SA2005
TEMPERATURE
MONITORING SYSTEM

BY

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ABOUT THIS MANUAL

This manual is a comprehensive reference for TSGC, Inc.'s SA2005 temperature monitoring system.

Although each section is a self-contained unit and may be read separately, for a complete understanding of the SA2005, you should read the entire manual in the order presented.

The SA2005 ScanCenter console is the center of TSGC, Inc.'s SA2005 relay based temperature monitoring system. The SA2005 temperature monitoring system is based on the proven technology of the II CS 201 0. The SA2005 ScanCenter console is a stand-alone, state-of-the-art, microprocessor based operator interface. It is designed to be placed in an office environment and act as a stand alone operator interface.

The SA2005 is housed in a modified version of TSGC, Inc. Company's sleek ScanCenter enclosure. The SA2005 uses a compact and versatile circuit board. It has a 2 line by 40-character display and the ScanCenters membrane keypad and may be connected to various other equipment to provided added features. It is capable of sounding an alarm when certain conditions occur. It may be connected to a serial printer to provide hard copy printout or may be connected to an IBM compatible PC via an RS-232C serial port to access the temperature information.

The SA2005 controls the timing and operation of all the switches and retrieves temperature information from the switches. The SA2005 can operate in automatic mode or Individual sensors can be manually selected and viewed from the SA2005.

It can be used to monitor the temperature of grain in grain storage facilities, coolers and other cold storage facilities and various other industrial applications.

The SA2005 has several built-in diagnostic features.

The SA2005 hardware and software will be covered in this manual.

A SA2005 is typically used to provide monitoring of grain in grain storage facilities.

A basic SA2005 system consists of a SA2005 ScanCenter, one or more remotely located switch boxes, and many temperature-sensing cables.

The cables contain temperature sensors that consist of copper and constantan wires. The wires are soldered together to form sensors. Each soldered area is a heat sensing point called a thermocouple (T/C).

TSGC, Inc.'s switches connect directly to the temperature sensing cables. Each switch is connected to many temperature sensors. The switch selects the sensor to be read and the SA2005 converts the low-level analog temperature signals from the temperature sensors to digital form and accumulates the temperature data. The data is then available to be connected to a serial printer to provide hard copy printout or connected to a PC.

The sensors are connected to switches that select the T/C to read.

When the monitored point exceeds the absolute alarm limit, the alarm condition exists and will be printed, and alarmed if the required conditions exist (print selected, printer connected, and ready)

PRINTER OPTION

The reports provided by the SA2005 require an IBM, Epson, Okidata or LaserJet compatible serial printer to be connected to the RS-232 port. The SA2005 will send the data to the printer via the RS-232 port at 19200 Baud with settings of 8 data bits, No parity and 1 Stop bit. The printer typo is set in the Setup screen. Enter a numeric value, 0 - 4 at the Prt field. The numbers correspond to the printer type as follows:

0 = No control codes sent
1= IBM Graphics
2= Epson
3= Okidata
4= HP LaserJet

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OPERATIONS SUMMARY

This section gives a summary of the various SA2005 software operations. This section is not meant to teach the keystrokes of each operation, but just give a basic understanding of what is supposed to happen with each option.

OPERATIONS OVERVIEW

The SA2005 connects to several pigtail connectors. The switches pigtails are connected to the temperature sensing thermocouple cables located at various points around the facility. The thermocouples are a copper and constantan wire, which are soldered together to form a temperature sensitive dissimilar junction or TC. The TC's generate a voltage proportional to temperature that is converted to a digital value by the SA2005. Each cable is assigned a number. The SA2005 can retrieve the temperature of any TC on any cable in the system.

The SA2005 can display the temperature of an individual sensor for diagnostic purposes or it may continuously scan the temperatures of each sensor and compare it against pre-determined set points and sound an alarm, print a report of the time and temperature.

The SA2005 may monitor for temperature of a sensor. Each cable may be assigned an alarm and alarm limit. When the SA2005 is in Auto Scan Mode, alarm above the alarm set points. An alarm contact may be connected to an alarm to alert the operator of alarm conditions that may require attention. The SA2005 may be connected to a serial printer via a 25 pin RS-232 port.

ENTERING DATA

The SA2005 keyboard is a one-piece membrane style keyboard that has 16 keys. The mode key and one cursor arrow key.

The SA2005 keypad contains all of the letters of the alphabet on the number keys similar to a telephone keypad. Each letter key has 3 letters that are accessed in sequence. For example, the "l " key has the letters "A", "B", and "C" on it. When the cursor is on an alpha field such as bin alpha or cable alpha, pressing the "1" key the <u>first</u> time will enter an *"A"*. The second time it is pressed without moving the cursor or pressing another key, a "B" will be entered. The third press will enter a "C" and so on starting with "A" again.

Numeric data entry is accomplished by pressing the number keys. Most data entry fields have a maximum value that may be entered. If the value entered exceeds the limit, the entered value is restricted to the maximum value. The Enter key will normally increment the displayed value by one. The Cursor key may be used to cycle to the next data entry field on the screen.

MODES OF OPERATION

The SA2005 has three normal modes of operation: Auto Scan, Manual and Set Limit as will as several service and diagnostic modes.

Modes of operation:

The SA2005 has three modes of operation: auto, manual, and setup.

Auto display screen:

Manual display screen:

Setup display screen:

In all modes of operation in which data entry is allowed, there is a blinking cursor that indicates which field will be changed when data is entered from the keypad. The cursor and numeric keys may be used to edit entries shown on the screen. When data entry is not allowed, as in automatic retrieval mode, for example, the blinking cursor is not displayed.

Upon power on or from any other mode, pressing the Print key enters Auto or "waiting for timed scan mode. The SA2005 has an alarm clock feature that enables the unit to read the temperature of all cables, which are not locked out at a preselected time. In this mode, the display shows the next programmed retrieval time and the current time and date.

When the retrieval time arrives or the Print key is pressed, the SA2005 initiates full automatic system retrieval. Storing the temps to ram and printing as specified in The SA2005 setup. The SA2005 will read and print ohms but unlike temperature data, it does not store ohm readings.

The SA2005 stores 4 readings of temperature histories in RAM. When an individual cable is completely read, the SA2005 updates the cable history on a first in first out basis and can print a total of 5 temperature histories (the current and 4 stored readings) for the cable. Sensors whose temperature has risen more than the Rate of Rise Limit (a global number not related to individual cable alarm set points) from previous reading or that has exceeded the Hi or Lo alarm set points will be printed in boldface on printout.

In Auto mode, pressing the enter key causes the SA2005 to enter manual mode. Manual mode allows an individual TC to be selected and read. It does not print or update the temperature history. In manual mode, the SA2005 display contains: Bin., Cable, Section, T/C, Temp or Ohms, Hi and Lo alarm set points, and whether an individual cable will be included in auto scan or skipped. Selective readings may be taken by selecting the starting point in Manual mode and then returning to Auto mode to initiate a reading. Likewise, selecting a point in auto mode and then switching to Configuration mode will allow the frequency of an individual sensor to be monitored.

Pressing the # key while in Auto or Manual mode will enter Setup mode. In Setup mode, the Settle Delay, the number of temperature readings to print on the printout (1 to 5), and the Rate of Rise limit value can be set. The V/F output (Frequency) is also displayed as an aid in setting the calibration and Settle delay. This screen is also home to a "byte change" facility that may be used to make calibration and configuration changes.

The SA2005 has two auxiliary relays, one of which acts as the alarm relay. The mode key is

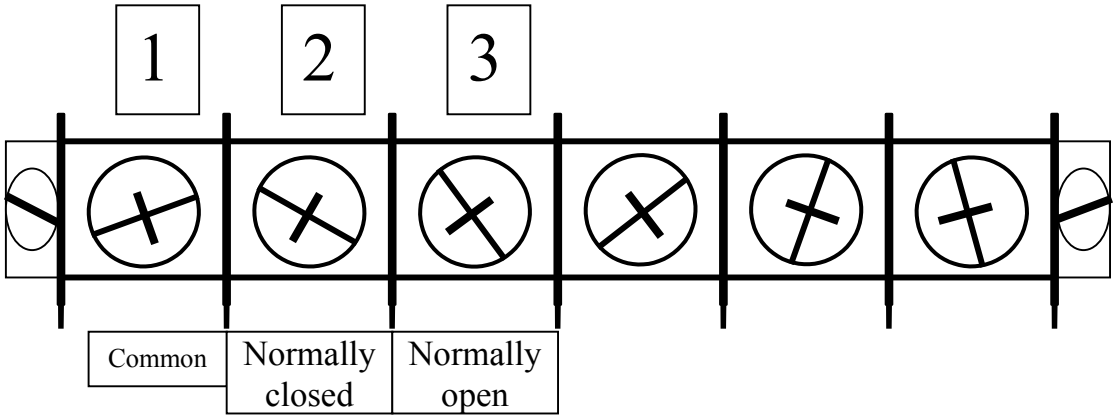
used to change mode of operation

At power on, the SA2005 goes to Auto Mode.

Power on Sequence

When the SA2005 is first turned on, several things are accomplished in rapid succession. alarm relay is closed momentarily to check its operation.

To hook up the alarm horn and the alarm light you need to attach the ground of the power supply to the common (terminal 1). Then the positive wires from the horn and the light should be spliced to the positive from the power supply. The remaining ground wires from the horn and the light should be connected to normally open (terminal 3).



Setting Time and Date

To set the time and date clock/calendar in the SA2005, The display shows the time and date in the real time clock and allows changes to be entered. Use the cursor key(s) and the numeric keys to change the time and date settings. The time is entered in 12-hour format. The AM/PM may be toggled by positioning the flashing on the value and pressing the 1 or 0 key.

Auto Mode

At power on, the SA2005 goes to Waiting Mode and waits for the operator to choose PRINT to print alarms or ENTER or # key.

Manual Mode

Manual Mode allows individual sensors to be read. The desired cable and Sensor numbers can be entered from the keypad and the temperature values fetched from the appropriate sensor will be displayed. Sensors can also be stepped through sequentially using the Enter key when the cursor is flashing on TC. In Manual Mode, the SA2005 continuously monitors the temperature of the specified TC. This allows rapid diagnostics and troubleshooting of the system.

SERVICE AND MAINTENANCE

For system maintenance and service see the System Maintenance Manual. The SA2005 console requires no maintenance and has no user-serviceable components. If problems occur, contact TSGC, Inc. at (800) 438-8367.

PROBLEM SOLVING PROCEDURES

If you encounter a system error, DON'T PANIC. Write down any information appearing on the screen. Write down the keystrokes that you entered before you encountered the error.

Try to reset the system by turning the SA2005 off and then turn it back on after a few seconds.

Check the following connections to be sure the system is still connected properly.

1. Your SA2005 is receiving power.
2. Your SA2005 is turned on.
3. Your SA2005 cable connections are secure.

If none of the above procedures will allow you to run the System, or additional errors occur, if you continue to have problems, call TSGC, Inc. at 1-800-438-8367 and give us the above information.

SPECIFICATIONS

Power	115 VAC +1O%-l5% 50/60 Hz.

	50 watts maximum 220 VAC Optional
Weight	5.5 lbs.
Operating Temperature Range	32 ° to 110 ° F
Printer Interface	RS-232 19200 Baud, 8 Data, 1 Stop, no parity
External Alarm Contact Rating	1 AMP 115 VAC - closes on alarm in Auto Mode.

Serial Communications Line

Physical Connection	RS-232
Transmission Speed	19200 Baud

GLOSSARY

Default - A value that is automatically entered when you press <ENTER> without entering any data. It can be overridden by entering a value at the prompt.

Printer - The device by which information is put on to paper.

Select - The process of selecting an option. Using the keyboard arrow keys, place the select bar over the desired option and press <ENTER>.

Sensor - A temperature reading device (Thermocouple).

TC - See Thermocouple

Thermocouple - A temperature reading device, also know as a T/C or TC.