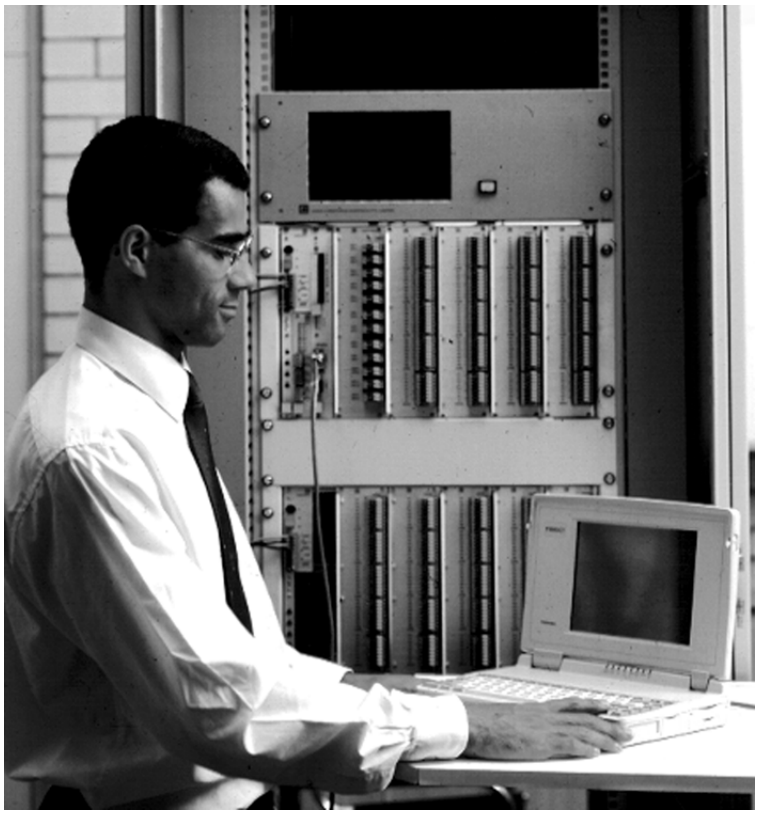
FOXBORO®

PSS 21S-4A2 B3

# I/A Series® Remote Terminal Unit (RTU)
# C50 TOOL — A Diagnostic Utility



The RTU diagnostic TOOL runs on any IBM PC/AT compatible computer with at least 640 KB of RAM. Most TOOL functions are menu driven.

**FEATURES**

- Utility program that allows diagnosis of RTU activity
- RTU to PC communications protocol (IEC 870-5) includes retries and error handling
- Center screen “Error” pop-up showing bad messages or no-reply state
- Hardware overview display, showing configuration summary of connected RTU
- Downloading/uploading of RTU software, database configuration and calculation software to/from RTU
- Access to I/O module; allows reviewing of calculation and communication detail displays
- Communication test modes include trapping of transmitted and received messages
- Allows inspection of all inputs, control of outputs and testing of calculation logic

The C50 TOOL program communicates with the RTU through a serial interface. Many of the diagnostic windows feature dynamic updating of RTU data. Other windows show dynamic communication information, including control of diagnostics, and displays of raw communication packets. This allows a real-time view into the RTU's complete operation.

In addition, full RTU configuration details are available, including input and output names, as well as communication details. This information is integrated into the real-time data update display.

### Bootstrap Mode

Bootstrap code is executed by the RTU when there is no valid software to load, or if the Reset/Sense switch on the Master Processor Module is held in the "Sense" position during re-boot. The RTU is started in this mode when new software is installed.

### The TOOL Menu

When TOOL is first started, with the computer connected to the RTU, the menu shown in Figure 1 appears and the menu options explained below are available.

### Hardware Overview

Selecting this option displays a list of all configured I/O modules and communication ports including the file and slot number each module occupies and the channel number of its corresponding communications port Figure 2.

Information appears in three columns as described below:

- Configuration - designates the type of module expected in slot position
- Readback - shows the type of module actually installed in that position
- Error- indicates the number of error events that the module has experienced since start-up

Function keys can also be used to view detailed error displays and statistics; OPTObus messages; and port and internal software module information.

### Set Time

The RTU's real-time clock is initialized using the "Set Time" function key on the top level menu. Note that when on-line, the RTU time is normally synchronized by the Master Station communications interface.

### Selection of Software and Configuration

On start-up, the bootstrap program examines the available sets of programs and configuration data and decides which to use. The starting points are the defaults selected. But the defaults are overridden if the default selection does not contain valid data at the time of re-boot. Default database configuration and software are selected using the function keys.

### Restarting the RTU

Pressing the *Restart RTU* function key causes the RTU to reset. As the RTU restarts, a diagnostic reply failure message may be posted; press the ENTER key to clear the failure message.

### Downloading/Uploading of Configuration and Software

The diagnostic TOOL program is used to download/ upload configuration details, RTU software and calculation software, to/from the RTU. A pop-up dialog box indicates the progress of the transfer.

### Database Objects

The database object is an important basic element of the RTU internals. Database objects are associated with all physical input, output and calculation variables.

The I/O card detail in the hardware overview allows access to the physical input or output, and the objects associated database details. Regardless of the I/O card's type, the basic database detail is the same and is always presented using a pop-up dialog box.

There are five types of database objects:

- Digital
- Digital SOE (Sequence of Events)
- Analog
- Floating-Point Analog
- Control

All objects have the following common properties:

- Name
  Every object has a unique name, assigned using 'C50CFG Configurator' when setting up the database.
- Address
  An object address consists of the following numbers: Node number, File number, Slot number and Entity or Sequence number.

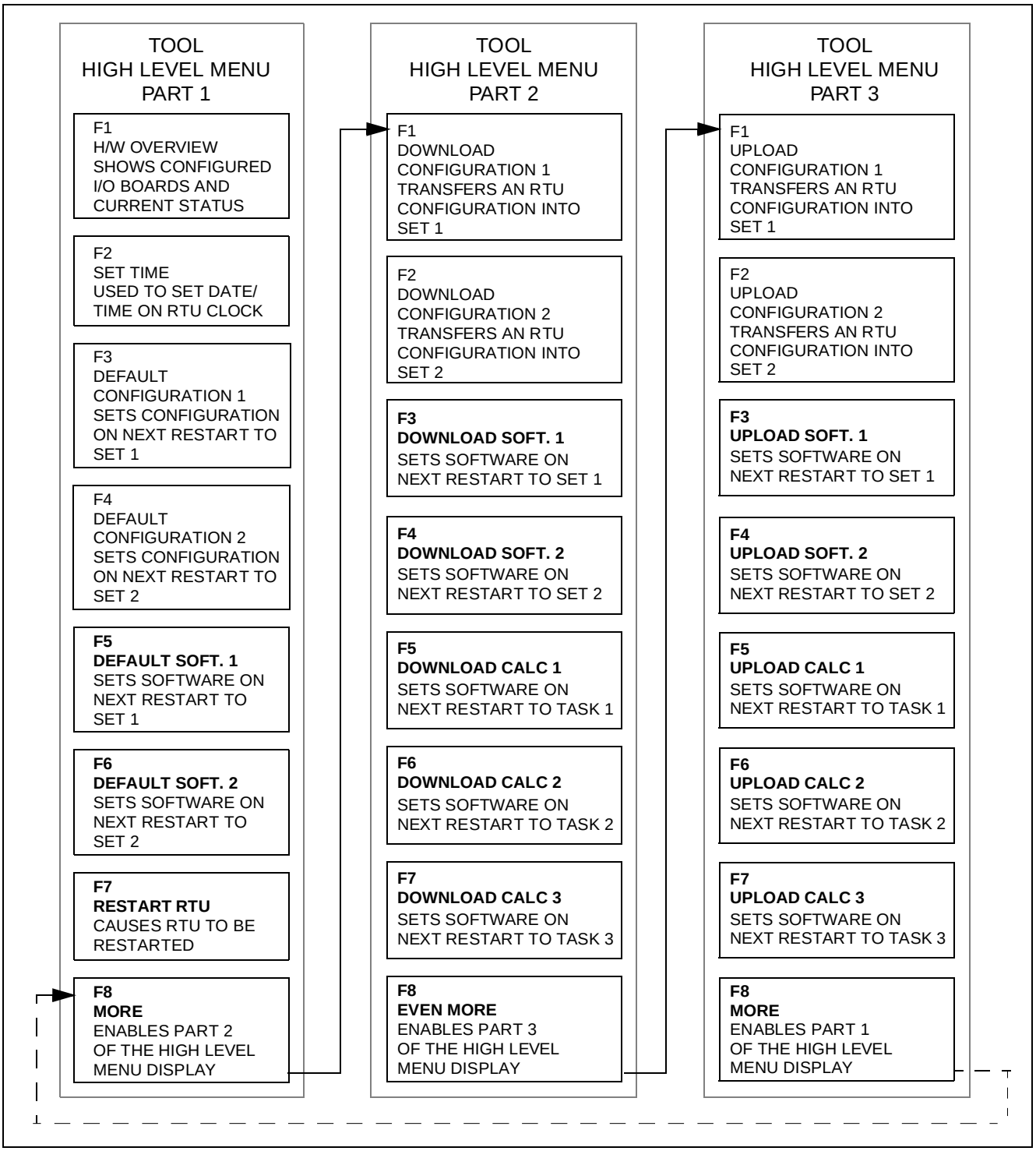



Figure 1. C50 TOOL High Level Menu Options

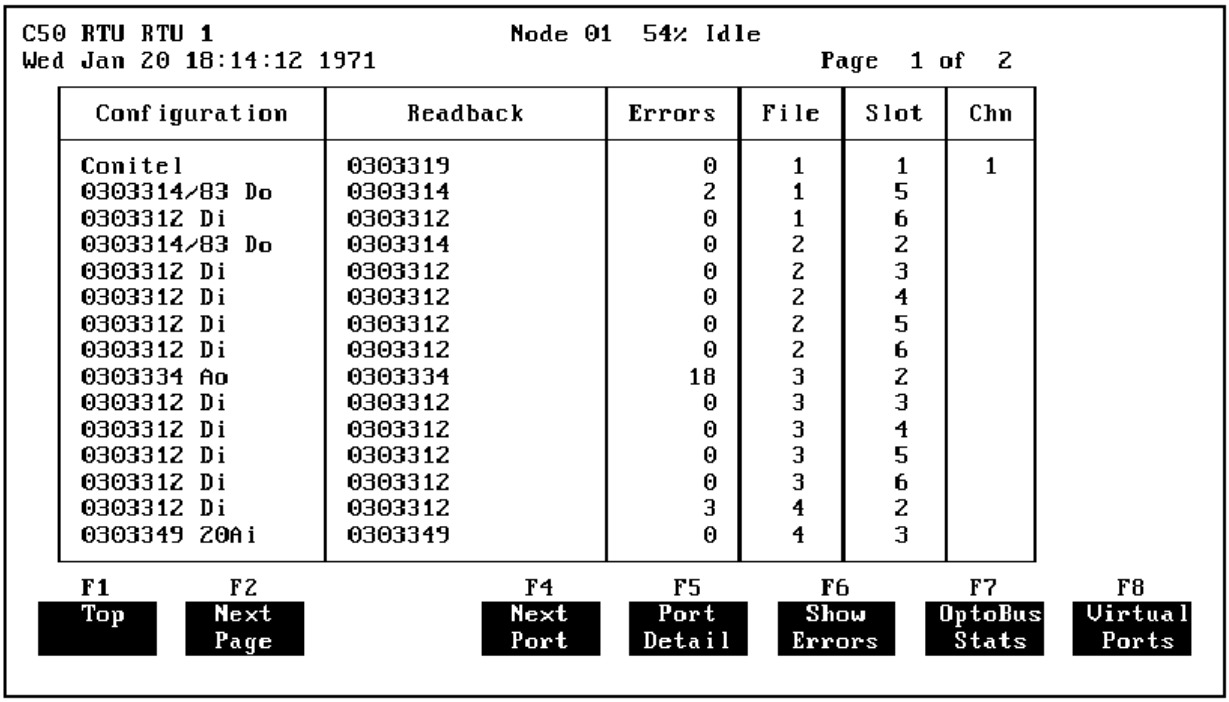



Figure 2. Typical Module List

### The Digital Object

A digital object is associated with an input that has a binary state. In the RTU, a digital object keeps track of the number of transitions that the input has detected, acting as a counter associated with each input. The least significant bit of the counter represents the actual input state.

### The Digital SOE Object

A digital SOE object is a digital object with the additional feature of storing a time tag for each transition resolved to ±1 msec, showing the history of the point state transitions.

### The Analog Object

An analog object is associated with an input that has a linear range. In the RTU, the analog object keeps track of the current value of the analog input.

### The Floating-Point Analog Object

This is shown in the same manner as the analog object, except that the value is a floating point quantity. Floating-Point objects are only available within calculation tasks.

### The Control Object

A control object is associated with an output, either pulsed or latched. In the RTU, control actions are directed towards objects for their interpretation. No state information about the physical output condition is kept in the object.

### Detail Displays

A detailed display of each module Figure 3 is viewed by selecting *Hardware Overview* in the top level menu. You then choose the module to be inspected from the module list and select *Port Detail*. This display allows a detailed examination of the configuration and real-time attributes of the module. Individual points may be examined by selecting a point, then selecting *Point Detail* (see Figure 4) from the function key options.

Calculation task detailed displays are accessed by selecting *Virtual Ports* from the module list.

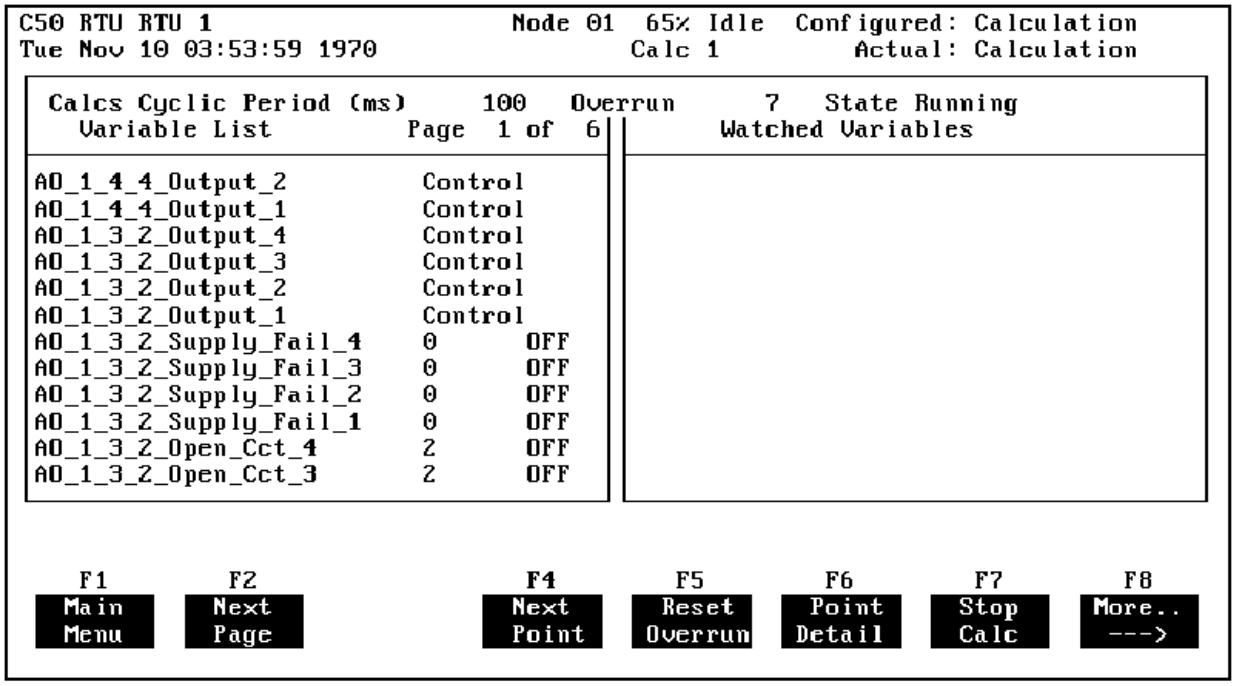



Figure 3. Typical Calculation Detailed Display

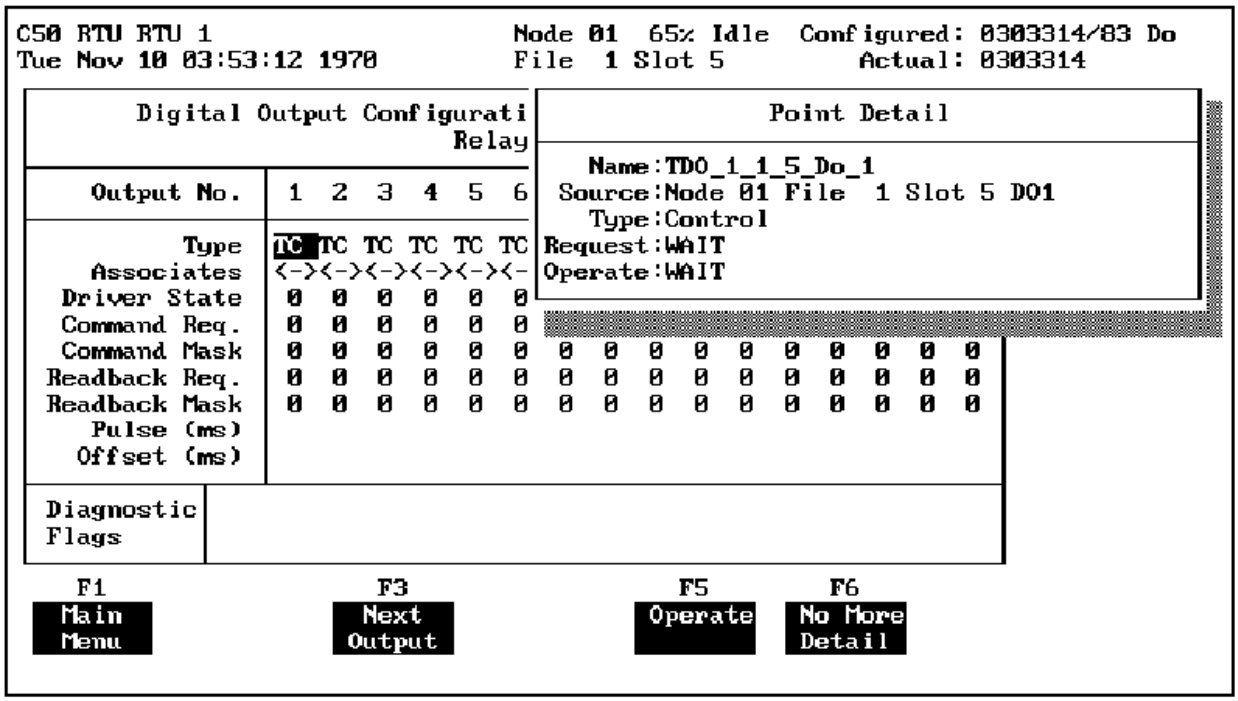



Figure 4. Typical Module Detailed Display with Point Detail

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33 Commercial Street
Foxboro, Massachusetts 02035-2099
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