those faults programmed into the Smart Trac AC1 can be reported. Certain faults are already programmed into the system as "standard" faults. Other faults require user programming.

When an established (programmed) fault is detected by the Smart Trac AC1, it is considered *active* and is displayed on the Smart Trac AC1 digital operator. The fault is reset when a key is pressed on the panel. Once reset, another fault may appear on the Smart Trac AC1 panel and the process is repeated.

A fault is considered *active* until it is reset. A queue of active faults is maintained by the Smart Trac AC1. If all faults have been reset and until a new fault is detected, the display will read "No Active Faults."

Faults are time-stamped. You must decide whether a given fault should be kept in one or both of two lists: the twenty *Oldest Faults* or the twenty *Newest Faults*. At the time you establish the faults, you select in which of the two lists you'd like the fault to appear. Both history lists may be cleared.

Faults may result from a failure of system hardware or firmware, or from a program failure (of either Smart Trac software or the application program).

Standard Faults

An application programmer determines faults that cannot be changed by the user of a Smart Trac AC1. Those faults are considered important and must always be reported. See listings of standard faults in the publication *Smart Trac Fault Tables*.

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Establishing the Faults You Want to Report

You decide which faults and errors are displayed and reported. As part of the initial configuration, you must program your Smart Trac AC1 with the desired faults and errors using the **Fault Manager**.

To access the **Fault Manager**:

1. Click **Start**, **Programs**, **MAG-300**, **Control Studio**. The **Open Node Dialog Box** appears.

2. Double click the node you want to configure, then double click the Interface Card **FAULTMGR**. The Fault Manager main screen appears.

You may need to install the FAULTMGR driver from the CD-ROM. In this case, you would follow normal device driver installation procedures, similar to that described in the publication *Smart Trac Fault Manager*.

The **Fault Manager** screen contains three tabs: the **Fault Editor**, **Define Outputs**., and **Configure.**
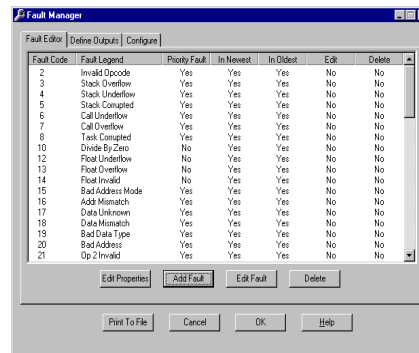
Figure 22. Fault Manager opening screen.

The main menu always opens with the **Fault Editor** tab selected because you must define faults before you define outputs.

Printing Fault Lists to a File

You may print a list of information contained on any of the three tabs.

1. Click the **Fault Editor, Define Outputs** or **Configure** tab.

2. Click **Print to File**. A **SAVE AS** dialog box appears.

3. Enter a filename and path for the file (or Browse through the path to the file location you desire). Press **Enter** or click **OK**. A text file is generated and saved with all information contained on the selected tab.

4. Using a text editor or word processing program, open the file as saved.

5. Choose **File | Print** from the editor or word processor.

Adding or Changing Fault Codes

Use the **Fault Manager** to add or change fault code defaults. Certain faults are reserved by the system and may not be changed. See the list of "Standard Faults."

Adding a Fault Code

1. Click **Add Fault**. The **Add Fault** dialog box appears. You are prompted for a **Fault Code**.

Figure 23. The Add Fault Code dialog box

Some properties may be grayed out. You are prevented from editing these properties.

By clicking the **Cancel** *button, you may back out of your entries and the* **Add Fault** *screen.*

2. Enter a **Fault Code** and a **Fault Legend** of as many as 16 numbers.

3. Check or uncheck properties you'd like the fault to have. These may include **Priority Fault**, **In Newest History**, **In Oldest History**. See Changing (Editing) Fault Code."

4. Click **Apply** to accept your entries. The **Add Fault** screen remains displayed, ready for you to add another fault.

5. When done adding faults, click OK to save your entries and exit the **Add Fault** dialog box.

Changing (Editing) Fault Codes

1. Click on a line to select (highlight) it. This allows the line to be edited if the **Edit Allowed** properties check box is checked.

   - If editing is allowed, the **Edit Fault** dialog box appears.

   - If editing is not allowed, a Fault Manager information box appears with the message "Fault Code Edit Property Not Set" (click OK to continue).

NOTE: If more than one line is selected, an information box appears indicating "Only one line may be edited at a time." (Click OK to continue.)

---

2. Enter a **Fault Legend**, the name of the fault being entered. You may enter a legend of up to 16 characters.

Properties **Allow Edit** *and* **Allow Delete** *will be displayed but grayed out. They cannot be changed.*

3. Check or uncheck properties of the fault, as you desire. These include **Priority Fault**, **In Newest History**, and **In Oldest History**.

By clicking the **Cancel** *button, you may back out of your entries and the* **Add Fault** *screen.*

4. Click Apply to accept your entries. The **Edit Fault** dialog box remains displayed, ready for you to edit another fault.

5. When done adding faults, click **OK** to save your entries and exit the **Edit Fault** dialog box.

Changing (Editing) Properties of a Fault

1. From the **Fault Manager** screen, click a line to be edited.

2. Click **Edit Properties**. The information box appears as shown in Figure 24. Properties Warning.
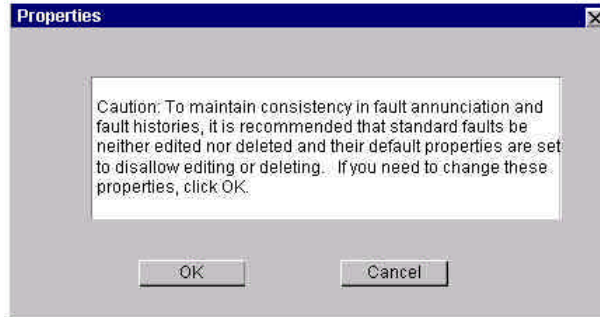
Figure 24. Properties Warning

3. Click **OK** if you wish to change properties for the selected line. The dialog box for the selected fault appears with **Priority Fault, In Newest History**, **In Oldest History** will be grayed out, indicating that they may not be edited.

4. Check or uncheck **Edit Allowed** and/or **Delete Allowed**, as desired.

By clicking the **Cancel** *button, you may back out of your entries and the* **Edit Propertie***s screen.*

5. Click **Apply** to accept your entries. The **Edit Properties** dialog box remains displayed, ready for you to edit another fault's properties.

6. When done editing properties, click OK to save your entries and exit the **Edit Properties** dialog box.

Deleting a Fault Code

1. From the **Fault Manager** screen, click a line or lines to be deleted. Those lines whose properties allow deletion will remain selected (highlighted).

NOTE: To delete more than one contiguous line, hold down the SHIFT key and click on the first line to be selected. Continue to hold down the SHIFT key and click on the last contiguous line to be selected. Release the keys. The first selected line, the last selected line and all lines in between will remain selected (highlighted).

To delete more than one line, one at a time, hold down the CTRL key and click each line to be deleted. To deselect a line, CTRL click a highlighted line.

2. Click **Delete.** The **Fault Manager** shows only lines not deleted.

Editing Legends for Fault Codes

The legends, or descriptive text for fault codes, may be edited only if the **Allow Edit** field is checked as a property of the fault.

1. From the **Fault Manager** screen, click a line to be edited. The line will be highlighted.

2. Edit the **Fault Legend**, as desired.

3. Click **Apply** to accept your changed legend.

4. Click **OK** to save the change and exit the dialog box.

Assigning Fault Priorities (In Newest History or In Oldest History)

Priorities of Fault Codes may be edited only if the **Allow Edit** field is checked as a property of the fault.

1. From the **Fault Manager** screen, click a line to be edited. The line will be highlighted.

2. Check or uncheck the **Priority Fault, In Newest History** or **In Oldest History** check boxes, as desired.

3. Click **Apply** to accept your changes.

4. Click **OK** to save the change and exit the dialog box.

Defining Outputs

Use the **Fault Manager** to define or modify outputs. Select the **Define Outputs** tab. The screen should appear as in Figure 25.
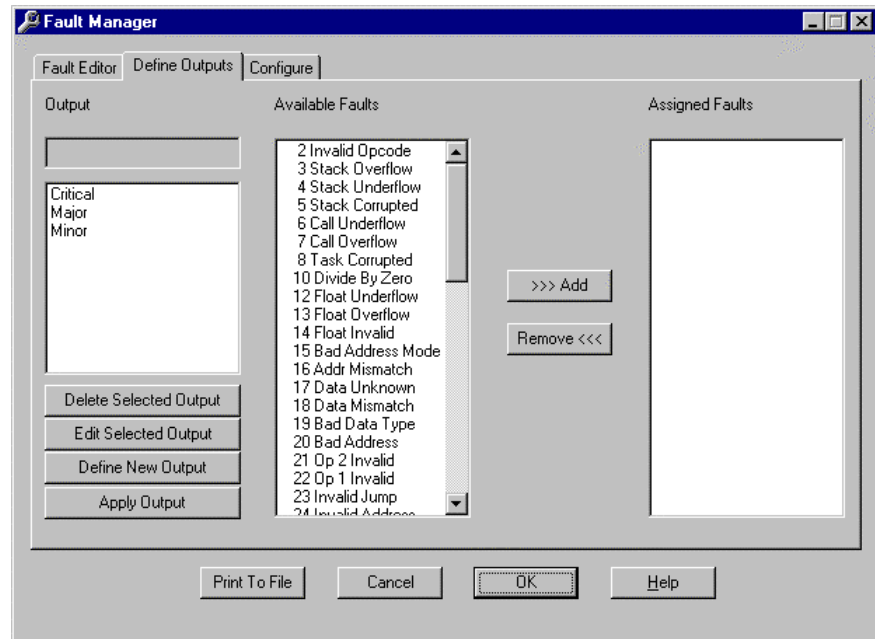
Figure 25. Define Outputs Menu

Adding an Output

1. Click **Define New Output**. The **Output** edit box and **Assigned Faults** scroll box become empty and ready for data to be entered. The **Available Faults** scroll box displays all of the available faults.

2. Enter an output name in the **Output** edit box. Standard (default) outputs include Critical, Major and Minor faults. You may assign faults to the output (refer to "Assigning Faults to Outputs").

Do not confuse the use of Critical, Major and Minor faults with Smart Trac Major and Minor Faults defined in the Appendices. Here, they are only names for collections of faults. You may create collections and name them as you wish.

3. Click **Apply Output**. The newly defined output will appear in the **Output** box.

Assigning Faults to Outputs

You may assign faults to outputs before the **Apply Output** button is clicked while defining a new output or when in **Edit Selected Output** mode.

1. In the Output box, find the **Output** to which you want to assign a fault. Click it. It will be highlighted and appear in the **Output** edit box.

2. Scroll the **Available Faults** box until the fault you want to assign appears in the box. Click it. It will be highlighted.

NOTE: You may use SHIFT-Click to select more than one contiguous fault or CTRL-Click to select more than one non-contiguous fault.

3. Click **>>>Add**. The fault will move from the **Available Faults** box to the **Assigned Faults** box.

NOTE: You may continue to assign faults to outputs by repeating the process.

4. Click **Apply Output** to save the assignments.

Removing an Output Fault

Removing faults from outputs may be done when defining a new output before the **Apply Output** button is clicked or when in **Edit Selected Output** mode.

1. Scroll the **Output** box until you find the output from which you want to remove a fault. Click it. It will be highlighted and appear in the **Output** edit box.

2. Scroll the **Assigned Faults** box until the fault you want to remove appears in the box. Click it. It will be highlighted.

3. **NOTE:** You may use SHIFT-Click to select more than one contiguous fault or CTRL-Click to select more than one non-contiguous fault.

4. Click **Remove<<<**. The fault will move from the **Assigned Faults** box to the **Available Faults** box.

NOTE: You may continue to assign faults to outputs by repeating the process.

3. Click **Apply Output** to save the assignments.

Editing an Output

You may change the name of an output or reassign faults using the **Edit Selected Output** option of the **Define Outputs** tab.

1. Scroll the **Output** box until you find the output you wish to edit. Click it. It will be highlighted and appear in the **Output** edit box.

NOTE: You may edit only one output at a time.

2. Click **Edit Selected Output**.

3. To change the name of the output, highlight the name in the **Output** edit box and enter the new name.

4. To change faults assigned to the output, select the fault or faults you wish to remove or add in either the **Available Faults** or the **Assigned Faults** box. Click **>>>Add** or **<<<Remove** (refer to "Assigning Faults to Outputs" or "Removing an Output Fault").

5. Click **Apply** Output. The selected output will appear on the **Define** Outputs screen as modified.

Deleting an Output

Deleting outputs is done from the **Define Outputs** dialog box.

1. Scroll the **Output** box until you find the output you wish to delete. Click it. It will be highlighted and appear in the **Output** edit box.

NOTE: You may use SHIFT-Click to select more than one contiguous output or CTRL-Click to select more than one non-contiguous output.

2. Click **Delete Selected Output**. The selected outputs will be removed from the **Output** scroll bar and the outputs are deleted from the software driver.

Configure the Fault Manager

You may change configure the Fault Manager's scan rate and the number of faults in the newest and oldest fault lists.

1. Click the **Configure** tab. The **Configure** screen appears.
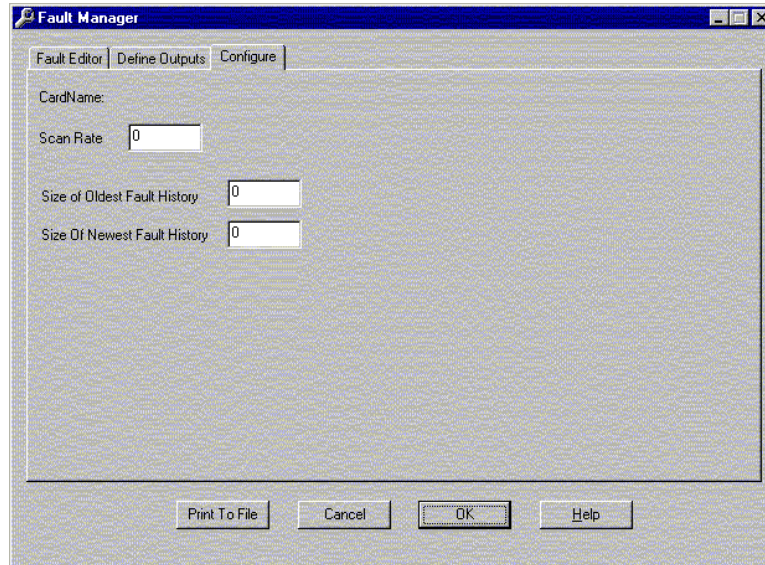
Figure 26 Fault Manager Configure dialog box.

2. Click and drag the cursor over **Scan Rate**, **Size of Oldest Fault History**, or **Size of Newest Fault History** to change that value.

NOTE: You may click **HELP** for a more detailed explanation of each value.

3. Enter the new value.

4. Click **OK** to save the change(s).

Done with Fault Manager changes?

When done making changes, Click OK to save all changes, exit the Fault Manager configure screen and return to the Control Manager.

Linking the Fault Manager and the Digital Operator

You must create a program to associate output from the Fault Manager with the input of the Digital Operator. In a nutshell, you create symbols for the inputs to the Digital Operator and outputs from the Fault Manager, then create a function block to link the two. An example is used to explain this process. The example assumes previous creation of an interface card name of *OperCard* for the Digital Operator driver. We will add *FromFM...* (inputs to the Digital Operator from the Fault Manager) and *ToOper...* (outputs of the Digital Operator) symbols.

To create the symbols:

1. Load **Control Studio** (**Start**, **Programs**, **MAG-300**, **Control Studio**) for the node desired.

2.   The **Symbol Editor** area shows defined symbols.
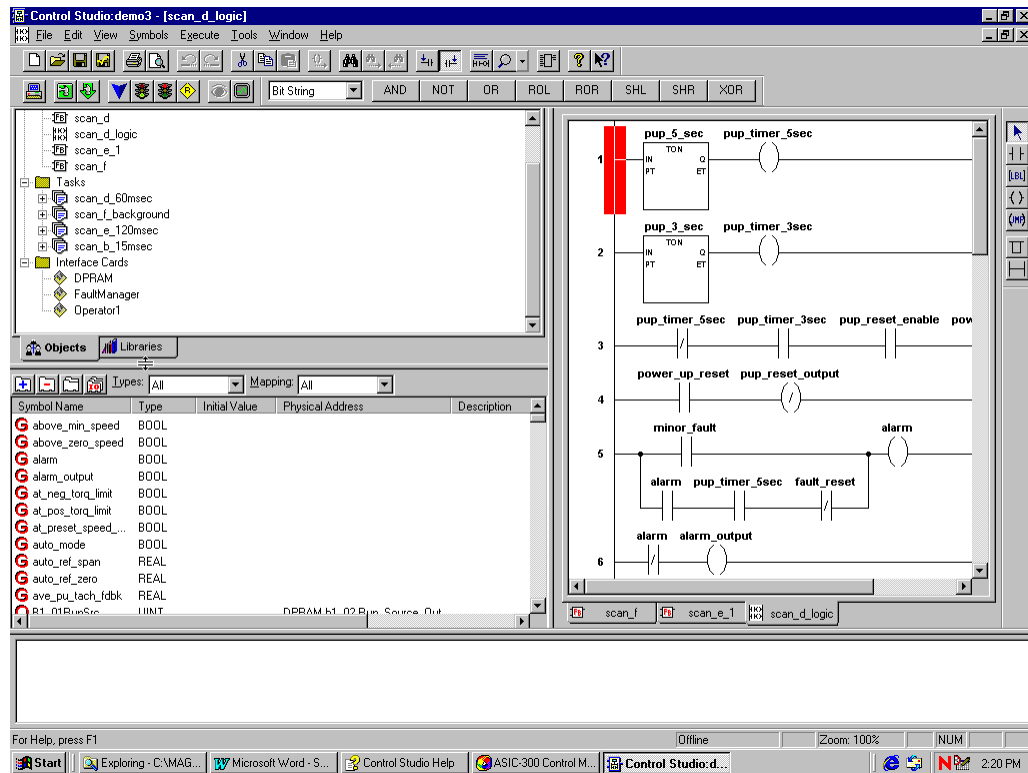
Figure 27. The Control Studio showing the Symbol Editor area

3.   Drag and drop the right border of the Symbol Editor area so that you can view the fields Type, Initial Value, Physical Address and Description.

4.   Select I/O from the Mapping drop-down selection list.

5.   Select *OperCard* (or other name) from the **Interface Card** drop-down selection box.

6.   Click the blue plus (+) sign [icon] . The **Symbol Details** dialog box appears for the task selected by clicking one of the Task tabs.
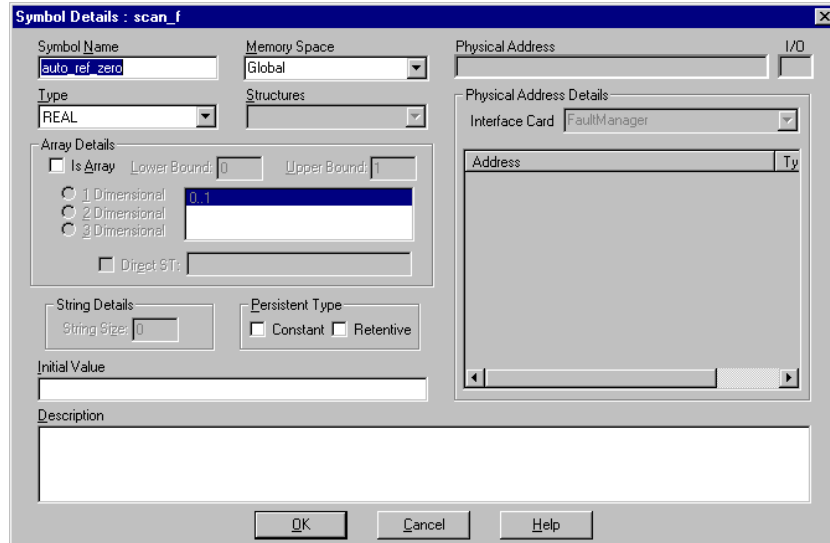
Figure 28. The SymbolDetails dialog box

7. Type a name of your choice in the box after **Symbol Name.** In the figure, we used *ToOperOpResponse*

8. Select **I/O** from the **Memory Space** drop-down selection list.

9. In the **Physical Address Details** area, select **Operator** from the drop-down **Interface Card** selection list. Symbolic names for all available physical addresses appear in the box below the **Interface Card** selection list.
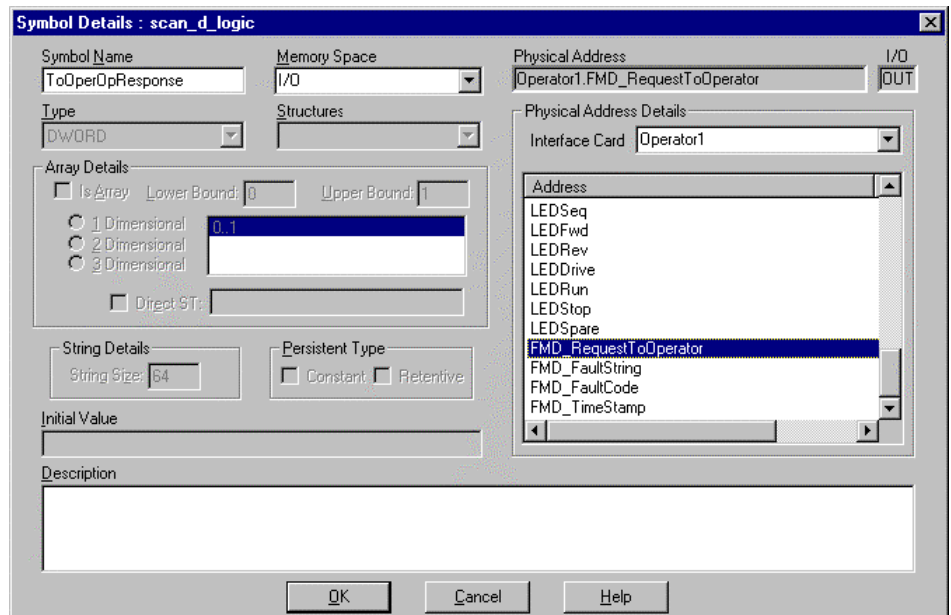
Figure 29. Assigning a Physical Address to a Symbol Name

10. Select a Physical Address (symbolically named) from the **Physical Address Details address/type/I/O** box by clicking on it to highlight it. In this case, we chose the *FMD_RequestToOperator*

physical address. This links the physical address with a symbol to be used in a function block diagram.

11. Click **OK** to accept your name, your choices and add the symbol.

12. Continue to add symbols (steps 3 through 8) until you complete adding all those you need for your function block. Close the **Symbol Editor** when done.
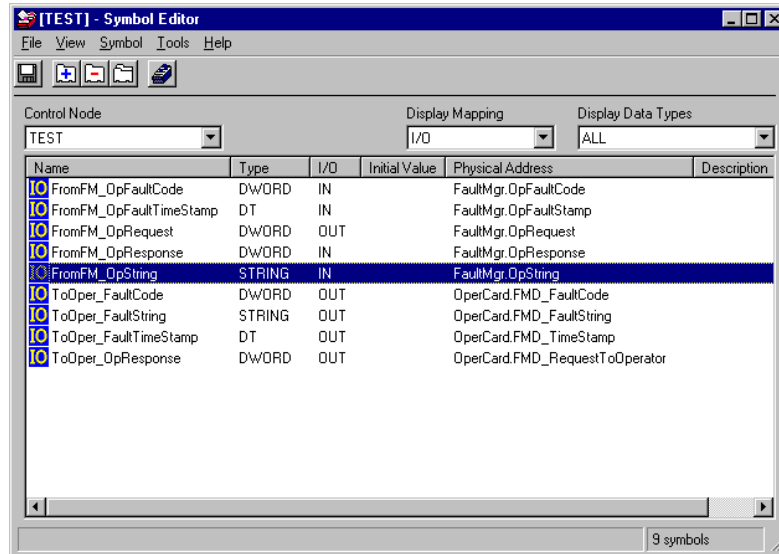
Figure 30. All Symbols needed for function block are added

Next, you create the function block to associate inputs to the Digital Operator from the Fault Manager (the *FromFM_* symbols) with the outputs of the Digital Operator (the *ToOper_* symbols).

13. Open the **Function Block Editor** by right-clicking **Programs** under a desired node name and selecting **New Program Unit…** or clicking **Object**, **New**, **Program Unit**. The **New Program** dialog box appears.
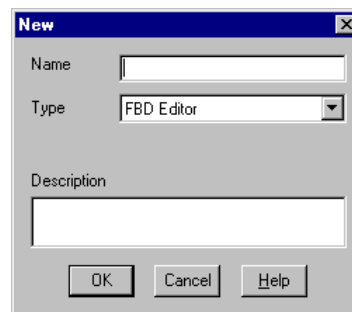
Figure 31. Selecting FBD Editor from the New program dialog box

14. Select **FBD Editor** from the drop-down selection list and enter a program name. In this case, we chose *FaultOperatorLink* as the name for our new program in the form of a function block diagram.

15. Click **OK.**

16. Click on the **Global** tab at the bottom of the **Function Block Editor**. The symbols you just added should be listed.

If you're unsure how to use the Function Block Editor, consult the online help available from the Editor's toolbar.

17. By dragging and dropping, add the *FromFM_* symbols and *ToOper_* symbols to the function block editor screen and connect them using the Connector icon. Your function block diagram should eventually look like the one below:
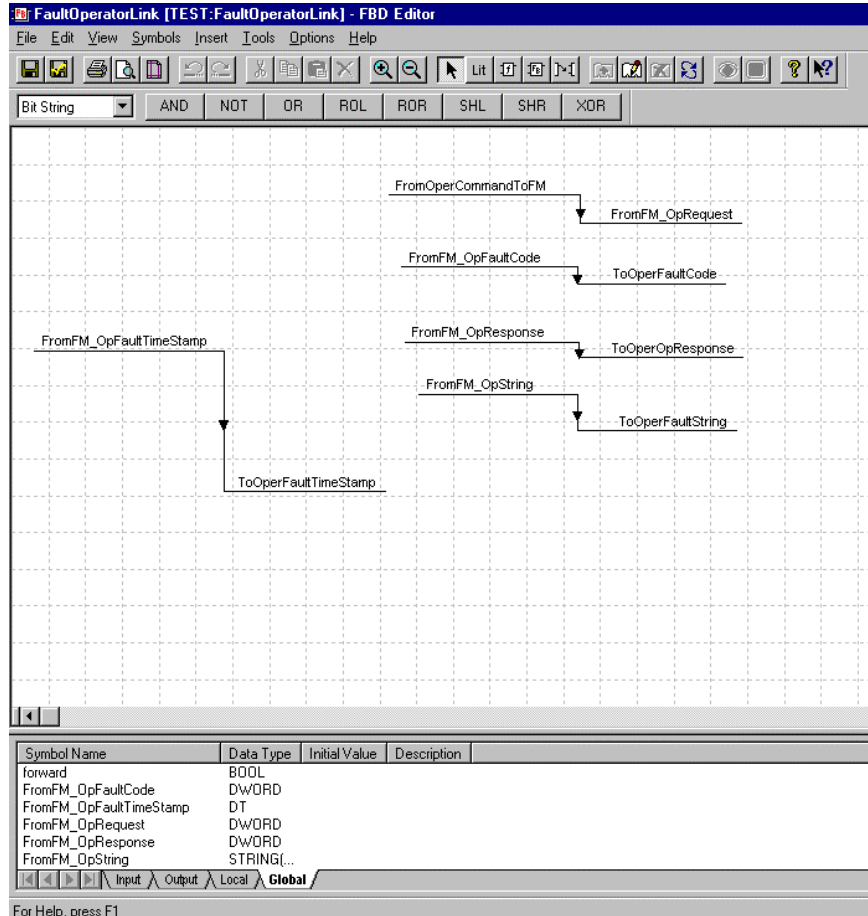
Figure 32. The completed FaultOperatorLink function block

18. Click **File**, **Save and Validate**, and provide a *filename* to save and validate your function block. You now have a block to display faults from the fault manager on the Digital Operator, with a time stamp and a text string to display as the fault description.

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Control Nodes and Program Libraries

What are Control Nodes?

A Control Node is a textual and graphical representation of a Smart Trac AC1, which usually resides on a communications network. Control Nodes can be treated like objects that are copied, pasted, imported and exported from within the Smart Trac software environment. All Smart Trac AC1s on a network (or even a standalone drive) must be associated with a control node in order to work with Smart Trac Workstation. Control Nodes may be *created* or *imported*.

Creating a Control Node

To *create* a Network Control Node:

1. Load the **Control Manager** by clicking **Start, Programs, MAG-300, Control Manager**. The Control Manager dialog box appears. Menu items include **File**. **Edit, View**, **Monitor**, **Tools**, and **Help**. Many actions you can do with an Icon you can do through the menu system. Use whichever is easiest for you.

2. Right click on the **CONTROL NODES** folder. The folder becomes highlighted and a selection menu appears with **New** item highlighted.
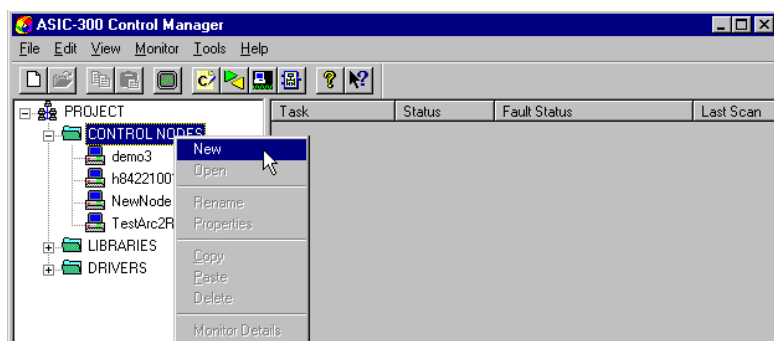
Figure 33. Creating a Control Node

3. Click **New**. The **New Control Node** dialog box appears.
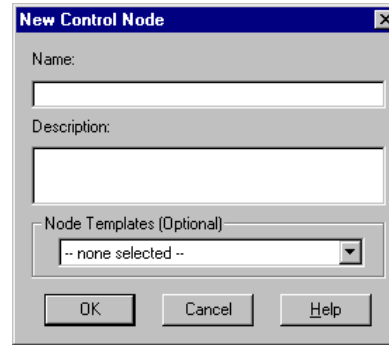
Figure 34. The New Control Node dialog box

A control node name must be unique within the network, begin with a letter or underscore, have no spaces or punctuation (other than the underscores), and be no more than 64 alphanumeric characters long.

4. Enter a **Name** of your choosing for the new control node, a description and click **OK**. The new Control Node appears on the Object Tree and **Control Studio** loads. Folders to contain **Program Units, Tasks** and **Interface Cards** are automatically created. They appear beneath the created control symbol.

Templates can be used to add information such as interface cards, program files, symbols and tasks from previously created nodes. You can also use copy, cut and paste nodes. See the topic *Control Node Operations* in *Control Manager* online help.

Importing a Control Node

To *import* a Control Node for a networked Smart Trac AC1:

NOTE: Installation of a Control Node requires you to have a hardware key installed in your parallel port. If you do not have a hardware key, you will not be able to import a node. Whether your workstation recognizes the hardware key will be discussed at the appropriate time later in this procedure.

Laptop users: In order to get your hardware key to be recognized by Smart Trac software, you may need to have your laptop attached to a docking station, with AC power applied.

1. Ensure you've installed the hardware key, or *dongle*, on your system.

2. Load the **MAG-300 Control Manager**. The Control Manager dialog box appears with a tree structure in left window. If control nodes have previously been created, you will see a folder for each of them. It may be necessary to click once on the plus sign to the left of the name, or double click the **CONTROL NODES** folder, to expand the tree.

3. From **Control Manager**, click **Tools**.

*Use the **Object Archive** utility to make a backup or archive copy of your control system, or to transfer objects between control nodes in the same or different projects.*

4. Select **Object Archive**. The Object Archive dialog box appears (see Figure 35).

NOTE: If your workstation does not recognize or sense the hardware key from your parallel port, the text 'Object Archive' will be grayed out. It will be impossible to load a Control Node if this is the case. Contact your MagneTek representative as described in Technical Support.
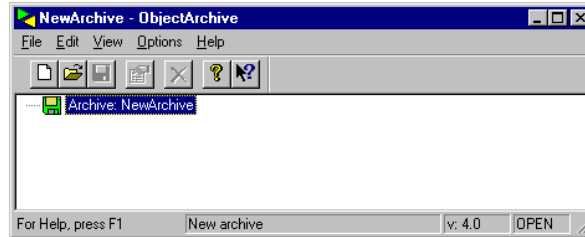
Figure 35. The Object Archive dialog box.

5. Open the archive containing the control node to be imported by selecting Open from the Object Archive File menu. An Open dialog box appears. If the archive is not in the default folder, you can navigate to the path containing it.

TIP: It may help to toggle on Object Archive's Always On Top feature from the View menu.

6. After locating the archive, select it and click OK. The archive appears in the Object Archive window.

7. From Object Archive, select and drag the control node to be imported to the Control Manager Control Nodes list.

8. *To permanently store the node in your workstation*, drag and drop it into Control Manager. It usually takes a few seconds for the process to complete. For example, click on FILENAME in Object Archive; keeping the mouse button pressed down, and drag FILENAME to a node within Control Manager. As soon as the existing node is highlighted, you may release the mouse button.

NOTE: A small warning box will appear, just after releasing the mouse button, asking if you really want to copy the node over your original node. Click 'Yes'.

9. All information such as symbols, programs and tasks that existed in FILENAME will be included in this node.

10. Click **Close**. The Object Archive dialog box closes. Your new Control Node has been successfully imported.

Configuring or Editing a Network Control Node

NOTE: This procedure must be followed for all types of networks. It includes those that use RS-232, Ethernet or other methods of communication.

To configure a Control Node:

1. Load Control Studio with the node you wish to configure.

2. Right click the node you want to configure. A small menu appears
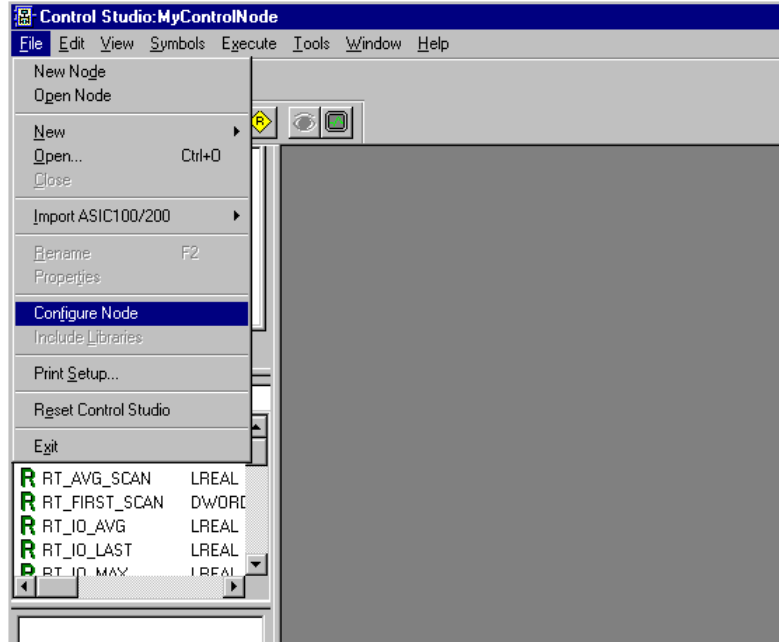
Figure 36. Configuring the node loaded with Control Studio.

3. Click **Configure Node** from the menu. The **Configure Control Node** dialog box appears. It has four tabs: **Definition**, **Options**, **Timeout**, and **General.**.

4. Click the **Definition** tab.
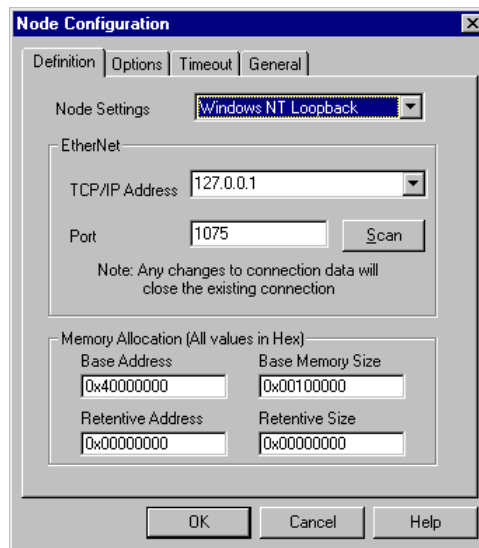
Figure 37. The Definition Tab of the Node Configuration Dialog Box.

5. From the **Node Settings** selection box, choose from one of several types of settings, including, Pharlap, Smart Card Ethernet, Smart Card RS-232, Windows CE, Windows NT or Windows NT Loopback. You can communicate with a single Control Node over a serial line or with one or more Control Nodes over an Ethernet network.

6. If RS-232 is selected, the following dialog box appears:
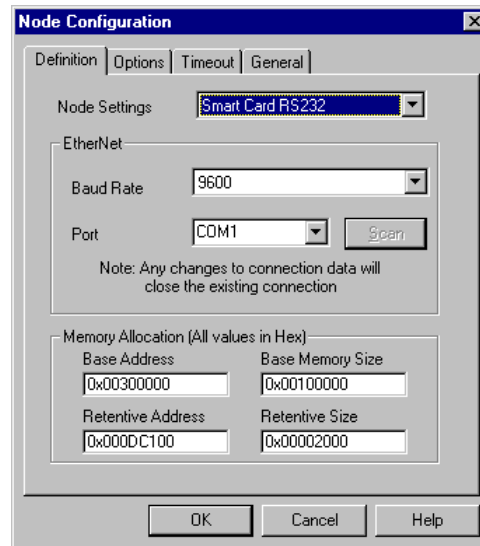
Figure 38. The Node Configuration Smart Card RS-232 Selection.

You must enter the communications **Baud Rate** and **Port** you'll be using to communicate information from the Smart Trac AC1 node to the host PC.

Specifying memory addresses and sizes and debug handling during the build process are included on the **Definition** dialog box.

- The **Base Address** indicates where user memory starts on the Smart Trac AC1 system. This should always be "0x300000" for the Smart Trac AC1.

- The **Base Memory Size** is the amount of memory on the Smart Trac Drive system. This should always be "0x100000" for the Smart Trac AC1.

- The **Retentive Address** is the starting address of nonvolatile RAM. This should be "0xDC000 for the Smart Trac AC1.

- The **Retentive Size** is the amount of nonvolatile RAM in the system. This should be "0x3F00" for the Smart Trac AC1.

If the Smart Trac AC1 will be on a Wide Area Network (WAN) or you do not know how to assign a TCP/IP address, check with your company's Information Services Dept for a TCP/IP address.

If **Smart Card Ethernet** is selected, the following dialog box appears:
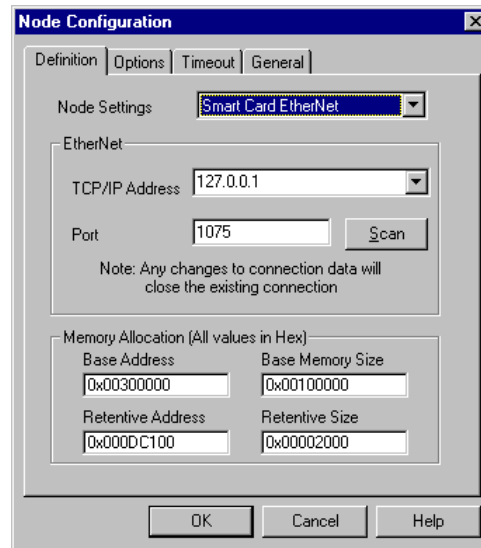
Figure 39. Configure Control Node Ethernet Communications Dialog Box.

7. If you have a TCP/IP address assigned to the node, you may manually enter it. You may also scan the network for a valid TCP/IP address by clicking Scan. Doing so will poll the network and display a list of addresses of active embedded control nodes within a range of addresses you specify. You may choose from among these addresses. For the NT Runtime Engine, enter the TCP/IP loopback address of 127.0.0.1 The port number is always 1075.

8. Click the **Options** tab. The following dialog box appears:
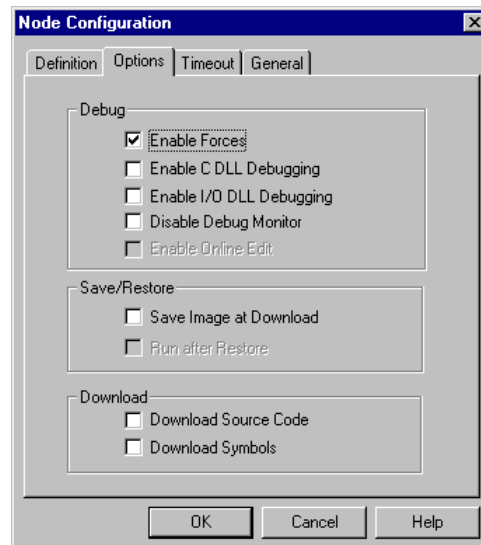
Figure 40. Configure Control Node Build dialog box.

•   When **Debug: Enable Forces** is checked, symbols can be forced in the Watch Window. Forced symbols cannot be modified

by the program as it runs. Forcing symbols aids in debugging a program.

- **Enable C DLL Debugging, Enable I/O DLL Debugging**, and **Disable Debug Monitor** should all remain unchecked.

Normally, you'll want to check both the **Save/Restore** options.

- Check **Save Image After Download** if you want the program to be saved on the system you're downloading to once it is down with the download.

- Check **Run after Restore** if you want the downloaded, user program to be run immediately after power-up.

- If neither **Save Image After Download** or **Run after Restore** are checked, you indicate that you want to the program to be downloaded each time you power-up.

- Check **Download Source Code** only if you want to keep a copy of the user program on the PC or Smart Trac AC1 being downloaded to. This might be done for backup reasons.

- Check **Download Symbols** if you want to download symbol information to a local HMI (Human Machine Interface). Normally, this is unchecked.

9. Click the **Timeout** tab. The dialog box appears as in **Error! Reference source not found.**.
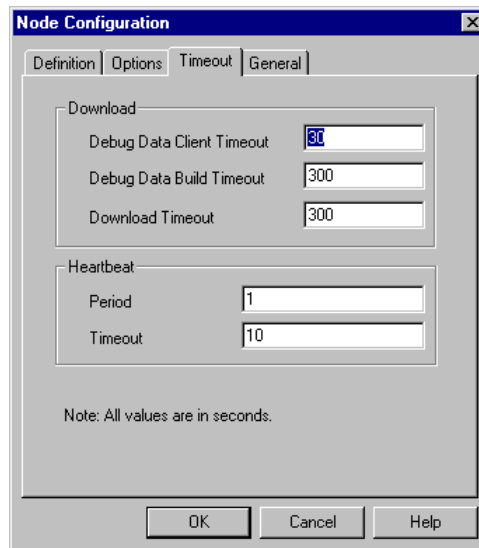
Figure 41. Configuring with the Timeout dialog box.

Timeout options prevent the system from hanging up if there is a problem during downloading or other communications operations. They are separated into two types: **Download** and **Heartbeat** options.

- **Debug Data Client Timeout** should be increased (from 30 seconds) if you get the error "A debug database client has not relinquished the database."

- **Debug Data Build Timeout** should be increased (from 300 seconds) if you get the error "Failed to build the debug database."

- **Download Timeout** should be increased if the download times out without completing.

- **Period** indicates the time between heartbeat pulses sent from the master workstation to a slave. The default value is 1 second. It should not normally be changed.

- **Timeout** is the amount of time the workstation waits for a response from the slave. If no response is received, it tries two more times using the same timeout. The default value is 10 seconds. It should not normally be changed.

a.

10. Click the **General** tab. A small dialog box appears.
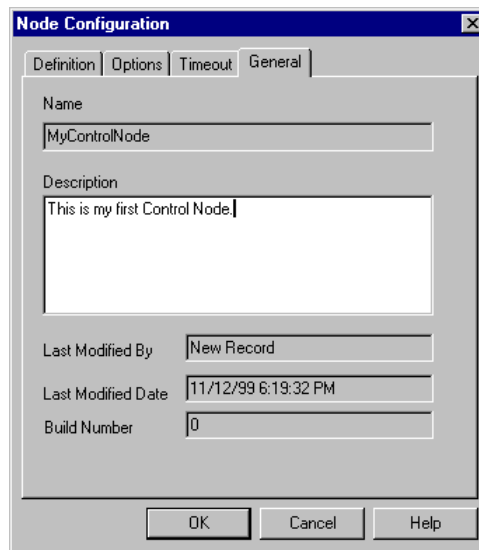
Figure 42. The General tab of the Node Configuration dialog box.

This dialog box allows you to enter your own control node name and description with the node being configured. You may also record who last modified the node and the date of modification, as well as a "build number", or a sequential number assigned each time the node is reconfigured.

Importing Smart Trac Program Libraries

A library consists of objects that can be brought into a user program. A typical object is a 'C-language' Function Block. A collection of these already-designed function blocks is contained in a *Program Library*. Several programs are already included with all Smart Trac AC1s for installation into your library, including DEVNET, MODBUS and SERIAL. The procedure below describes how to add a program to the library.

NOTE: Installation of MagneTek libraries requires you to have a *dongle*, or hardware key, installed in your computer's parallel port. If you do not have a hardware key, you will not be able to install library programs.

1. Ensure you've installed the hardware key, or dongle, on your system.

2. Load the Control Manager in Smart Trac Workstation. The Control Manager dialog box appears with a tree structure in the upper left window. If control nodes have previously been created, you will see each of them listed under CONTROL NODES. It may be necessary to double click on the words CONTROL NODES (or click the plus "+" sign to the left of the words) to expand the tree. If previous Control Node(s) were created, you will see each of them listed

3. After the session opens, view the tree structure in the upper left window. The words 'PROGRAM LIBRARIES' will appear in the structure. If the default libraries were installed, you will see DEVNET, MODBUS, and SERIAL listed under PROGRAM LIBRARIES. Sometimes it is necessary to place your mouse pointer on PROGRAM LIBRARIES and double click on it in order to expand the tree structure.Locate the file to be imported. Some assumptions will be made here: a) the file to be imported is named MAG_LIB.EXP; and, b) MAG_LIB.EXP contains one or more libraries within it. Adjust your proceedings accordingly. Insert the floppy disk or CD-ROM containing file MAG_LIB.EXP into the workstation's A:\ drive (or the CD-ROM drive, usually d:\ or e:\).

4. From **Control Manager**, click **TOOLS.**

5. Click **Object Archive**... The **Object Archive** dialog box appears.

6. **NOTE:** If your workstation does not recognize or sense the hardware key from your parallel port, the text 'Object Archive' will be grayed out. It will be impossible to load a library if this is the case. Contact your MagneTek representative as described in Technical Support.

7. Click **LOAD**. Then click the **Browse** button in the upper right corner, the one with three dots on it. The **Export** dialog box appears.

8. Locate the file MAG_LIB.EXP (used in this example) on either your computer's floppy disk drive (usually a:\) or the CD-ROM (usually d:\ or e:\). Click MAG_LIB.EXP to highlight it. Click **OPEN**. You are returned to the Object Archive dialog box.

9. Click **Load Archive File**. The MAG_LIB.EXP library will be loaded into temporary memory on the workstation. Upon successful completion of loading, three libraries will appear in the Object Archive window: MAG_CPB, MAG_WIND, and PG_SC_CARD (your library names may vary).

10. *To permanently store libraries in your workstation*, drag and drop each of them into Control Manager. You may have to separate the windows enough to see both at the same time. It usually takes a few seconds for each library to be installed. As an example, click on MAG_CPB in Object Archive. While keeping the mouse button pressed down, drag it to PROGRAM LIBRARIES within the Control Manager. As soon as the wording 'PROGRAM LIBRARIES' is highlighted, release the mouse button. All three libraries should now appear as part of the tree structure under PROGRAM LIBRARIES.

11. Click **Close**. The Object Archive dialog box closes, completing installation of the Program Library.

Linking Program Libraries with Control Nodes

To choose objects from and Program Library, you must first link your Smart Trac **Control Node** with that library. A Control Node must have been established and may be viewed as part of the tree structure under the words 'Smart Trac Workstation' in the **Control Manager**.

1. Right click on a desired **Control Node** under Smart Trac Workstation. A pop-up menu appears.

2. Click **Choose Program Libraries** from the menu. A dialog box appears showing all available libraries

3. Click on a library. Click **arrows** to add or subtract libraries. Libraries appearing in the left window are inactive for this node; libraries appearing in the right window permit you to choose objects from it. After libraries have been chosen, select **OK**.

NOTE: At this point, you can create a new PROGRAM UNIT, open it, and add objects or functions from your newly added libraries. The objects just added are function blocks.

4. *To ensure that new objects (function blocks) are accessible*, click the function block icon and place a block on the **FBD Editor** grid. The **Function Block Details** dialog box appears. Enter a desired instance name. Scroll through the Function Block Type until you see the functions you just added.

Accessing Help on Predefined Function Blocks

To access online Help on the predefined function blocks that are included with your system:

1. In Control Manager, click Program Units.

2. Choose a program of your choice and double click it to load it. The **Function Block Diagram Editor** appears with the name of the chosen program displayed in the upper left corner.

3. Click **Help** in the menu bar at the top of the screen.

4. Choose **Language Reference** and click it.

5. Find **Smart Trac Functions** in the selection box and double click it to open further selections (What's Different, Standard MagneTek Library, MagneTek Winder Library, PG Card Library).

6. Double click the selection to open it.

7. Click a function to open the help for it

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(FAQS): How Do I…?

What are the PC system requirements to run Smart Trac Workstation?

To operate Smart Trac software, you must meet the following minimum requirements:

- Minimum: Pentium 133 MHz CPU, 64 Megabytes RAM.
- Recommended: Pentium 450 MHz with 128 Megabytes RAM.
- Runtime Engine: Minimum 8 MB RAM, Recommended 16 MB RAM.
- Hard disk with at least 200 Megabytes of free space (typical Windows NT® installation requires 150 Megabytes; Smart Trac Workstation requires 50 Megabytes).
- SVGA (800 X 600) video monitor or better.
- Keyboard, mouse, and touch screen panel or combination of these.
- Smart Trac Workstation CD-ROM.
- Microsoft Windows NT® V4, Service Pack 3 (or higher) with a minimum of 20 Megabytes of virtual memory swap space.
- Optional: Microsoft Visual C++ V6.0 for "C" Function Block support.
- A dongle, or software encryption key, supplied with each Smart Trac AC1.

What functions are available in the system library?

At the time of publication of this manual, MagneTek provided three basic functions: Standard Winder, Standard Unwind, and Standard Mainline. These provide for constant tension center winders (CTCW) and dancer position trim applications. Others may have been developed by the time you read this.

How can I get the library functions I need?

Contact your MagneTek Sales Representative for a hardware key to access additional library functions.

I've installed the software, but I still can't access software functions I purchased. What's wrong?

Chances are you have not installed the *dongle* , or hardware key that is included with your software purchase. You must install the dongle on the parallel port of your computer. Once installed, if you still cannot access the functions you purchased, contact a MagneTek representative (see "Technical Support").

How do I synchronize multiple Smart Trac AC1s?

Use optional Arcnet cards in all Smart Trac AC1s to be synchronized. The Arcnet driver contains an algorithm which automatically establishes one of the Smart Trac AC1s as the *Sync Master*. This Smart Trac AC1 transmits synchronizing messages to the other networked Smart Trac AC1s. To allow a drive to participate in the synchronization, a task must be configured to be of type I/O Sync, with the I/O Sync Card identified as the Arcnet card.

How do I load and use the write flash program *WRTFL4.EXE*?

The procedure below describes how to load and use the write flash program.

1. Before you can load the program, gather the items you need for the procedure:

   - 1 Cable 46S03359-0010

   - 1 Write Flash program WRTFL4.EXE.

   - 1 Data File, latest version (G112131.dat or later).

   - 1 Digital operator P/N JVOP-130

   - 1 of either Ribbon cable 0.4 meter 46S03293-00P4 or Ribbon cable 1.5 meter 46S03293-01P5. (Both require adapter)

   - 1 Adapter connector 05P00034-0888

2. Copy the write flash program WRTFL4.EXE and data files from the distribution CD-ROM, floppy diskette, or other media, to a location on your computer's hard drive (normally to the path "Program Files\smartrac\utility\r*\…", where * is the release number. (The exact pathname for your system may differ from this somewhat).

3. Click **Start**, **Run**. Enter the path name of the program WRTFL4.EXE or **Browse** to the WRTFL4.EXE program through the path chosen in step 2. Click **OK**. The program starts.

4. From the WRTFLASH window, select **EDIT**, **Configuration.** Select the appropriate COM port and set the baud rate to 38400.

5. Click **File**, **Open** and open the file **G112131.DAT**. Click **OK**.

6. Click **File**, **Write Flash ROM**.

7. Connect the cable between your computer's COM port (so it matches your configuration) and the 1CN port of the inverter control card (used for the Digital Operator).

8. Set the switch on the cable to **ON**. The data file G112131.DAT loads to the 4 megabyte flash ROM on the inverter control card.

Note: The name of the data file may be different than that used in the above description. Use the name of the latest flash ROM file.

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9. To verify the version number of the flash ROM upgrade, connect the Digital Operator with extension cable to the 1CN port of the inverter card. This puts permits the Digital Operator to read drive parameters directly, bypassing the Smart Trac CPU. Monitor parameter U1-14 to view the software version number. (For data file G112131.DAT, it should be 12131).

How do I manage *Task Priorities*?

Each task must be assigned a priority, so that the Smart Trac CPU card can properly allocate its resources. If not properly assigned, Task Overrun faults may occur.
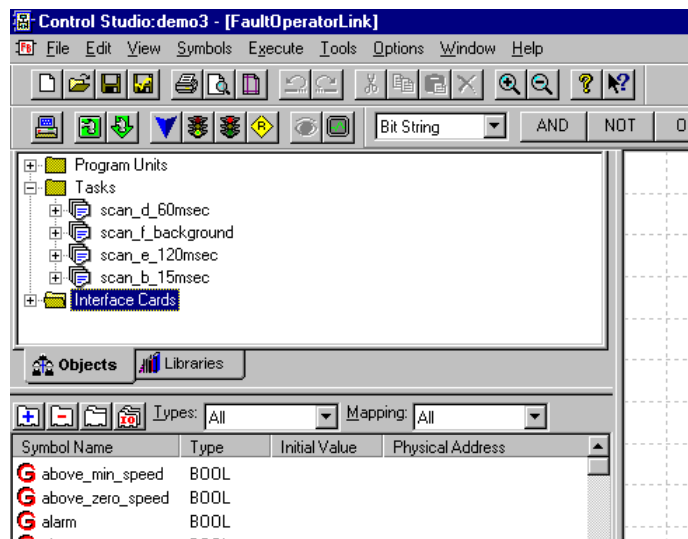

Figure 43. The Task listing in Control Studio..

You assign program units to tasks in Control Studio. By moving an instance of a program unit up or down in the task list, you determine the order in which it is executed when the task runs.
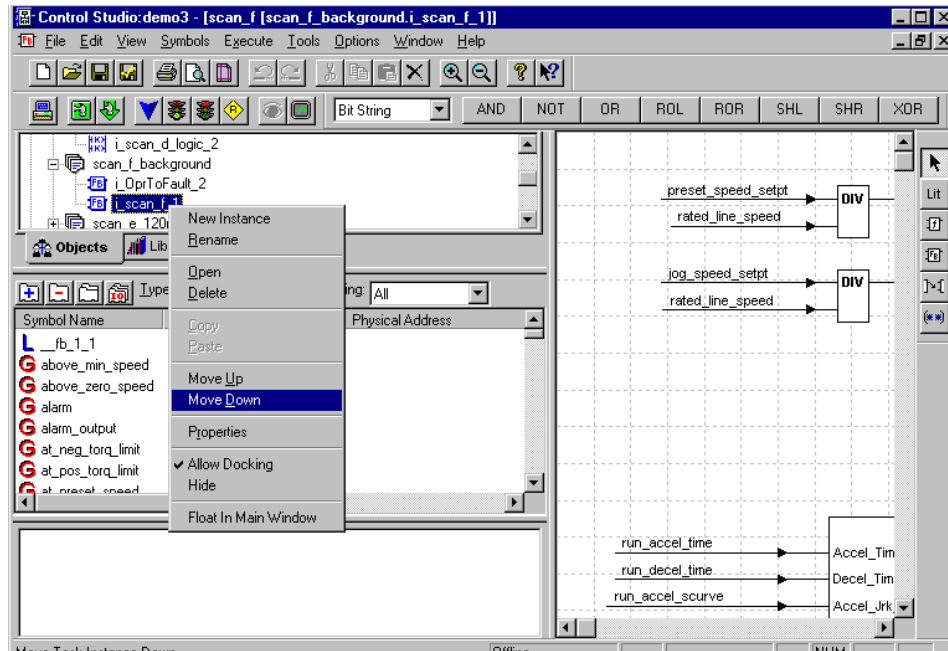
Figure 44. Right click of a Task allows moving task up or down in priority..

A few guidelines to assigning priorities follow:

- No task should be run with a priority higher than once every 15ms and only one such high priority (15 ms) should be run.

- Assign no more than 10 tasks per Smart Trac AC1.

- Typical priorities are high (15ms), medium (60ms), and low (120ms), but can vary significantly by user application. The rate associated with a priority may be set to any value within the allowable range.

- You may choose from three task types: Continous, Cyclic, or IO Sync.

b. *Continuous* tasks: You may define only one task as continuous. The task must run in background mode only and at low priority.

c. *Cyclic* tasks: As a rule, you should try to run Cyclic tasks no faster than 5 ms. You should try to keep the number of cyclic tasks to a minimum (only 3 or 4 such tasks and preferably 1 or 2).

d. *IO Sync* tasks: These tasks are syncronized to the Option Card scan rate.

- By reducing the priority of cyclic tasks or their number, you can sometimes work around a Task Overrun problem. This problem often results from using the same priority level for more than one task.

- To check to see if you are overrunning a task:

  1. Click **Start**, **Programs**, **MAG-300**, **Control Node Monitor**. The Control Node Monitor loads.

  2. In the **Tasks** box, highlight the associated task while it is running.

  3. Right click and select **Properties**. The **Properties** dialog box appears. You can view time spent on each task.

How do I configure the Smart Trac AC1 for Closed Loop Torque Control?

To set parameters in DPRAM, see the publication "Smart Trac AC1 DPRAM."

To provide closed loop torque control, you program function blocks and set parameters D5_01 (Torque Control) to "1" and U1_04 (Control Method) to "2" (Open loop vector). A somewhat simplified function block diagram for running to an s-curve under closed loop torque control is depicted in Figure 45.

For details of function blocks, reference the online help while in the Function Block Editor. Click Help, Language Reference, Smart Trac Functions.

Function block **SCRV_0** runs at a high priority .015s (15 millisecond) scan rate. The block provides a speed reference where both acceleration and jerk rates are controlled. The resulting speed vs. time curve resembles an "S", causing a ramp along an S-Curve. Inputs to block **SCRV_0** includes a per unit manual reference, speed regulator release and the parameters from block **SCRV_1**. Block **SCRV_1** runs at a low prority scan rate, converting user inputs into acceleration and jerk rates and providing them to block **SCRV_0**. The output of block **SCRV_0** provides a speed reference as input to block **RREG_0**, a speed regulator designed to handle resonant loads. Per unit encoder feedback from block **PG_TACH** provides the speed feedback to block **RREG_0**. **RREG_1**, running at a low priority, calculates gains needed by **RREG_0**. The block **RREG_0**, running at a higher priority, provides the calculated torque reference to the input at torque limit block **LIMIT_BLK**. Finally, the results of all calculations provide the **Tref** torque reference.
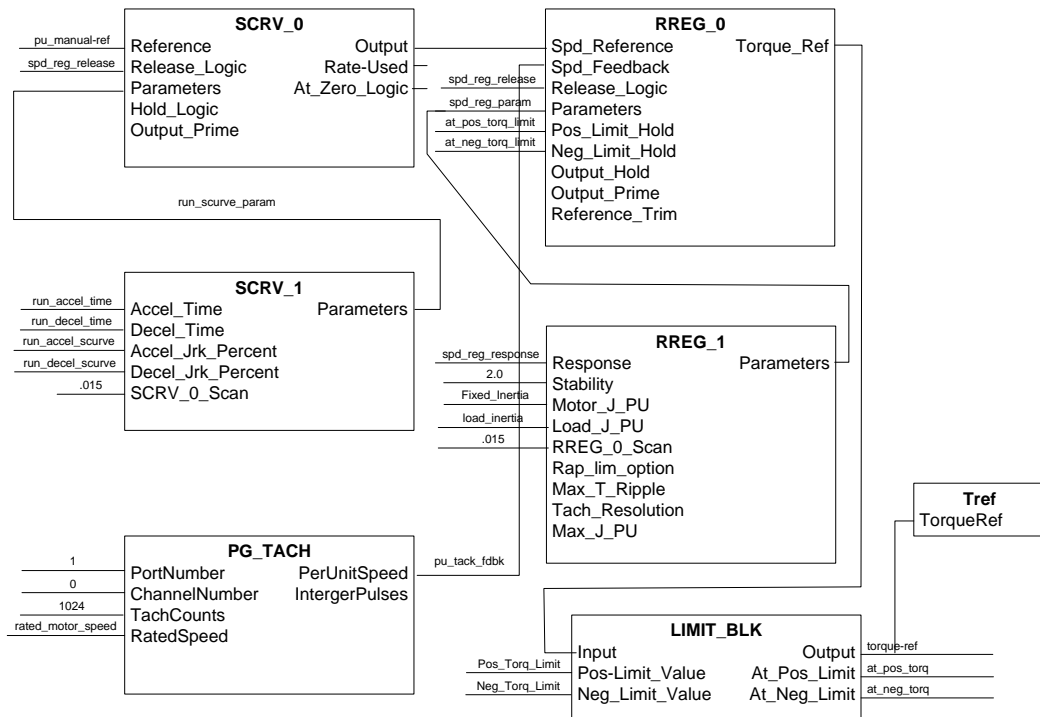
Figure 45 Simplified Function Block Diagram for Closed Loop Torque Control.

Appendices

Summary

The following pages include:

- Smart Trac AC1 Dimensions.

- Wiring, Grounding and Installation Practices for Noise Immunity – practice these recommendations if your Smart Trac AC1s will be located in heavy industrial or electrically noisy environments.

- Parameter Settings and Factory Defaults – a listing of settings available in your Smart Trac AC1 and those set at the factory.

- Reference List – other publications and/or web sites which may be of use to you in installing or operating your Smart Trac AC1.

- Application Parameters - pages on which to record your application's parameters and their settings.

- Faults – tables listing major and minor faults common to all Smart Trac AC1s, and other card faults. The faults appear on the digital operator display if and when they occur.

- Training – how to request Smart Trac training, including a form to fill out and fax or mail to us.

- Technical Support – how to contact MagneTek if you need assistance.

- Problem Report – a form to fill out and fax if you need to resolve a problem.

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Dimensions of Your Smart Trac AC1

Input Volts	Continuous Ouput Amps[1]	Nominal HP[2]	Mounting Screws	Height (Inch)	Height (mm)	Width (Inch)	Width (mm)	Depth (Inch)	Depth (mm)	Enclosure Type[3, 4]
2 3 0 V	3.2	3/4	#10	11.89	302	6.75	171	10.23	260	**NEMA 1**
	6	1	#10	11.89	302	6.75	171	10.23	260	
	8	2	#10	11.89	302	6.75	171	10.23	260	
	11	3	#10	11.89	302	6.75	171	10.23	260	
	17.5	5	#10	11.89	302	6.75	171	10.23	260	
	25	7.5	1/4"	12.68	322	8.32	211	12.00	305	
	33	10	1/4"	12.68	322	8.32	211	12.00	305	
	49	15	1/4"	15.83	402	10.30	261	12.80	325	
	64	20	1/4"	15.83	402	10.30	261	12.80	325	
	80	25/30	1/4"	24.02	610	12.99	330	14.12	359	
	130	40/50	1/4"	26.57	675	16.73	425	16.98	432	**Protected Chassis**
	160	60	1/4"	26.57	675	16.73	425	16.98	432	
	224	75	3/8"	31.50	800	18.70	476	16.98	432	
	300	100	3/8"	36.42	925	22.64	575	18.95	482	
4 6 0 V	1.8	1	#10	11.89	302	6.75	171	10.23	260	**NEMA 1**
	3.4	2	#10	11.89	302	6.75	171	10.23	260	
	4.8	3	#10	11.89	302	6.75	171	10.23	260	
	8	5	#10	11.89	302	6.75	171	10.23	260	
	11	7.5	#10	11.89	302	6.75	171	10.23	260	
	14	10	1/4"	12.68	322	8.32	211	12.00	305	
	21	15	1/4"	12.68	322	8.32	211	12.00	305	
	27	20	1/4"	15.83	402	10.30	262	12.80	325	
	34	25	1/4"	15.83	402	10.30	262	12.80	325	
	41	30	1/4"	24.02	610	12.99	330	14.12	359	
	52	40	1/4"	24.02	610	12.99	330	14.12	359	
	65	50	1/4"	30.91	785	12.99	330	14.12	359	
	80	60	1/4"	31.91	785	12.99	330	14.12	359	
	96	75	1/4"	33.46	850	12.99	330	14.12	359	
	128	100	3/8"	32.28	820	17.91	455	16.98	432	**Protected Chassis**
	165	125	3/8"	32.28	820	17.91	455	16.98	432	
	224	150	3/8"	36.42	925	22.64	575	17.96	457	
	302	200/250	3/8"	36.42	925	22.64	575	17.96	457	
	450	300/350	3/8"-16	57.09	1450	37.40	950	20.33	517	
	605	400/500	3/8"-16	62.99	1600	37.80	960	21.11	537	
	400A	-		97.50	2477	31.50	900	32.20	818	**NEMA 1** Dimensions for NEMA 1 without circuit breaker options.
	800A	-		97.50	2477	39.00	990	32.20	818	
	1200A	-		97.50	2477	63.00	1600	32.20	818	
	1600A	-		97.50	2477	71.00	1803	32.20	818	
6 0 0 V	400A	-		97.50	2477	31.50	900	32.20	818	
	800A	-		97.50	2477	39.00	990	32.20	818	
	1200A	-		97.50	2477	63.00	1600	32.20	818	
	1600A	-		97.50	2477	71.00	1803	32.20	818	

1. Drive overload capacity is 150% for one minute.
2. Nominal Horsepower is based on Standard NEMA B 4-pole motor design.
3. NEMA 1 enclosure is an available option for protected chassis ratings.
4. NEMA 4 and 12 enclosures are available options.
5. Dimensions for NEMA 1 w/o circuit breaker options.
6. Customer enclosure designs are available.

Parameter Settings and Factory Defaults

For a listing of Parameter Settings and Factory Faults, see the publickation "Smart Trac AC1 DPRAM Parameter List."

Reference List

The following publications may be of help to you. Some are referenced within this manual. Others are listed as important supporting information.

ARCNET Local Area Network Standard:Token Bus (2.5 MBPS)

ATA/ANSI 878.1, ARCNET Trade Association, 1992. Information about ARCNET and the standard may be obtained at the web site:

www.arcnet.com

CAN (Controller Area Network)

Contact CAN in Automation (CiA), the international users and manufacturers group, a non-profit trade association that develops and supports various CAN-based protocols including DeviceNet.

www.can-cia.de/

DeviceNet

Contact the Open *DeviceNet* Vendor Association, Inc. at:

http://www.odva.org/

Ethernet

For a good primer on ethernet, visit Charles Spurgeon's Ethernet Web Site at:

http://www.ots.utexas.edu:8080/ehternet

GPD 515 Technical Manual, TM 4515

MagneTek Drives and Systems, 16555 West Ryerson Road, New Berlin, WI 53151. You may obtain additional product and training information at the web site:

http://www.magnetekdrives.com

IEC-61131-3	An international standard for software control of programmable logic controllers established by International Electrotechnical Commission (IEC). For more information, visit their web site at:
	http://www.iec.ch/home-e.htm
	For information about the standard, contact PLCopen. a vendor- and product-independent world-wide association that brings greater value to users of Programmable Controllers through the pursuit of the IEC 1131-3 open software development standard.
	http://www.plcopen.org
IEEE Standards 802.3, 802.3a, 802.3i	Institute of Electrical and Electronics Engineers. Standards may be downloaded on a subscription basis from the web site:
	http://www.standards.ieee.org
MagneTek Drives and Systems	For more information about MagneTek drives and systems, training programs and contacts, visit:
	http://www.magnetekdrives.com
National Electrical Code	Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101. You may obtain copies of the NEC on various media at the web site:
	http://www.nfpa.org
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.htm
Profibus	For more information about Profibus, contact PROFIBUS International, "an umbrella organisation for the expanding PROFIBUS 'User Groups' which now cover 20 countries in Europe, North and South America, Africa, and the Pacific Rim."
	http://www.profibus.com

Application Parameters

By filling in the table on the next few pages, you will record the parameter settings specific to your application for later reference.

Parameter Designator	Description	Incre- ment	Setting Range	Inverter Board Factory (Default) Setting	Application Setting

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Fault Tables

See the separate publication *Smart Trac AC1 Fault Tables* for a complete an up-to-date listing of the faults your Smart Trac may experience. Each issue of the Fault Manager driver ships with a copy of this publication. The fault tables will help diagnose and troubleshoot any problem that may occur.

Training

MagneTek holds Training Seminars at its Training Facility in New Berlin, WI. The facility includes training rooms with individual desktop computers and videoconferencing capabilities, a drive demonstration room displaying MagneTek's drives, and an on-site company lunchroom. Mail or fax the form below to obtain information on scheduled dates of Training Seminars for the Smart Trac AC1.

Should you have questions about training, or need information quickly, you may contact the Help Desk at (800) 541-0939 or (262) 782-0200.

Training Seminar Information Request

You may fax your request to MagneTek at (262) 782-3416, or mail to:

MagneTek
Ref: Training
16555 West Ryerson Road
New Berlin, WI 53151

Last Name   *First Name*   *Middle Initial*

Title/Position

Company Name

Address

Address

City   *State*   *ZIP*

Telephone   *Fax*

---

e-mail Address

Technical Support

Should you need technical assistance with installation or troubleshooting of your Smar 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.

Problem Report

Name: _____

Address: _____

_____

City: _____ State: _____ Zip _____

Serial Number: _____ Hp: _____ ☐ 230 ☐ 460

Occurance: ☐ Frequently   ☐ Intermittantly ☐ Rarely

Nature of Problem: _____

_____

_____

_____

_____

_____

_____

Conditions when problem occurs: _____

_____

_____

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Glossary of Terms

acceleration rate	The change in speed divided by the change in time (the rate of change in speed).
Arcnet	Acronoym for Attached Resource Computer Network, it is one of the oldest forms of networks. Created in 1977 by Datapoint Corporation, ARCNET uses token passing in combination with star/bus topology to transmit data at 2.5 Mbps (mega bits per second). It is simple, inexpensive and reliable and is a good solution for small LANs. Cabling may include RG-62, 90-ohm or 93-ohm coaxial, UTP and fiber optic. It will support as many as 255 nodes.
BIOS	Abbreviation for Basic Input/Output System. The BIOS insulates application software from the hardware by providing primitive I/O services and by programming the hardware's interrupt handling.
Bridge	A device used to control network traffic. It splits a network segment, passing data through or rejecting it depending on the destination device's physical address
CAN	Acronym for Controller Area Network. This type of network was originally developed for the auto industry and was later found useful for many other industrial applications.
contiguous	Touching along a boundary or a point.
DPRAM I/O Driver	Acronym for Dual Port Random Access Memory I/O Driver. It allows programs written with the Smart Trac Workstation and downloaded to the Smart Trac AC1 to set and read parameters on the Smart Trac AC1 using the Smart Trac AC1's Dual Port RAM.
Ethernet	The most common type of network, ethernet is an open network standard (per Ethernet 802.3). It was developed by Intel, Digital and Xerox. It is relatively low-cost yet offs support for a variety of protocols and computer platforms. Several ethernet cabling standards exist including 10Base-5 (Thick), 10Base-2 (Thin), 10Base-T (twisted pair). All provide data transfer rates of 10 Mpbs. Variations have been introduced for faster networking, including 10Base-FL (10 Mbps over fiber optic cable), Fast Ethernet (10Mbps or 100 Mbps), 100VG-AnyLAN (100Mbps) and Switched Ethernet.
faults	Abnormal conditions generally requiring corrective action. Major faults stop execution of the program. Minor faults do not stop execution but isssues a warning, displayed as a fault on the digital operator.
flash memory	A type of memory that can be programmed while installed in a printed circuit board. It retains its contents even in the absence of power.

Function Block	Once of three Program Control Unit types. A programming language element, typically represented by a graphical block, consisting of inputs, outputs, internal variables, and a set of operations. Function blocks are instantiated and can contain state information from one invocation of an instantiation to the next.
global symbols	Symbols defined for use among all Program Control Units associated with a node. Global symbols cannot be seen or accessed across the network.
hub	A connection device that receives a signal, then transmits it to the connected devices.
IEC-61131-3	Part 3 of the international standard on Programmable Controllers, which specifies Programming Languages, including Relay Ladder Logic (RLL), Structured Text (ST), Sequential Function Charts (SFC), Function Blocks (FB), and Instruction Lists (IL).
Instruction List	The IEC 61131-3 Instruction List language for programmable controllers. Alternatively, a program control unit developed using the Instruction List language.
Interface Card	An entry of the Object Menu in Control Manager. It allows you to select and configure any special hardware added to your Smart Trac AC1.
jerk rate	The change in acceleration rate divided by the change in time (rate of change in acceleration).
LCD	Acronym for Liquid Crystal Display.
LED	Acronym for Light Emitting Diode.
local symbols	Symbols defined for use within a Program Control Unit. Its use is limited to the program control unit in which it is defined.
Operator Configurator	A selection box that permits setting of parameters and feedbacks. This determines the menu items and structure displayed to the user of the Smart Trac AC1.
PC/104	An embedded PC bus standard. The standard defines the mechanical size of a self-stacking bus. Also an IEEE draft standard, called the P996.1 Standard for Compact Embedded PC Modules, PC/104 Specification, Version 2.1, July 1994, PC/104 Consortium.
Program Units	An entry on the Object Menu of the Control Manager. It is a storage bin for user programs which may consist of relay ladder logic, function blocks, sequential function charts, and/or structured text.
RAM	Acronym for Random Access Memory. This type of memory loses the state of its contents upon removal of power.
Relay Ladder Logic	An implementation of the IEC 61131-3 Ladder Diagram language.
resonant loads	Loads which have a tendency to resonate (oscillate). An example is a large load with high inertia connected by a belt drive to a motor.
Retentive	A symbol, stored in NVRAM, that remains unchanged after a power-down/power-up sequence.
router	A hardware and software connection between two or more networks that permits data traffic to be passed from one network to the other based on the intended destinations of the data.

Sequential Function Charts	The IEC-61131-3 defined Sequential Function Chart language used for programmable controllers or a program control unit developed using Sequential Function Chart language.
Structured Text	The Structured Text language specified by IEC 61131-3 used in programmable controllers. It provides a structured programming environment similar to that of the computer programming language PASCAL.
Symbol	An entry on the Obect Tree of Control Manager. It is a location where user-defined variables are created and stored.
Tasks	An entry on the Object Menu. It allows you to specify what programs to run and when to run them.
TCP/IP	Acronym for Transmission Control Protocol/Internet Protocol. It is a connection-oriented specification for the format and relative timing of information exchanged between communicating devices. TCP opens and maintains a connection between two communication hosts on a network.
TCP/IP Addresses	An addressing method used to specifiy the Network ID, for general location of the host, and the Host ID, which uniquely identifies an individual host after the network is located. It further defines segments on the network. This information is used to route information to its proper destination.
Watch Window	A feature that allows observation of a program as it runs. You can look at the value of I/O points, global symbols, and run-time symbols (i.e. fault and scan conditions). As the program runs, symbol values are displayed. You may set or force symbols to certain values using this window to aid in debugging a program.

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