SC4000 Radio Communicator

Operation and Installation Guide

radionics

A member of the Bosch Group

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1.0 SAFECOM Telemetry Communications System

SAFECOM is a long-range telemetry communications system for monitoring life safety security alarm panels which are remotely located at a customer site. The SAFECOM system utilizes specially designed telemetry transmitters and receivers to provide a secure and reliable radio communications link between remote alarm panels and a Central Monitoring Station. The information provided to the Central Monitoring Station allows security personnel or local authorities to respond immediately and appropriately to all alarm events detected at the customer site (see the following figure**).**

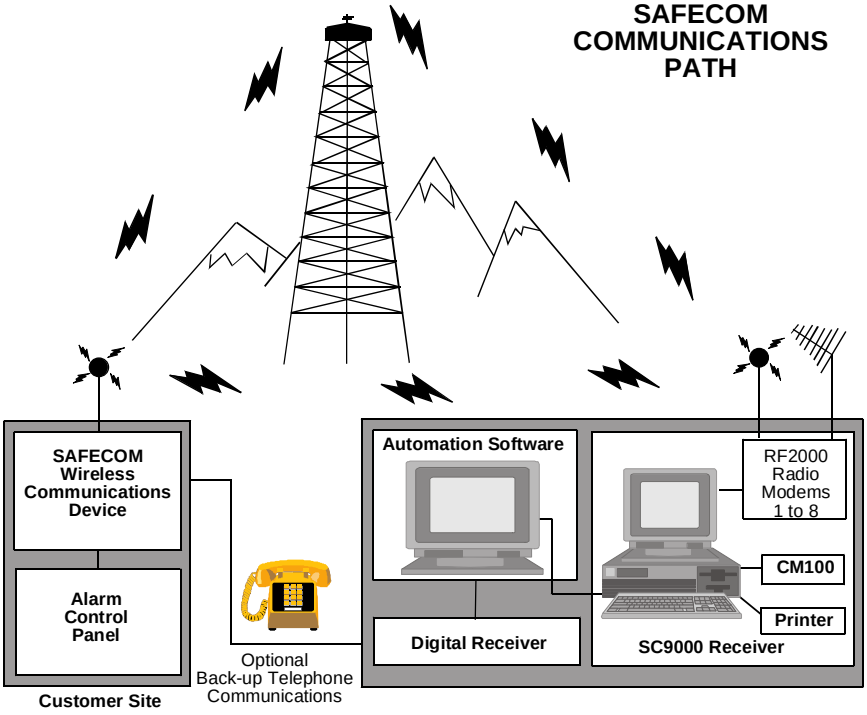

Figure 1: SAFECOM System

1.1 SAFECOM Communications Paths

The SC9000 Receiver acts as the nerve center of the SAFECOM Base Station. The SC9000 Receiver uses a personal computer to operate the ST1000 Receiver Software and provide radio communications with Radio Communicators via the RF2000 Radio Modem.

A Radio Communicator is a SAFECOM Communications Panel which is located at a customer site; commercial or residential. The SC9000 SAFECOM computer can supervise, monitor and control up to 2,500 Radio Communicators through two-way telemetry radio communications. The receipt of each message or poll that is transmitted is validated by the receiving site; SC9000 computer or Radio Communicator. The receiving site will then transmit an acknowledge message in response.

Supervisory polling is performed by the SC9000 computer for each Radio Communicators to verify two-way telemetry radio communications and the operational condition of the Radio Communicator. The supervisory polling interval is individually programmable for each Radio Communicator in the SC9000 computer account base.

The SAFECOM radios can be configured to transmit (TX) and receive (RX) on a single frequency pair directly to the Central Station. When the SAFECOM system is set up for Direct Mode, the SC9000 computer communicates directly with the Radio Communicators in the field. No repeater is used for this type of SAFECOM system (usually found in smaller proprietary systems like those found on a military base, university, or factory/commercial plant.

The SAFECOM radios can also be configured to transmit and receive on a frequency pair to a repeater located on a mountain, tower, or high building in the desired coverage area. When the SAFECOM system is setup for Repeater Mode, the SC9000 computer communicates with the Radio Communicators through a, U.L. Listed, SAFECOM SC801 or SC802 Data Repeater or a commercial grade voice repeater that has been configured with a SAFECOM DP1000PWA controller board. The SC801/SC802 or equivalent repeater is normally installed at a Commercial Repeater Site.

The use of a SAFECOM type repeater or equivalent, significantly increases the coverage area (range). Radio area coverage and reception ranges are also dependent on the extent of a number of environmental effects, e.g., propagation losses due to atmospheric conditions, and the proximity of the radio transmission and reception paths to dense foliage and metal structures, etc.

The majority of SAFECOM Radio Communicators are ordered to TX and RX in the 450-470 MHz UHF frequency range. Other frequency bands currently supported by Radionics include, the 403-450 MHz, 470-512 MHz, 136-174 MHz VHF range and the 900 MHz band. Additional frequency ranges are available upon request. The SC9000 computer can communicate with all Radio Communicators assigned to that specific SAFECOM network on a single RF "channel" through one SAFECOM RF2000 Radio Modem. A single RF "channel" is one radio frequency pair for either direct OR repeater communications.

With the installation of a SAFECOM 4 or 8 port Expander Board, the SC9000 computer can communicate on 1 to 8 independent and addressable RF "channels." Each RF "channel" communicates through a separate RF2000 Radio Modem. The addition of RF channels can be used to achieve backup redundancy in an area, or greater RF coverage range.

The SAFECOM IT1500 Installation Tester allows the installer to test for a standardized signal level from the remote radio site to the SC9000 computer and back, full two-way. Through this testing by a sales or service representative a two-way communications link can be confirmed between a Radio Communicator and the Central Station Receiver prior to the installation of a SAFECOM system.

1.2 Overview of SAFECOM Radio Communicators

Radionics is the original equipment manufacturer for the following SAFECOM Radio Communicators:

SC4000, Full Data Transfer, Eight Zones, Four Outputs, Radio Communicator

- UL Listed
- Radio Communications as primary path, phone line backup
- Full data transfer of all alarm panel signals
- Eight zones on board for Open/Closure/Voltage/Bell Out/Ground
- Relay Outputs for remote control, signaling, and/or automatic switching on-site

SC4000F, SSWF Fire Reporting Radio Communicator

- UL Listed for Supervisory, Sprinkler and Water Flow applications, reporting via radio
- Four on board SSWF inputs
- Relay outputs for remote control, signaling, and/or automatic switching on-site

SC3100, Full Data Transfer Radio Communicator

- Radio communications as primary path, phone line backup
- Full data transfer of all alarm panel signals

SC2104, Eight Zones, Phone Line Monitor, Radio Communicator

- Radio communications as primary or backup path
- Phone line monitoring (line sniffing)
- Eight zones on board for Open/Closure/Voltage/Bell Out/Ground

IT1500 SAFECOM Sales/Installation RF Tester

- Two-way radio communications tester for radio communicator site installations

SC801/SC802 SAFECOM Digital Data Repeater

- UL Listed for long range alarm reporting via radio
- Fully Addressable to allow up to eight independent repeaters in the same coverage area
- Full battery backup and lockable cabinet, with tamper reporting via radio

1.3 SC4000, Full Data Transfer, Eight Zones, Four Outputs Radio Communicator

The primary SAFECOM Radio Communicator system is the SC4000. All other SAFECOM Radio Communicator units are derived from capabilities and features found on the SC4000. The SC4000 is normally configured as a stand-alone device for interface with the remote site's existing alarm panel.

Introduction

Each SC4000 is capable of monitoring contact open/closure status for four inputs. These input lines allow End-Of-Line (EOL) Supervisory Loop status monitoring for normal, open and short conditions. Up to four (4) Loops may be monitored by the SC4000 as a UL Listed device. Up to eight auxiliary loops, two per Input, may be monitored when the SC4000 is programmed for expanded mode as a non-UL Listed device. Any change of input status condition, is immediately reported to the SC9000 computer. The SC4000 box tamper switch is also continuously monitored for fault and restoral detection. A message is immediately sent to the SC9000 computer when the SC4000 panel door is opened and again when it is returned to the closed position.

Each SC4000 is also configured with four two-position contact relay outputs. These relays may be selectively configured for a Normally Opened (N.O.) or a Normally Closed (N.C.) condition. The Central Station operator can remotely control the On/Off status of any device by sending radio commands from the SC9000 computer to enable or disable the output relays. The SC4000 may also be programmed to automatically enable or disable the output relays in response to a (Open or Short) detected on one of it's Inputs or a SC4000 system failure condition.

The SC4000 is normally configured as a stand-alone device for interface with the customer's existing alarm panel. It is located at a customer site; commercial or residential. It is usually mounted on the wall, next to the existing alarm panel. The antenna can be mounted directly on the SC4000 enclosure or remotely positioned for optimum radio reception and transmission.

The SC4000 is normally installed to Intercept all of the alarm panel signals from the host alarm panel, also known as a Dialer. The Dialer message is then digitally encoded and sent to the Central Station SAFECOM SC9000 computer via the SAFECOM network. When SAFECOM is installed, it is the PRIMARY means of alarm panel communication, with the phone line being the backup route. The SC4000 is capable of interfacing with most alarm panels that use any industry standard pulse format (3+1, 4+2, FBI Superfast, Radionics Slow, etc.) or Dual Tone Multiple Frequency, DTMF (ADEMCO Contact ID, ADEMCO High Speed, or ADEMCO 4+2 Express), or SIA-R, or Radionics Modem and Modem IIe, or BFSK formats.

The SC4000 can almost be thought of as "a digital receiver in a box", in that it has the ability to receive signals from the host alarm panel and then generate an ACK and kissoff to the alarm panel, while sending the signal to the Central Station SC9000 computer. The SC4000 sends all the necessary (ACK) tones to the host alarm panel in response to the Dialer seizing the phone line. These ACK tones can be programmed through the Central Station SAFECOM computer to Short and Long durations, frequencies of 1400 or 2300 Hz, as well as Low/High (Contact ID) and the Radionics D6500 Modem ACK.

In addition, the SC4000 can be programmed at the Central Station to send a 440 Hz tone to the Dialer to simulate dial tone. This tone comes in two bursts, lasting one second each, and is usually enough to satisfy alarm panels that "sniff" the phone line.

The host alarm panel's signals are sent to the Central Station SC9000 computer. Then the signals are displayed on the SC9000 computer and transferred to the Central Station's Automation Software (BOLD, SIS, SIMS, DICE, MAS, or most industry standard software packages). Primary routing of the digital alarm messages is via the SAFECOM network between a SC4000 in the field and the Central Station SC9000 Receiver; then to an Automation software program.

The SAFECOM SC9000 computer can monitor each of the unique alarm panel signals from each SC4000. The SC4000 functions strictly in a supervisory capacity when interfaced with an existing alarm system. The SC4000 is an intercept/delivery system which is designed for easy installation and interface with almost any alarm system; just connect the alarm panel Dialer cable to the SC4000 terminal strip and the House Phone cable, from the RJ31X jack, to the SC4000 terminal strip. Refer to the wiring diagram for the SC4000, found in this manual or on the SC4000 label, inside the door.

No modifications to the existing alarm system are required. The normal operation of the existing alarm panel and security system is not affected in any way. The existing detectors and initiating circuits still report the status of items directly to the host alarm panel. The difference is that when the host alarm panel goes to send a signal, it no longer uses the phone line. The SAFECOM network is used to send all signals. One advantage to this is that signals will continue to be received at the Central Station regardless of the phone line's status and the house phones will seldom be interrupted by the alarm panel.

The SC4000 requires 120VAC. This power source is usually connected to the SC4000 using the factory provided wall plug-in power transformer.

The SC4000 is usually installed with a 12VDC battery for back-up power in the event of an AC failure. This battery provides all of the necessary peak current (amperes) requirements when the SAFECOM Radio Transceiver is transmitting (TX) and receiving (RX). The battery is mounted inside of the SC4000 Radio Communicator enclosure and is accessible by opening the main door.

Each SC4000 is configured with a Fallback life safety feature. The Fallback mode of SAFECOM communications ensures that **all** alarm event messages sent by the host alarm panel will be routed to the Central Station in case

of a SC4000 or SAFECOM network failure. It also provides the ability to perform alarm panel programming and downloading via the telephone line.

Alarm panel signals are normally routed to the Central Station by SAFECOM radio communications as the primary mode of transportation. In the event that the SC4000 cannot send the Dialer message via the SAFECOM network due to some type of failure, the message is automatically routed to the backup phone line and on to a digital receiver at the Central Monitoring Station (Fallback Mode).

1.4 UL Listings Held by the SAFECOM SC4000 Radio Communicator

The SAFECOM system is listed by Underwriters Laboratories (UL) as follows:

Application and Category	Listing Standard
Central Station Burglar Alarm Units Commercial Burglary - “AA” Rating	UL 1610
Police Station Connected - Mercantile Premises Listed “AA” Rating	UL 365
Control Units for Fire Protective Signaling Systems Listed “Commercial Fire” Rating	UL 864
Proprietary Burglar Alarm System Units Proprietary Burglary - “AA” Rating	UL 1076
Household Burglar Alarm Units Residential Burglar Alarm Applications	UL 1023
Household Fire Warning System Units Residential Fire Applications	UL 985
Process Management Systems Service: “Non-Critical Applications”	UL 864

1.5 UL365 - Police Station Connected - Mercantile Premises

The following criteria must be met when installing the SC4000 to an alarm panel for an Underwriters Laboratories Listed (UL365) Police Station Connected - Mercantile Premises "AA" Burglary Application:

- The alarm panel must be a UL365 Listed device for Police Station Connected -Mercantile Premises, and must be suitable for this type of application.
- The alarm panel must be enclosed in an Attack Resistance Box.
- Both the alarm panel and the SC4000 must be located within the protected premises.
- The telephone cable from the alarm panel to the SC4000 must be enclosed in galvanized steel conduit with the following restrictions:
  - The conduit used must be UL Listed.
  - EMT or FLEX type conduit is not acceptable.
  - The length of the conduit can not exceed 18 in. (45.7 cm).
  - The conduit must be connected to the Panels at both ends with a closed nipple connector.
  - The conduit connecting the alarm panel to the SC4000 must be supervised for Opens with a monitoring loop. Install the monitoring loop utilizing the following procedures:
    1. Run a wire originating inside the SC4000 Radio Communicator through the conduit to the alarm panel through a 3.3 KΩ 10% tolerance resistor and loop it back through the conduit to the inside of the SC4000 Panel.
    2. Connect one end of the wire to the positive (+) side of SC4000 Input #1, Terminal #1 “Aux 1.”
    3. Connect the other end of the wire to the negative (-) side of SC4000 Input #1, Terminal #2 “Com.”
    4. If this monitoring loop is cut, the SC4000 will immediately send the message "Open: Input 1" to the SC9000 computer and the Alarm Event Code "211" will be sent to the automation software.

The text "Open" may be modified using the Input Translation Table (XLAT) to display at the SC9000 computer any text definition of up to eight characters maximum which properly describes the open condition of the monitored loop. Ensure text is assigned to the Alarm Event Code "211" in the Automation software, which properly describes the open condition of the monitored loop.

1.6 N.F.P.A. (National Fire Protection Association) Standards

The SAFECOM SC4000 Radio Communicator complies with the National Fire Alarm Code, NFPA No. 72.

1.7 SC4000 Radio Communicator Specifications

- **Size:** 11.25 in. x 11.25 in. x 3.5 in. (28.6 cm x 28.6 cm x 8.9 cm)
- **Weight:** ≈ 8 lb. (3.6 kg) without battery; ≈ 14 lb. (6.4 kg) with battery
- **Temperature:** Operating: 0° to +60°C (+32° to +140°F)
  Storage: -40° to +75°C (-40° to +167°F)
- **Operating Voltage:** 18V AC, 40VA
- **Battery:** 12V DC, 6.5 AH minimum
- **Backup Time:** 24 hours
- **Panel Indicators:** AC Power and Panel Trouble
- **Panel Control:** Silence Button
- **Panel Door Monitor:** SC4000 Tamper Switch
- **Inputs:** Alarm panel TELCO line, AC Operating Voltage, Battery, Radio Receiver Interface
- **Auxiliary Inputs:** Four EOL Terminated (2 wire class “B” circuits)
- **Outputs:** Telephone company line, radio transmitter Interface
- **Auxiliary Outputs:** Four form “A” relay contacts rated at 1.0A at 30V DC, Normally open or normally closed, jumper selectable
- **Receiver:**
  (Radio specifications may vary with the use of different makes of radio modules.)
  Frequency Range: 400-512 Mhz
  Minimum Sensitivity: -113 dBm (0.5µV) for –12dB SINAD
  Selectivity: 70 dB at 12.5 KHz channel spacing
  Frequency Range: ± 5 Parts Per Million (ppm)
- **Transmitter:**
  (Radio specifications may vary with the use of different makes of radio modules.)
  Frequency Range: 400-512 MHz
  Frequency Stability: ± 5 ppm
  RF Output Power: 2 watts ± 0.2 W
  Deviation: ± 2.0 KHz ± 0.2 kHz
  Modulation: FM

1.8 Notices

1.8.1 Copyright Notice

1.8.2 Trademarks

SAFECOM™ is a trademark of Radionics, a division of Detection Systems, Inc. Other brand or product names are trademarks or registered trademarks of their respective holders.

1.8.3 Notice

The technical information in this manual has been carefully checked for accuracy and is presumed to be reliable and correct. However, Radionics assumes no responsibility for any inaccuracies and reserves the right to modify and revise this manual without notice. Changes are periodically made to the information herein; these changes will be incorporated in new editions of this publication.

Please contact our Technical Support Department to request copies of this publication, technical information, and product support for all of the SAFECOM product lines.

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1.8.4 Federal Communications Commission (FCC) Statement

This equipment generates and uses radio frequency (RF) energy. If not installed and used properly, that is, in strict accordance with the manufacturer's instructions, it may cause interference to radio or television reception. This equipment has been tested and certified to comply with the specifications for a Class B digital device, pursuant to Subpart J of Part 15 of FCC rules. These specifications are designed to provide reasonable protection against such interference. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment on and off, the user is encouraged to correct the interference by one or more of the following measures:

- Reorient the radio/television receiving antenna.
- Move the antenna leads away from any wire runs to the SAFECOM system.
- If using an indoor antenna, have a quality outdoor antenna installed.
- Relocate the SAFECOM system with respect to the radio/television receiver.
- Connect the host alarm panel's AC transformer to a different outlet so the SAFECOM system and the radio/television are on different branch circuits.
- If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user might find the following booklet prepared by the Federal Communications Commission helpful: "How to Identify and Resolve Radio-TV Interference Problems." This booklet is available from the U.S. Government Printing Office, Washington D.C. 20402. **Stock No. 004-000-00345-4.**

Properly shielded and grounded cables and connectors must be used for connection to peripherals in order to meet FCC emission limits. Radionics is not responsible for any radio or television interference caused by using other than recommended cables or by unauthorized modifications to this equipment. It is the responsibility of the user to correct such interference.

1.8.5 Federal Communications Commission (FCC) Notice to Users

1. **Upon request only,** the telephone company (TELCO) must be provided with a notice of intention to install or permanently remove the SC4000, along with the following information:
   a) Manufacturer: Radionics, a division of Detection Systems, Inc.
   b) Model Number: SC4000
   c) FCC Registration Number: 1 L3USA-73968-MO-N
   d) Ringer equivalence: O.OA
   e) Type of Jack: (USOC) RJ31X, RJ32X, or equivalent

Note: *The SC4000 is intended to be used in conjunction with Alarm Dialing Systems, and makes use of the RJ31X, RJ32X or equivalent jack required for such systems. An equivalent jack is one which, when the system is disconnected from the jack, will continue to allow proper operation of the customer's telephone equipment.*

2. The SC4000 may not be connected to a TELCO-operated coin telephone line. Connection to privately-operated coin telephones is subject to local or state regulation, but **is not recommended by the manufacturer.**
3. The TELCO may, under certain circumstances, temporarily discontinue service and/ or make changes in its facilities or its service which may influence the operation of the SC4000. However, the telephone company is required to give adequate notice in writing of such changes or service interruptions.
4. In case of operational problems, disconnect the SC4000 (and Alarm Dialing System) from the TELCO line by removing the modular plug from the TELCO jack:

If, after disconnecting the equipment from the TELCO jack, the customers regular phone operation has not been restored, notify the telephone company that they may have a problem, and request prompt service at **no cost to the user.** If a problem is found in premises wiring not installed by the TELCO, the customer will be subject to a service charge. If a fault is found in wiring installed by the TELCO, the customer may be subject to a service call charge.

If, after disconnecting the equipment from the TELCO jack, the customers regular phone operation returns to normal, the equipment must remain disconnected until the SC4000, Alarm Dialing Equipment, or related wiring is serviced or replaced.

Unless otherwise noted in the Installation Guide (e.g. battery replacement, etc.), the SC4000 may not under any circumstances (in or out of warranty) be adjusted or repaired in the field. The location and phone number of the manufacturer, Radionics, is listed in this guide.

Notes:

2.0 Circuit Board

2.1 SC4000 Circuit Board Components

The following information describes the function of the headers, LED's, and some of the significant components located on the SC4000 Communications Panel circuit board: See the following figure and descriptions:

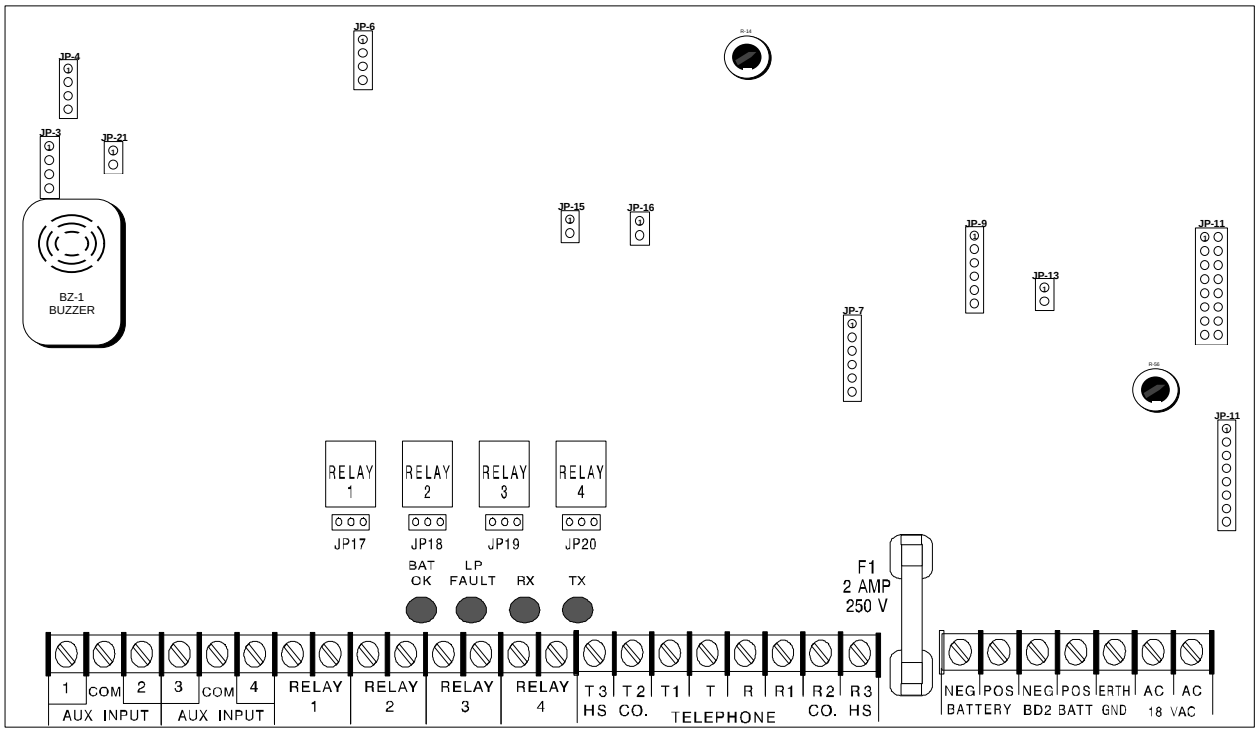

Figure 2: SC4000 Circuit Board

Bat OK LED

This LED illuminates to indicate the condition of the battery during normal operations or to indicate a hardware failure during CPU initial programming. There are three illumination conditions for this LED during normal SC4000 operations (after the SC4000 has been programmed):

1. On = Battery is good. When the LED is constantly on the battery is charged.
2. Off = Battery is bad. When the LED is off the battery potential is below acceptable limits.
3. Blinking = Battery test in progress. When the LED is blinking, a battery voltage test is in progress. The test will last for a period of two (2) minutes. Battery test can be initiated by one of two methods:
   - Initiated by the SC9000 Central Station operator via the Low Battery command.
   - Initiated automatically by the SC4000 internal program Firmware once an hour.

Note: *The Bat OK LED is also used as a Hardware Fault Indicator during initialization. See the Manual Initialization section in this guide for hardware LED indications.*

BZ1-Buzzer

Generates an audio alarm. The Buzzer Silence button is located on the front of the SC4000 panel door.

F1- System Fuse

Two Amp, 250 Volt fuse in-line with the battery. Provides circuit protection and fire prevention during periods of operation when the SC4000 is using the battery for primary power.

JP-3- Tamper

This header is connected to the SC4000 Tamper Switch inside of the SC4000 panel door.

JP-4- LEDs

This header is connected to the LEDs and the Silence button on the front of the SC4000 panel door for display of AC Power and Trouble indications and to silence the buzzer.

JP-6 - CPU RST

Allows system reset or initialization of the Central Processor Unit (CPU). Pins #1 and #2 (top two pins) are used to reset the CPU and retain the programmed data. Pins #3 and #4 (bottom two pins) are used to erase all programmed data in the CPU and to re-initialize the SC4000.

JP-7- LS-500

This header is used to connect an optional telephone line simulator board (LS-500). The LS-500 is sometimes required where the host alarm panel has phone line fault detection and requires more than 12VDC to see a "good" phone line.

Note: *The alarm panel is no longer directly connected to the phone line. The SC4000 simulates the phone line to the alarm panel.*

JP-9- CD, SQ, SQ

This header is used to specify what source the CPU will use to determine if there is radio activity on the RF channel. **This is factory set at Radionics, and should never be changed.** See the following:

- **CD - Carrier Detect:** The input source is from the Modem. The CD source is only used for radios that utilize internal squelching and do not provide an external connection for RF channel activity. Used to accommodate other types of radios.
- **SQ - Squelch Not:** The input source is from the radio. The squelch is normally low, CD is normally high.
- **SQ - Squelch:** The input source is from the radio. The squelch is normally high, CD is normally low. This is the NORMAL SC4000 configuration for placement of the shorting plug.

JP-11- Radio M

This header is used for interface to a Motorola radio.

JP-12- Radio J

This header is used for interface to a Johnson, MAXON or TEKK radio.

JP-13- CH#1

Provided for future expansion.

JP-15- TXD

Must have shorting plug installed.

JP-16- RXD

Must have shorting plug installed. The following applies to the installation of a shorting plug on the JP17, JP18, JP19, and JP20 headers:

- A shorting plug is installed on pins #1 and #2 for a Normally Open (N.O.) relay condition (Open = Disabled, Closed = Enabled).
- A shorting plug is installed on pins #2 and #3 for a Normally Closed (N.C.) relay condition (Closed = Disabled, Open = Enabled).

JP-17- N.O. N.C.

This header is for the Auxiliary Output Relay #1.

JP-18- N.O. N.C

This header is for the Auxiliary Output Relay #2.

JP-19- N.O. N.C.

This header is for the Auxiliary Output Relay #3.

JP-20- N.O. N.C.

This header is for the Auxiliary Output Relay #4.

JP-21- BZR OFF

This header is used to disable the BZ1 audio alarm. The buzzer will be active and the audio alarm will be heard with **no** shorting plug installed. The SC4000 is configured at the factory with the shorting plug installed to disable the buzzer. For U.L. fire applications, remove the shorting plug from the header to enable the buzzer.

LP Fault LED

This LED illuminates to indicate a Loop Fault on an SC4000 Input. The response behavior of this LED is specified by the SC9000 Central Station operator for each SC4000 account. A Yes selection is programmed on the "Fault Open" or "Fault Short" parameter on the third page of setup in the SC4000 account. The LP Fault LED can not specify which of the four SC4000's input lines the fault has been detected on. It only indicates that a fault has been detected on one of the four inputs.

Trouble LED

The Trouble LED on the front of the SC4000 panel door will illuminate when the SC4000 declares Comm Failure with the Central Station computer and/or when it detects a low battery condition (less than 11.5 VDC during a load condition).

R-14

Adjustment for the battery float charge level. **Set by Radionics at the factory. This should not need adjustment.**

R-56

Adjustment for the radio transmitter modulation deviation. **Set by Radionics at the factory for the transmitter audio drive level. This should not need adjustment.**

RX LED

This LED illuminates to indicate that the SC4000 is receiving radio carrier wave (Carrier Detect - CD). This can be a message from the Central Station or it can be another SAFECOM radio out in the field or a high level of electrical noise at the site.

TX LED

This LED illuminates to indicate that the SC4000 is transmitting a signal.

2.2 Circuit Board Terminal Strip

The following is a brief description of all the terminal connectors located on the terminal strip of the SC4000 circuit board. Refer to the following illustration and descriptions:

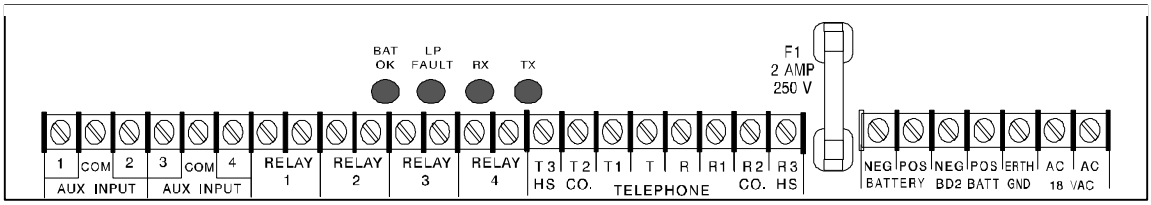

Figure 3: Terminal Block

Do not attempt to make any wiring connections to the terminal strip prior to reading the Pre-installation and Installation Procedures contained in this manual. The potential for fire or severe damage to the SC4000 circuit board components exist if these procedures are not closely followed.

The terminals are described, in order, from left to right:

- **#1- Input 1 (+):** Terminal for connecting the positive side of an EOL loop.
- **#2- Inputs 1 and 2 COM:** Terminal for connecting the common side of the EOL loop for both inputs 1 and 2.
- **#3- Input 2 (+):** Terminal for connecting the positive side of an EOL loop.
- **#4- Input 3 (+):** Terminal for connecting the positive side of an EOL loop.
- **#5-Inputs 3 and 4 COM:** Terminal for connecting the common side of the EOL loop for both inputs 3 and 4.
- **#6- Input 4 (+):** Terminal for connecting the positive side of an EOL loop.
- **#7 and #8 - Relay 1:** Terminals for connecting a device to output relay #1 for remote control of the device from the Central Station (air conditioners, heaters, lights, arm/disarm alarm panels, etc.).
- **#09 and #10 -Relay 2:** Terminals for connecting a device to output relay #2 for remote control of the device from the Central Station (air conditioners, heaters, lights, arm/disarm alarm panels, etc.).

Pre-Installation Requirements

- **#11 and #12 - Relay 3:** Terminals for connecting a device to output relay #3 for remote control of the device from the Central Station (air conditioners, heaters, lights, arm/disarm alarm panels, etc.).
- **#13 and #14 - Relay 4:** Terminals for connecting a device to output relay #4 for remote control of the device from the Central Station (air conditioners, heaters, lights, arm/disarm alarm panels, etc.).

Note: *Refer to the SC4000 Programming section of this manual for a listing and description of the different programmable relay types. These include manual switching, automatic switching, momentary closures, etc.*

- **#15 - T3 HS:** Terminal for connecting the SC4000 to the premises house phones that are connected to Terminals 1 or 8 of the RJ31X phone jack. HS stands for House Phones. This is the "House Phone Return" from the host alarm panel through the SC4000 to the House Phones. The other side of the House Phone line is connected to terminal #22 on the SC4000 (listed below).
- **#16 - T2 CO:** Terminal for connecting the incoming Telephone Company Line (TIP) from the RJ31X phone jack to the SC4000. CO stands for Telephone Company Line. The other side of the Telephone Company Line is connected to terminal #21on the SC4000 (listed below).
- **#17 - T1:** Terminal for connecting the SC4000 to the House Phones return terminal (TIP) on the host alarm panel. The other side of the House Phone return line from the host alarm panel is connected to Terminal #20 on the SC4000 (listed below).
- **#18 - T:** Terminal for connecting the host alarm panel incoming phone line (TIP) from the SC4000. The other side (Ring) of this line is connected from the host alarm panel to Terminal #19 on the SC4000 (listed below).
- **#19 - R:** Terminal for connecting the host alarm panel incoming phone line (Ring) from the SC4000. The other side (TIP) of this line is connected from the host alarm panel to terminal #18 on the SC4000 (listed above).
- **#20 - R1:** Terminal for connecting the SC4000 to the House Phones return terminal (Ring) on the host alarm panel. The other side of the House Phone return line from the host alarm panel is connected to Terminal #17 on the SC4000 (listed above).
- **#21 - R2 CO:** Terminal for connecting the incoming Telephone Company line (Ring) from the RJ31X phone jack to the SC4000. CO stands for Telephone Company Line. The other side of the Telephone Company Line is connected to Terminal #16 on the SC4000 (listed above).
- **#22 - R3 HS:** Terminal for connecting the SC4000 to the premises House Phones that are connected to Terminals 1 or 8 of the RJ31X phone jack. HS stands for House Phones. This is the "House Phone Return" from the host alarm panel, through the SC4000, to the House Phones. The other side of the House Phone line is connected to terminal #15 on the SC4000 (listed above).
- **#23 - Neg Battery:** Terminal for connecting the negative (-) line from the back-up battery (12 VDC, 6.5 AH).
- **#24 - Pos Battery:** Terminal for connecting the positive (+) line from the back-up battery (12 VDC, 6.5 AH).
- **#25 - Neg BD2 Batt:** Not used.
- **#26 - Pos BD2 Batt:** Not used.
- **#27 - Erth Gnd:** This terminal is for connecting the earth ground wire to the SC4000.
- **#28 and #29 - AC18VAC:** These terminals are for connecting the 18 VAC (40 VA, 15 A) output of the wall plug-in transformer supplied by Radionics.


WARNING

Do not connect the 120V AC, 60 Hz AC power source to Terminals #28 and #29. The potential for fire or severe damage to the SC4000 circuit board components exist if the Installation Procedures are not followed exactly.

3.0 Pre-Installation Requirements

3.1 SC4000 Pre-Installation Requirements

Prior to the installation of the SC4000 Radio Communicator, several conditions must be satisfied and physical phenomena considered to insure trouble free SAFECOM operation.

3.2 Wiring Requirements of the SC4000

All wiring utilized for the installation of the host alarm panel and the SC4000 Radio Communicator must be in accordance with (IAW) local building codes. The following is recommended gauge and type wiring for installation of the host alarm panel and the SC4000:

- Alarm panel dialer phone Lines: IAW industry installation standards.
- SAFECOM antenna RF cable : It is usually preferred to mount the factory provided antenna directly on the SC4000 enclosure.
- SAFECOM antenna RF cable for remote antenna installation (antenna located remotely, away from the SC4000): For distances of 15 ft. (4.6 m) or less we recommend using RG-58 or equivalent. For distances up to 30 ft. (9.1 m) we recommend RG-8 or equivalent. For distances exceeding 30 ft. (9.1 m) or more contact a Radionics SAFECOM Applications Engineer for recommendations.

3.3 AC Power

Primary power for the SC4000 Radio Communicator is an 18 VAC, 40 VA transformer. The transformer requires a 120 VAC/60 Hz or 220 VAC/50 Hz power source. Connect the transformer to an electrical outlet that is rated at 15A or more.

Note: *The 120V AC, 60 Hz commercial power must be unswitched and from a reliable source.*

Note: *For NFPA 72 applications, a dedicated branch circuit must be used to supply the 120V AC, 60 Hz power for the transformer. The circuit must have a means of being disconnected which is available only to authorized personnel and identified as a Fire Alarm Communications Panel.*

3.4 Backup Battery

The SC4000 is to be installed with a 24-hour rated backup battery to supply power for the system during interruptions in primary (AC) power. The back-up battery will provide the standby power necessary to meet NFPA requirements. In accordance with UL specifications, the backup battery will operate as the primary power source for 24 hours and will charge to full capacity within 24 hours when the AC power source is restored.

The following battery is approved by UL for installation and use with the SC4000 :

- YUASA, model #NP7-12. Maintenance-free, rechargeable sealed lead-acid.
- Nominal voltage = 12 VDC
- Nominal capacity (20 hour rate) = 7.0 AH
- Weight = 6.17 lb. (2.8 kg)

Note: *The SC4000 charging circuit is calibrated only for lead-acid gelled electrolyte (gel-cell) type batteries.*

Note: *Radionics recommends battery replacement every 3 to 5 years under normal use. Do not install the transformer into a power source that is routinely switched off. In addition to violating NFPA requirements, this will prevent heavy discharges of the battery resulting in premature failure.*

During an AC power loss the battery supplies all power to the SC4000. This load slowly discharges the battery. When the battery voltage drops below 11.5 VDC, the SC4000 will send a "Battery Trouble" message to the SC9000 Base Station. This alerts the Central Monitoring station that there are only four hours of battery charge remaining to sustain SC4000 operations.

After the AC power is restored, the SC4000 starts charging the battery until it reaches a voltage of 13.6 VDC. It will take a maximum of 24 hours for the SC4000 to charge the battery to full voltage capacity.

3.5 SC4000 Radio Communicator Location

The SC4000 enclosure can be mounted directly to a vertical surface, like a wall, using the “keyhole” mounting holes provided on the rear of the SC4000 enclosure. The factory supplied antenna should be attached to the antenna connector on the top of the SC4000. In some cases the antenna can be remotely located from the SC4000. This type of mounting will also require the use of an “L” bracket to mount the factory supplied antenna. The “L” antenna mounting bracket is Radionics part number #80072-101.


CAUTION

The SC4000 is not environmentally sealed. Do not mount the SC4000 where it can be exposed to the elements.

If the antenna is mounted directly on the SC4000 enclosure, the SC4000 should be mounted on the inside of an exterior wall for optimum radio transmission and reception. However, it should not be mounted in close proximity or on the same wall to:

- A cable bundle and/or wiring harness that is routed vertically and in close proximity to the SAFECOM antenna.
- A computer, PA, entertainment, or sound system.

The following should be considered when determining the location for mounting the SC4000:

- Antenna proximity to a cable bundle and/or wiring harness.
- Antenna proximity to computer, PA, entertainment, or sound systems.
- Easy access by a service technician.

3.6 Antenna Location

Improper antenna location is the single most common problem found in SAFECOM installations. The only way to properly determine the best location for the SAFECOM antenna installation is to use the SAFECOM IT1500 Installation Tester.


IMPORTANT

The SAFECOM IT1500 Tester must have a minimum of 9dB of attenuation installed between the Tester and the Tester antenna. If the Tester, along with the 9dB attenuator, does not produce a minimum of 10 "pass" indications following 10 tests, then the SAFECOM SC4000 Radio Communicator cannot be installed in this location. Refer to the SC9000 Operations Manual section titled "Using the IT1500 Tester" for more information on finding another location within this building and testing possible antenna locations. For information on ordering an external attenuator for your SAFECOM IT1500 Tester, contact a SAFECOM Applications Engineer at (800) 538-5807.

A successful RF communications link between the SC4000 and the Central Station SC9000 computer may be subject to external interference. Several environmental effects must be considered when determining the proper location for mounting the SC4000 antenna.

Transmission and receipt of radio signals may be blocked by metal, mountains, hills, foliage and other natural and man made obstructions.

Some extent of radio signal degradation may be seasonal. Weather may significantly degrade reception ranges due to propagation from temperature layers and reflection from the moisture content in the atmosphere. Transmission and reception ranges may be reduced by dense foliage on trees and shrubs. This degradation is normally experienced during the spring and summer months when the presence of leaves tends to block the signal path. During the winter, snow and ice on rooftops can also have a strong attenuation affect.

For optimum transmission and reception of radio signals, position the antenna as high as possible within the structure. Mounting the antenna on an elevated structure will enhance the line-of-sight Tx/Rx range and communications link effectiveness. The antenna **should not** normally be mounted inside metal buildings or enclosures. The proper antenna location is site specific for each installation.


IMPORTANT

All sales personnel should be required to utilize the IT1500 Tester with a minimum of 9dB of attenuation installed between the IT1500 Tester and the Tester antenna to determine if two-way radio communications between the prospective customer site and the Central Station SC9000 computer is possible.

After the initial testing performed by the salesperson, the installer should be required to utilize the IT1500 Tester, with a minimum of 9dB of attenuation installed between the IT1500 Tester and the Tester antenna to determine the proper antenna location within the customer site for installation.

The IT1500 is a portable tester which transmits a radio signal from the remote customer site to the Central Station SC9000 computer and receives an acknowledge (ACK) message to verify a successful two-way communications link for that particular geographic location and antenna position.

REMEMBER! Moving the antenna location as little as four inches (10.2 cm) in either direction can mean the difference between a trouble-free site or an angry customer that requires multiple service calls.

3.7 SC4000 Acceptable Antenna Types

The SC4000 is usually installed using the factory supplied omni-directional (OMNI) antenna. However, if testing using the IT1500 Tester with a minimum of 9dB of attenuation installed between the IT1500 Tester and the tester antenna shows that the factory supplied omni-directional antenna is not sufficient, the installer may choose to use a directional, gain antenna. This type of antenna is usually referred to as a “beam” or YAGI type antenna. The following is a partial listing of acceptable types of antennas for installation on or external to the SC4000 Radio Communicator. Both the omni-directional and YAGI type antennas are available to order directly from Radionics. Call (800) 538-5807 for more information.

Radionics factory supplied SAFECOM antennas:

Radionics Part Number	Description	Frequency Range
SC921-XX	½ wave, 2.5 dB gain, Rubber Duck	400-512 MHz
C740A	3.0dB gain Omni Whip	450-470 MHz
C742	10.0dB gain, Directional (Yagi)	450-470 MHz

Table 1: SC4000 Antenna Types

3.8 SC4000 Inputs

There are four inputs on the SC4000. The status of each of the four inputs is monitored by an End-of-Line (E.O.L.) Supervisory Loop circuit. There are three possible states for each E.O.L. supervised loop: Normal, Open, and Short.

Each SC4000 input can be programmed at the Central Station SC9000 computer for Non-Expanded or Expanded mode. By using the Expanded mode, monitoring of up to eight (8) AUX Loops is possible. One (1) or two (2) AUX Loops or Devices can be monitored by each Auxiliary Input, depending on how the inputs are programmed.

3.8.1 Non-Expanded

A non-expanded auxiliary input must be wired with a 3.3KΩ E.O.L. resistor. This external resistor is wired in series between the SAFECOM input wire (1,2,3, or 4) and the common ground on the SAFECOM SC4000 (black wire). See the following figure:

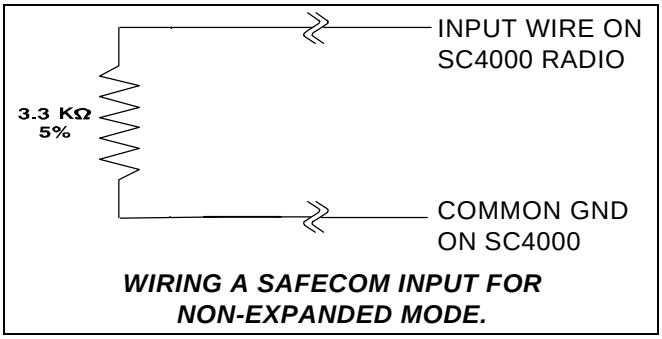

Figure 4: Non-expanded Mode Wiring

3.8.2 Expanded

A SAFECOM SC4000 can be programmed for Expanded mode. This mode allows the SAFECOM SC4000 to sense two different independent contact closures per input. When using an Expanded input type, you must wire the input with a 1.1KΩ and a 2.2KΩ 1 % precision resistor. See the following figure:

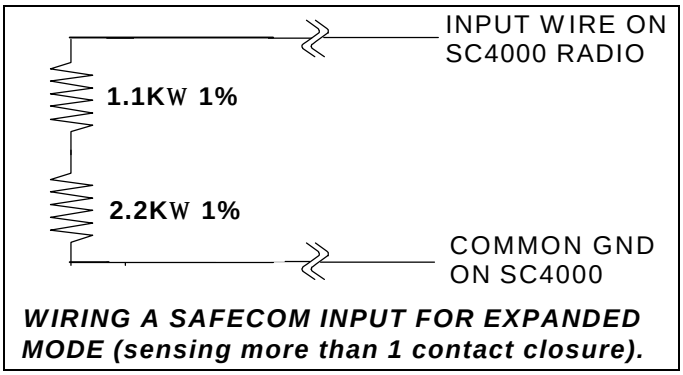

Figure 5: Expanded Mode Wiring

For Expanded SAFECOM inputs, the 1.1KΩ resistor forms the Primary Loop. Status conditions for the Primary Loops (across the 1.1KΩ) are reported to the Central Station SAFECOM SC9000 computer as “Short” or “Normal” on the corresponding input, “Input 1”, “Input 2”, “Input 3”, or “Input 4.”

For Expanded SAFECOM inputs, the 2.2KΩ resistor forms the Expanded or secondary Loop. Status conditions for the secondary Loops (across the 2.2KΩ) are reported to the Central Station SAFECOM SC9000 computer as “Short” or “Normal” on the corresponding Expanded input, “Input 1X”, “Input 2X”, “Input 3X”, or “Input 4X.”

3.9 SC4000 Relay Outputs

There are four (4) Output relays on each SC4000. Each output controls a Form “A”, one (1) amp, 2-position contact. The SC4000 can turn on or turn off any device normally controlled by a switch like air conditioners, pumps, tank valves, sirens, lights, CCTV cameras, access control devices, and arm/disarm alarm panels. Behavior and control of each individual output Relay is programmed by the Central Station operator in the radio communicator account Setup #3 menu. The SC4000 can be programmed to enable or disable the individual relays by one of two methods:

1. A manual Enable or Disable command is sent to the SC4000, by the Central Station operator each time an Enable/Disable status change is desired. (Relay output Type - 0). Once an Output Relay status is set, it will remain in that condition until changed by another manual Enable or Disable command, or if the SC9000 computer is rebooted.
2. The SC4000 is programmed in its radio communicator account setup with an output Type which defines the automatic switching by the SC4000 in the field.

The Radionics factory default status of the Output Relays is Disabled. The type of relay contact (Normally Open) or (Normally Closed) is determined by the position of a shorting plug jumper, just below the respective output relay on the SC4000 circuit board.

Notes:

4.0 Installation Procedures

4.1 Installation of the SC4000 Radio Communicator

This section describes the installation procedures for the SC4000 Radio Communicator.

4.2 SC4000 Radio Communicator

Vertically mount the SC4000 on a wall at the location determined from the considerations discussed in the section on pre-installation requirements. The total weight of the SC4000 is ≈ 14 pounds (battery included). Install the battery in an upright position at the base and inside of the metal SC4000 Panel enclosure.

Do not connect the AC power or battery wires to the SC4000 terminal strip at this time. Power-up Procedures are covered in the following section entitled "System Initialization."

The SC4000 is normally installed on a wall adjacent to the host alarm panel. See the following figure:

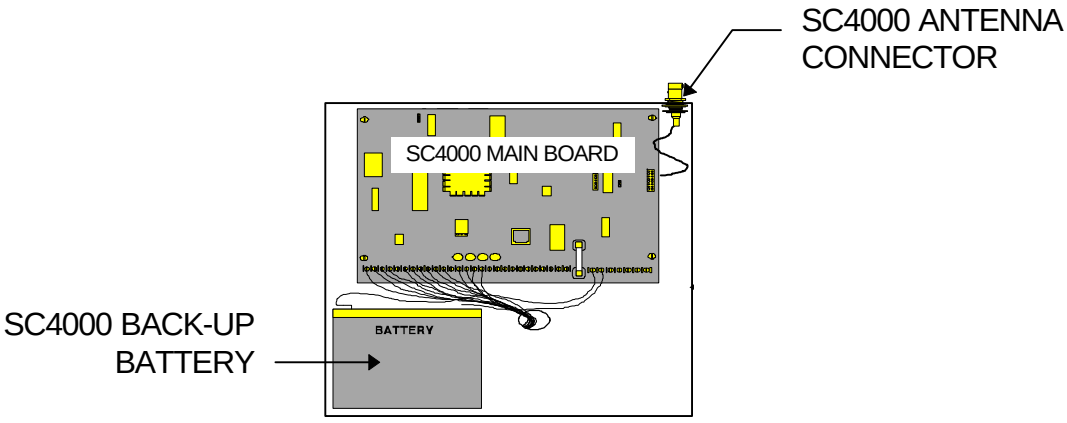

Figure 6: SC4000 Radio Communicator

4.3 Antenna

The antenna should be mounted directly on the SC4000 enclosure (see above illustration).

If a remote antenna location is required, mount the antenna in a suitable location as best determined by the results from the IT1500 Tester (with 6 to 9dB of external attenuation added). Use a 2"x2" Antenna Mounting L-bracket to attach the antenna to a beam or supporting structure.

For remote antenna installations, Radionics recommends using RG-58 for distances up to 15 ft. (4.6 m) and RG-8 for distances up to 30 ft. (9.1 m).

4.4 Wiring and Using the SC4000's Inputs

- Input #1: Connect the Input 1 Terminal to the factory supplied EOL resistor (3.3KΩ) with the other side of the resistor to the COM terminal on the SC4000. This will produce an "Input 1=Normal" condition. Applying a contact closure across the EOL resistor will produce an "Input 1=Short" condition.
- Input #2: Connect the Input 2 Terminal to the factory supplied EOL resistor (3.3KΩ) with the other side of the resistor to the COM terminal on the SC4000. This will produce an "Input 2=Normal" condition. Then applying a contact closure across the EOL resistor will produce an "Input 2=Short" condition.
- Input #3: Connect the Input 3 Terminal to the factory supplied EOL resistor (3.3KΩ) with the other side of the resistor to the COM terminal on the SC4000. This will produce an "Input 3=Normal" condition. Then applying a contact closure across the EOL resistor will produce an "Input 3=Short" condition.
- Input #4: Connect the Input 4 Terminal to the factory supplied EOL resistor (3.3KΩ) with the other side of the resistor to the COM terminal on the SC4000. This will produce an "Input 4=Normal" condition. Then applying a contact closure across the EOL resistor will produce an "Input 4=Short" condition.

4.5 Wiring and Using the SC4000's Relay Outputs

- SC4000 Terminals #7 and #8 - Relay 1: Terminals for connecting a device to Output Relay #1 for remote control of the device from the Central Station (air conditioners, heaters, lights, arm/disarm alarm panels, etc.).
- SC4000 Terminals #09 and #10 -Relay 2: Terminals for connecting a device to Output Relay #2 for remote control of the device from the Central Station (air conditioners, heaters, lights, arm/disarm alarm panels, etc.).
- SC4000 Terminals #11 and #12 - Relay 3: Terminals for connecting a device to Output Relay #3 for remote control of the device from the Central Station (air conditioners, heaters, lights, arm/disarm alarm panels, etc.).
- SC4000 Terminals #13 and #14 - Relay 4: Terminals for connecting a device to Output Relay #4 for remote control of the device from the Central Station (air conditioners, heaters, lights, arm/disarm alarm panels, etc.).

Note: *Refer to the SC4000 Programming Section of this manual for a listing and description of the different programmable relay types. These include manual switching, automatic switching, momentary closures, etc.*

4.6 Connecting the SC4000 to the RJ31X Jack

The following table is provided as a summary of connections for the telephone wires between the RJ31X Jack and the SC4000 Radio Communicator. The connections between the SC4000 Radio Communicator and the host alarm panel are covered in the next section.

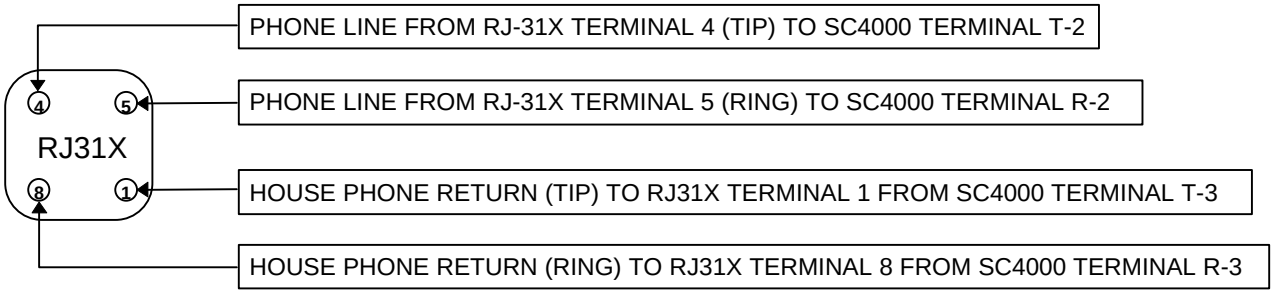

Figure 7: Connecting SC4000 to RJ31X Jack

4.7 Connecting the SC4000 to the Host Alarm Panel

The following table is provided as a summary of connections for the telephone wires between the host alarm panel and SC4000 Radio Communicator. The connections between the SC4000 Radio Communicator and the RJ31X Jack are covered in the previous section.

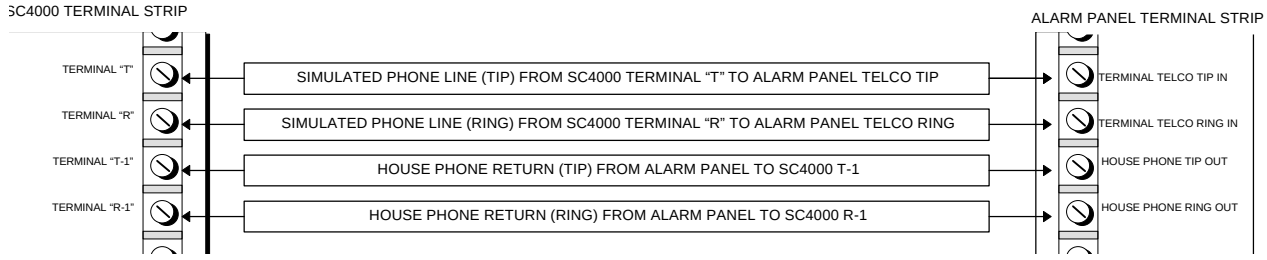

Figure 8: Connecting SC4000 to Host Panel

4.8 Optional LS500 Phone Line Voltage Simulator Board

The LS500 Phone Line Voltage Simulator is an optional device which connects to the SC4000 circuit board and allows it to be used with alarm panels that have a phone line supervision feature. Without the LS500, the SC4000 provides only 5 volts on the simulated Tip and Ring connections to the host alarm panel. Some alarm panels do not see enough voltage and will report a phone line trouble.

When the LS500 is connected the SC4000 is capable of providing approximately 40 VDC to the host alarm panel. This is usually sufficient to satisfy the alarm panel that the phone line is OK.

Note: *The LS500 will not solve compatibility problems between the SC4000 and opto-isolated type alarm panels (for example, some DSC and Australian panels). To solve this, the SC4000 must be sent to Radionics for a "DSC Modification" to the main SC4000 board.*

The LS500 must be used with alarm panels that are configured to do phone line supervision. It is also required for dual-line class B Fire and Security systems. The alarm panel can supervise both the secondary telephone line from the phone company, and the simulated primary phone line from the SC4000. If the real phone line fails, the alarm panel can simply send a Phone Failure message to the Central Station via the SAFECOM network. If the SC4000 fails or detects a problem with the SAFECOM network, it will automatically connect the alarm panel to the back-up phone line.

In this mode the alarm panel is still required to send test reports on both lines, just as it would if it were actually connected to two lines.

4.9 Installation of the LS500 Phone Line Simulator Board

The LS500 is a small plug-in board which is easily installed on the SC4000 circuit board. Utilize the following procedures for installing the LS500 Phone Line Voltage Simulator board:

1. SC4000 system power off. Turn AC off first, then the Battery DC power.
2. Install the LS500 on the JP7 header with the following steps.
3. Ensure the component side of the module faces to the left and away from the C8 capacitor.
4. The wire leads to the C8 capacitor may require a slight amount of bending to provide adequate clearance spacing for the LS500.
5. Ensure the 6 pin connector on the LS500 is properly aligned with the pins on the JP7 header.
6. SC4000 system power on. Turn Battery DC power on first, then the AC. **There are no programming changes necessary.**

5.0 System Initialization

5.1 System Initialization Procedures

The following describes the System Initialization Procedures for the SC4000 Radio Communicator:

Contact the Central Station SAFECOM computer operator. Then verify that the following information is entered in the SAFECOM SC9000 computer account for the specific SC4000 you are working on.

You must build an account into the SAFECOM SC9000 computer before the computer will recognize and place "on-line" a unit in the field. Below is a summary of the parameters necessary to program an SC4000 account into the SAFECOM computer. This is the first setup menu. These parameters must be entered, then "PG DOWN" to the second menu. The parameters that must be programmed by the Central Station are denoted in the following illustration and are summarized below:

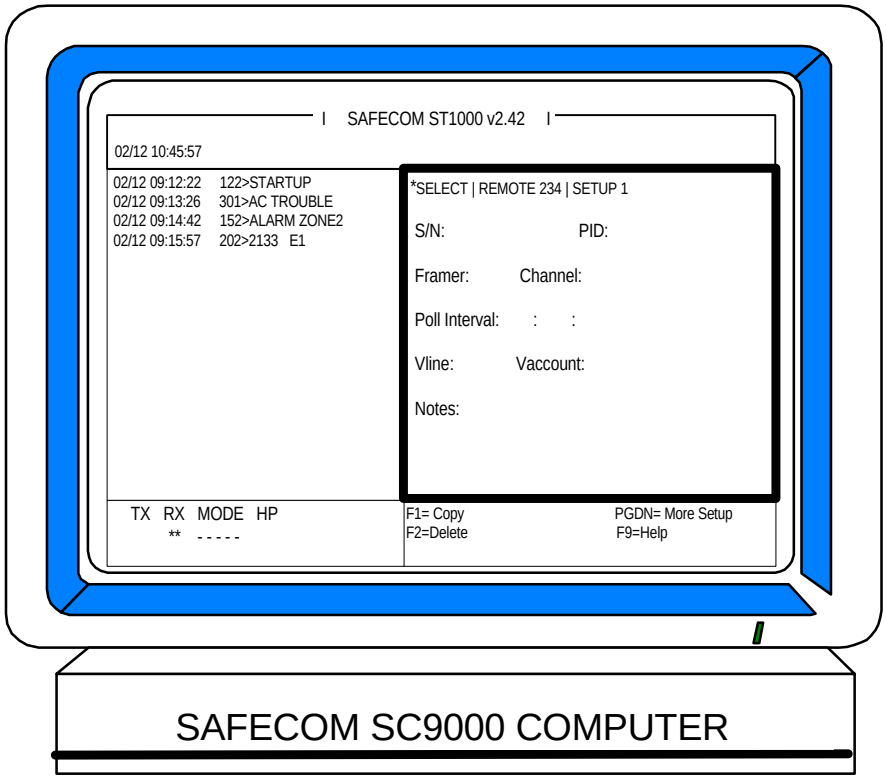

Figure 9: System Initialization

- **S/N:** This number must match the CPU Serial Number listed on the label of the SAFECOM SC4000.
- **PID:** This number must match the PID number on the label of the SAFECOM SC4000.
- **Framer:** This should correspond to the framer that is to be assigned to this unit.
- **Channel:** This should correspond to the channel that is to be assigned to this unit.
- **Poll Interval:** This is the time in hours : minutes : seconds that the unit in the field is to be polled by the Central Station.
- **Vline:** The number placed here will report to the Automation System as coming in from "line XX."
- **Vaccount:** The number placed here will report to the Automation System as signals coming from "account XXXX."
- **Notes:** This area is used to note the account information such as: Address, Customer, Account #, Install date, etc.

The following illustrates the second setup menu in the SC9000 computer for programming an SC4000 account. Below is a summary of the parameters necessary to complete the programming of an SC4000 account into the SAFECOM computer. This is the second setup menu. These parameters must be entered, then the operator will "ESCAPE" out and save the data to complete the building of the account.

Installation Procedures

The parameters that require programming are shown in the illustration and described below:

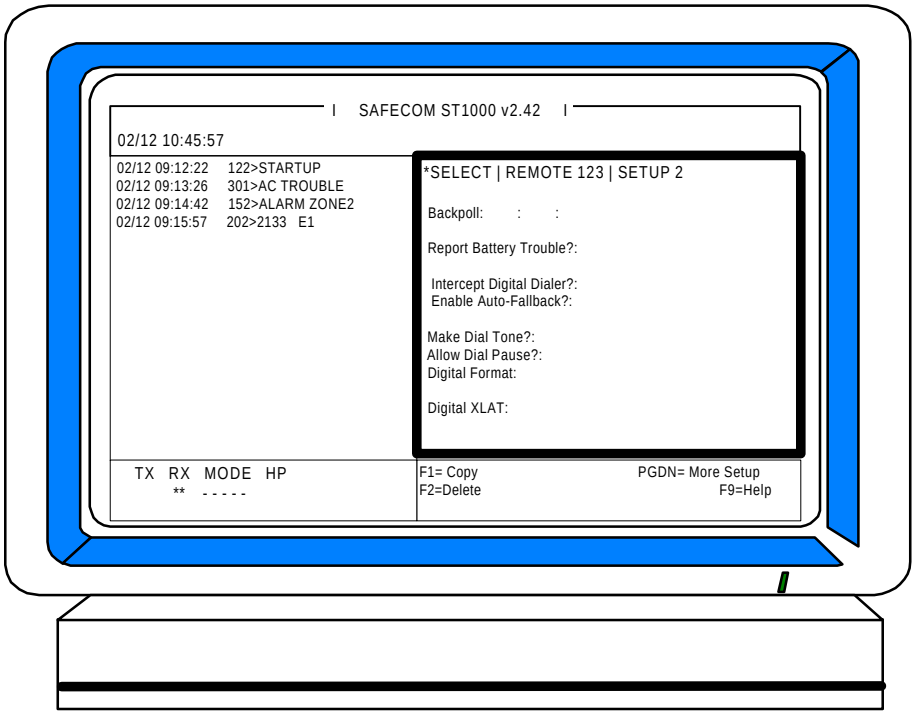

Figure 10: System Programming

- Backpoll: Backpoll specifies the maximum amount of time a SC4000 will tolerate no radio communications with the SC9000 computer. Recent changes to the SAFECOM system software have rendered this feature obsolete.
- Report Battery Trouble?: If this parameter is set to “Y” for Yes, then the SC4000 will report a low battery condition to the Central Station if this condition occurs. If “N” for No, the SC4000 will ignore a low battery condition.
- Intercept Digital Dialer?: Y or N: Specifies the routing of the host alarm panel’s signals to the Central Monitoring Station. If "YES" = The alarm panel Dialer messages will be intercepted by the SC4000 and sent to the Central Monitoring Station via the SAFECOM radio network. If "NO" = The alarm panel Dialer messages will always be routed to the Central Monitoring Station via the telephone line.
- Enable Auto Fallback? Y or N: Specifies whether the SC4000 will automatically revert to the phone line backup in the event of a SAFECOM system failure. If "YES" = The Fallback Mode (telephone Backup) will be initiated by the SC4000 if the alarm panel Dialer attempts to send an Alarm message via the SAFECOM radio communications system three (3) consecutive times and for some reason is not successful. If “NO" = The Fallback Mode will not be initiated. This type of configuration is usually reserved for applications having no phone lines.
- Make Dial Tone? - Y or N: Make Dial Tone specifies whether the SC4000 will send a simulated dial tone to the host alarm panel once the alarm panel prepares to send an alarm signal. If “YES” = The SC4000 will send the Dialer two 440 Hz tones after Line Seizure. Each tone is 1 second in duration. The 2nd tone is sent 2 seconds after the 1st. If “NO” = The SC4000 will not simulate a dial tone to the alarm panel. Characteristics of the alarm panel Dialer that the SC4000 will be communicating with dictate the selection for this entry.
- Allow Dial Pause?- Y or N: Allow Dial Pause sets the amount of time that the SAFECOM SC4000 will tolerate no activity after a digit has been dialed before deciding that the Receiver ACK tone should be transmitted. This sets a timing parameter and must sometimes be experimented with among different alarm panels to find the best choice.
- Digital Format: Programming of the SC4000 “format” must match the format that the digital dialer is sending. The tables below list the available formats and correct parameters. Please note that the PID (Product Identification Code) in the SC4000 determines how the SC4000 will be programmed.

Note: *For older SC4000s, the programming version required the operator to set two parameters, “Dialer ACK: and “Dialer Format” as shown below.*

Dialer ACK:

0= Short burst 2300 Hz, short burst 1400 Hz, long burst 2300 Hz, long burst 1400Hz.

1= Short burst 2300 Hz, short burst 2300 Hz.

2= Short burst 1400 Hz, short burst 1400 Hz.

3= Long burst 2300 Hz, long burst 2300 Hz.

4= Long burst 1400 Hz, long burst 1400 Hz.

5= DTMF (ADEMCO Contact ID / 4+2 Express / High Speed).

Dialer Format:

0= Unknown Dialer Format or any DTMF based format.

4= 3 +1 Pulse, double round.

5= 3 + 1 Pulse with parity.

6= Long burst 2300 Hz, long burst 2300 Hz.

4= Long burst 1400 Hz, long burst 1400 Hz.

5= DTMF (ADEMCO Contact ID / 4+2 Express / High Speed).

Note: *For newer SC4000s, please note that the programming for these newest versions require the operator to set only one parameter called "Digital Format" as shown below.*

Digital Format:

00= Either 2300 Hz or 1400 Hz ACK Tone, Any digital pulse type format.

01= Either 2300 Hz or 1400 Hz ACK Tone, Radionics BFSK.

02= Either 2300 Hz or 1400 Hz ACK Tone, 0-2 pulse type format.

03= Either 2300 Hz or 1400 Hz ACK Tone, 0-2 pulse type format with parity.

04= Either 2300 Hz or 1400 Hz ACK Tone, 3 + 1 pulse type format

05= Either 2300 Hz or 1400 Hz ACK Tone, 3 + 1 pulse type format with parity.

06= Either 2300 Hz or 1400 Hz ACK Tone, 4 + 2 pulse type format

07= Either 2300 Hz or 1400 Hz ACK Tone, 4 + 2 pulse type format with parity.

08= Either 2300 Hz or 1400 Hz ACK Tone, FBI Superfast (DTMF)

10= 2300 Hz ACK Tone, any digital pulse type format.

11= 2300 Hz ACK Tone, Radionics BFSK.

12= 2300 Hz ACK Tone, 0-2 pulse type format.

13= 2300 Hz ACK Tone, 0-2 pulse type format with parity.

14= 2300 Hz ACK Tone, 3 + 1 pulse type format

15= 2300 Hz ACK Tone, 3 + 1 pulse type format with parity.

16= 2300 Hz ACK Tone, 4 + 2 pulse type format

17= 2300 Hz ACK Tone, 4 + 2 pulse type format with parity.

18= 2300 Hz ACK Tone, FBI Superfast (DTMF)

20= 1400 Hz ACK Tone, Any digital pulse type format.

21= 1400 Hz ACK Tone, Radionics BFSK.

22= 1400 Hz ACK Tone, 0-2 pulse type format.

23= 1400 Hz ACK Tone, 0-2 pulse type format with parity.

24= 1400 Hz ACK Tone, 3 + 1 pulse type format

25= 1400 Hz ACK Tone, 3 + 1 pulse type format with parity.

26= 1400 Hz ACK Tone, 4 + 2 pulse type format

27= 1400 Hz ACK Tone, 4 + 2 pulse type format with parity.

28= 1400 Hz ACK Tone, FBI Superfast (DTMF)

30= Long 2300 Hz ACK Tone, Any digital pulse type format.

31= Long 2300 Hz ACK Tone, Radionics BFSK.

32= Long 2300 Hz ACK Tone, 0-2 pulse type format.

33= Long 2300 Hz ACK Tone, 0-2 pulse type format with parity.

34= Long 2300 Hz ACK Tone, 3 + 1 pulse type format

35= Long 2300 Hz ACK Tone, 3 + 1 pulse type format with parity.

36= Long 2300 Hz ACK Tone, 4 + 2 pulse type format

37= Long 2300 Hz ACK Tone, 4 + 2 pulse type format with parity.

38= Long 2300 Hz ACK Tone, FBI Superfast (DTMF)

40= 1400 Hz long ACK Tone, Any digital pulse type format.

41= 1400 Hz long ACK Tone, Radionics BFSK.

42= 1400 Hz long ACK Tone, 0-2 pulse type format.

43= 1400 Hz long ACK Tone, 0-2 pulse type format with parity.

44= 1400 Hz long ACK Tone, 3 + 1 pulse type format

45= 1400 Hz long ACK Tone, 3 + 1 pulse type format with parity.

46= 1400 Hz long ACK Tone, 4 + 2 pulse type format

47= 1400 Hz long ACK Tone, 4 + 2 pulse type format with parity.

48= 1400 Hz long ACK Tone, FBI Superfast (DTMF)

80= Any ADEMCO DTMF format (4+2 EXPRESS, ADEMCO High Speed, Contact ID)

81= SIA (RELAXED ONLY)

82= Radionics Modem II (D4112, D6112, D7112, D8112 and equivalent)

83= Radionics Modem IIe (D7212, D9112, and equivalent)

84= Special Contact ID format for Security Dimensions and Australian made alarm panels (Ness, EDM, Concepts).

- **Digital XLAT - 0 to 8:** The Digital Translation Table (XLAT) parameter tells the SAFECOM SC9000 computer where to look up alarm signals. The translation table (XLAT) gives the operator the ability to assign a table, and then build the table so that usually cryptic alarm signals like “31” will be looked up in the translation table assigned, and given a brief English text definition like, “BURG Z1.” This can be very useful in the unlikely event of an automation system failure. The translation table (XLAT) can allow the Central Station Operators to process alarms from the SAFECOM SC9000 directly without looking up codes to understand them. The translation text assigned to the Alarm Event Code is ONLY for display in the SAFECOM SC9000 computer and is NOT part of the Alarm message sent to the Automation software. Each Digital Translation (XLAT) table in the SAFECOM computer has 240 possible entries for Alarm Event Code to text translation/definition. A maximum of 8 characters are available for each Alarm Event Code translation/definition. IF “0” is selected for the translation table (XLAT) then all alarm signals from this specific account will be displayed exactly as they are transmitted by the host alarm panel without any translation/ definition.

Note: *The Digital Translation (XLAT) parameter does not have to be set for the SC4000 to operate properly.*

The following illustration shows the third setup menu in the SC9000 computer for programming an SC4000 account. Below is a summary of the parameters necessary to complete the programming of an SC4000 into the SAFECOM computer. The parameters must be entered, then the operator will “ESCAPE” out and save the data to complete building the account. Refer to the following illustration of Setup Menu #3:

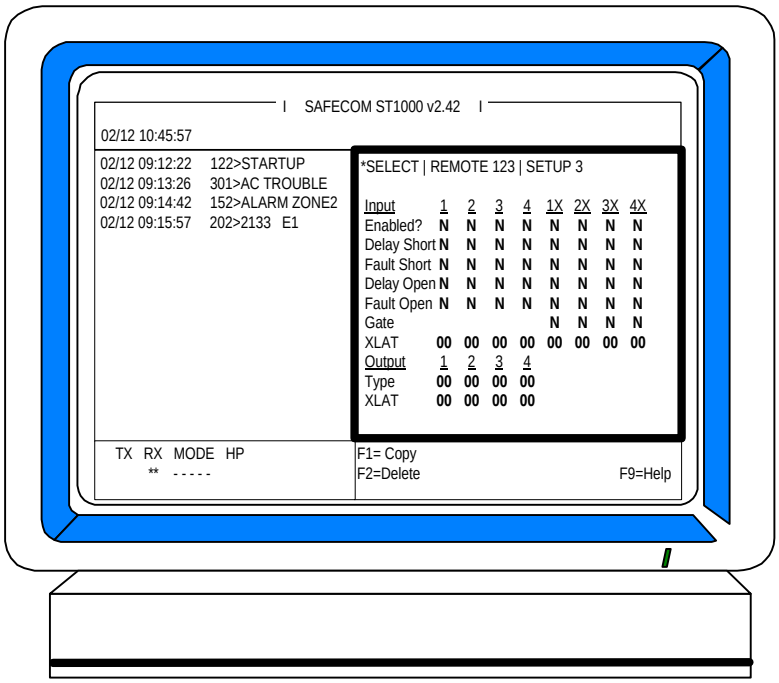

Figure 11: Setup Menu

The parameters required to be programmed are shown in the illustration above and described below:

- **Enabled? - Y or N:** Entering Yes or No to this parameter will enable or disable the respective input. If an input is programmed as N for No, the SC4000 will ignore any changes to this input.
- **1X, 2X, 3X, or 4X - Y or N:** All of these specify whether the respective Input will be treated as an Expanded or a Non-Expanded input. “YES” = The Input will be treated as an Expanded Input. The Input can be used for Expanded monitoring of two (2) Loops through a 1.1 KΩ resistor and a 2.2 KΩ resistor . The 1.1 KΩ resistor is the Primary Loop for the input specified. The 2.2 KΩ resistor is the Expanded Loop for this input. “No”= The Input will be treated as a Non-Expanded Input. The Input will be used for Non-Expanded monitoring of one 3.3 KΩ resistor.
- **Delay Short - Y or N:** This parameter will program in a delay in the respective input that will retard the reporting of the input when tripped.
- **Fault Short - Y or N:** Fault Short specifies whether the status of the Input will be treated as a Fault when a Short condition is detected across the EOL resistor on the specified Input .

When the input is configured for Expanded, the Primary and Expanded Loops will be individually monitored and a separate message will be reported when a Short condition is detected. “YES” = The following will occur when a Short condition is detected on the specified input:

1. The Loop Fault LED (yellow) on the SC4000 circuit board and the Trouble LED (red) on the SC4000 panel door will illuminate.
2. A Priority Alert message will blink and an audible tone will sound on the SC9000 computer.

- **Delay Open Y or N:** This parameter will program in a delay in the respective input that will retard the reporting of the input when tripped.
- **Fault Open- Y or N:** Fault Open specifies whether the status of the Input will be treated as a fault when an Open condition is detected on the specified Input .When the Input is configured for Expanded, the Input will be treated as a fault if an Open is detected on either the Primary or the Expanded Loop. “YES” = The following will occur when an Open condition is detected on the specified Input:

1. The LP Fault LED on the SC4000 panel circuit board and the Trouble LED on the SC4000 panel door will illuminate.
2. A Priority Alert message will blink and an audible tone will sound on the SC900 computer.

- **Gate:** This parameter refers to the operation of inputs on SC4000F type fire supervisory water flow and sprinkler reporting systems and is not applicable to the standard SC4000.
- **Input XLAT - 00 to 4F:** The Input Translation Table (XLAT) specifies the plain English text definition that you wish to assign to an Input. The text will be displayed in place of the default messages "Open, Short, or Normal." The Input Translation Table has 5 pages with 16 line numbers per page for a total of 80 line numbers. Each line provides a maximum of 8 characters for English text translation for Normal, Open, and Short Input conditions. The corresponding text assigned to the respective Input in the translation table is only for display at the SC9000 computer. It is **not** part of the message sent to the Automation software. Input translation gives the operator the ability to allow an input on an SC4000 to report "Temp Hi" or "Temp Lo" instead of "Input Short" or "Input Open." This ability can be very useful for processing alarm messages in the unlikely event of an automation system failure. Each translation table (XLAT) line contains three available conditions that the operator must define, "Short, Open, and Normal." These are the only conditions the SC4000 can detect and report on it's inputs.

Note: *The SAFECOM ST1000 v2.41 and higher software default values for all new radio communicator inputs are "00" and the default values for line #00 in the Input Translation Table are Normal, Open and Short.*

- **Output Type - 00, 01, 02, 03, 04, 07, 08, 09, 0A, 0C, 0D, and 0E:** Output Type allows the operator to define how the output relay will behave. It also defines the response behavior (Manual or Automatic Switching) of the specified (1, 2, 3, or 4) SC4000 Output Relays. The following describes the available relay types and how they will behave, as well as sample applications for there usage in the field:

Type	Description of the Relay Output and Possible Application
00	**Manually Enabled/Disabled by Operator Commands from the SC9000:** The relay is enabled/disabled by radio commands manually sent by the operator from the SC9000 computer. This type of output is used for applications requiring the Central Station operator to remotely control various devices (electric doors, air conditioning, pumps, valves, etc.).
01	**Enabled while Comm Fail:** The relay is enabled when the SC4000 experiences radio communication failure with the SC9000 computer. This can be used to sound a local annunciator (horn, buzzer, LED indicator) to indicate possible intentional jamming of the radio network is evident. The output relay is automatically reset to the Disabled position when radio communications to the SC9000 computer is restored.
02	**Enable while in Fallback Mode:** The relay is enabled (as a status follower) when the SC4000 enters the Fallback Mode (the backup phone line is now connected to the host alarm panel) as a result of a SAFECOM network failure or a manual command sent by the Central Station operator. This type of relay output can be used to allow a positive indication that the phone line has been connected directly to the host alarm Panel. This indication (sometimes called "Download Ready") at the Central Station is useful when remote arm/disarm via telephone keypad and downloading of the host alarm panel is necessary. The Relay is automatically returned to the Disabled position when the SC4000 returns to the digital Intercept Mode (SAFECOM radio routing or Alarm signals Primary).
03	**Enabled when the SC4000 detects a Low Battery:** The relay is enabled (as a status follower) when the SC4000 detects a battery voltage below 11.5V DC. The relay is automatically returned to the Disabled position when the SC4000 battery has been charged to a level of 13.6V DC. This can be used to sound a local annunciator (horn, buzzer, LED indicator).
04	**Enabled while AC Fail:** The relay is enabled (as a status follower) when the SC4000 detects a loss of AC power at the customer site. The relay is automatically returned to the Disabled position when the AC power at the site is restored. This can be used to sound a local annunciator (horn, buzzer, LED indicator).
07	**Enabled while HI Priority:** The relay is enabled (as a status follower) when the SC4000 detects a line seizure and dialing by an alarm panel Dialer. This usually indicates an alarm is about to be transmitted by the host alarm panel. This can be used to sound a local annunciator (horn, buzzer, LED indicator) to indicate that the host alarm panel is in an alarm state. The relay is automatically returned to the Disabled position when the SC4000 receives the ACK (Kissoff) from the SAFECOM SC9000. This can allow local personnel to know that the alarm signal was transmitted and received by the Central Station SC9000 computer.
08	**Enabled if Any SC4000 Input is in an alarm State:** The relay is enabled (as a status follower) when an alarm (Short or Open) is detected on any of the enabled SC4000 inputs. Any of the SC4000 auxiliary inputs that are set to "Y" for input fault short and/or input fault open. The relay is automatically returned to the Disabled position when all of the auxiliary input fault conditions return to the normal condition. This can be used to sound a local annunciator (horn, buzzer, LED indicator) to indicate that an input loop is in the alarm state.

Type	Description of the Relay Output and Possible Application
09	**Enabled for Corresponding Fault Backup:** The relay is enabled (as a status follower) **only** when the SC4000 detects radio communications failure with the SC9000 computer and an alarm condition (Short or Open) on an input loop is detected on the corresponding SC4000 auxiliary input. This can be used to sound a local annunciator (horn, buzzer, LED indicator) when the input loop is in the alarm state and the SC9000 **cannot** send the message due to a SAFECOM network failure. The relay is automatically returned to the Disabled position when communications are restored with the SC9000 computer and the corresponding input fault condition returns to normal.
0A	**Enabled for Corresponding Input Fault:** The relay is enabled (as a status follower) when a fault condition (Short or Open) on the corresponding input is detected. The corresponding input must be set to "Y" for "Fault Short" and/or "Fault Open." With this type of output, output relay 1 is linked to input 1 and so on. This can be used to sound a local annunciator (horn, buzzer, LED indicator) when the input loop is in the alarm state. It is also common to use this type of output type to allow the SC4000 to automatically perform a switching function, such as turning on an air conditioner system in response to a high temperature detection on its input. All relay output control for this type is performed automatically by the SC4000 not requiring Central Station operator intervention. However, the status of being monitored and the corresponding relay switching action, if performed by the SC4000, will be immediately reported to the Central Station operator for documentation and archival purposes. The relay is automatically returned to the Disabled condition when the input fault condition returns to normal.
0C	**Output Toggled Every Second:** The relay is toggled on and then off every 1 second. The relay will continue to toggle until the output type is changed. This type of output is commonly used to control automated equipment.
0D	**Output Toggled Every Minute:** The relay is toggled on and then off every 1 minute. The relay will continue to toggle until the output type is changed. This type of output is commonly used to control automated equipment.
0E	Enable While Input Reporting is Pending: The relay is enabled (as a status follower) when an input fault condition (Short or Open) is detected on the corresponding SC4000 input if the fault has not been reported. The corresponding input must be set to "Y" for input fault short and input fault open. The relay is automatically returned to Disabled when the auxiliary input fault condition is reported to the SC9000 computer and/or the corresponding input fault condition returns to normal.

- **Output XLAT - 00 to 4F:** The Output Translation Table (XLAT) specifies the plain English text definition that you wish to assign to an output. The text will be displayed in place of the default messages "Enabled" or "Disabled." The Output Translation Table has 5 pages with 16 line numbers per page for a total of 80 line numbers. Each line provides a maximum of 8 characters for English text translation for Enable and Disabled Output conditions. The corresponding text assigned to the respective output in the translation table is **only** for display at the SC9000 computer. It is not part of the message sent to the Automation software. Output translation gives the operator the ability to allow an Output on an SC4000 to report "Pump On" or "Pump Off" instead of "Output Enabled" or "Output Disabled." This ability can be very useful for remote control applications. Each translation table (XLAT) line contains two available conditions that the operator must define, "Enabled" and "Disabled." These are the only conditions an SC4000 relay output can be in and report.

Note: *The SAFECOM ST-1000 v2.41 and higher software default values for all new radio communicator outputs are "00" and the default values for line #00 in the Output Translation Table are Enabled and Disabled.*

At the SC4000 Terminal Strip, physically connect the following:

- **Neg Battery:** Connect the negative (-) side of the Battery (black wire) to terminal #23.
- **Pos Battery:** Connect the positive (+) side of the Battery (red wire) to terminal #24.

Note: *Ensure the battery is connected prior to connecting the AC power to the SC4000. This will prevent the SC4000 from sending a Battery Trouble message to the Automation Software via the SC9000 Receiver.*

At the SC4000 Terminal Strip, connect the AC transformer to a duplex electrical outlet.

Ensure that the AC transformer is secured to the duplex electrical outlet. This will prevent inadvertent AC power loss from jarring or bumping the transformer when plugged into the electrical outlet.

5.2 Establishing Communications with the Central Station SAFECOM SC9000 Computer

To establish radio communications between an SC4000 in the field and the Central Station:

1. Ensure the correct S/N, PID #, Framer #, and RF Channel are entered in the SC4000's account in the SAFECOM computer.

Note: *The SC9000 computer is located at the Central Station.*

2. Connect the positive (+ red) and negative (- black) wires from the battery to the SC4000, then connect the AC power transformer.

The TX LED on the SC4000 should illuminate red (TX) for about one second, then the RX LED should illuminate to indicate that the SC4000 Radio Communicator is transmitting and receiving. If the TX LED on the SC4000 circuit board **does not** illuminate to indicate that the system is transmitting during the initialization, a hardware component failure is possible. When the SC4000 system detects a hardware failure during initialization, the BAT OK LED on the SC4000 circuit board will blink to indicate a specific type of failure. The blinking will continue (re-occurring) until system power is removed from the SC4000 and/or the hardware discrepancy is corrected.

The following describes the BAT OK LED blinking indications for a hardware failure:

- 1 blink is a ROM failure, component U9 or the CPU, component U6..
- 2 blinks is a RAM failure, component U10.
- 3 blinks is a EEPROM failure in the CPU, component U6.
- 4 blinks is a LOW BATTERY indication, <10.5 VDC.
- LED **does not** illuminate indicates a CPU failure, component U6.

Note: *If the SC9000 cannot find any radio communicator account with this S/N, the SC9000 will ignore any startup messages from that particular SC4000.*

The SC4000 programming is complete and the SC4000 is on-line and operational for a radio communications link between an alarm panel Dialer and the SC9000 Receiver.

5.3 Manual Initialization of an SC4000 Radio Communicator

The SC4000 Radio Communicator may be manually Reset and/or Initialized. The Reset and Re-Initialize function is performed by a sequence involving momentarily installing and removing a shorting plug on the JP6 CPU RST Header. The Initialization procedure is performed for the CPU of a SC4000 that has previously been Initialized and programmed. This is often used when an SC4000 Radio Communicator has been in service, then removed, and placed into another account.


CAUTION

The following procedure will erase all the parameter memory in the SC4000 CPU with the exception of the CPU serial number.

1. AC and/or DC power is applied to the SC4000 (power on).
2. Place a shorting plug on pins #3 and #4 (bottom 2 pins). Leave the shorting plug installed. This allows the CPU to be initialized.
3. Initiate a momentary short between pins #1 and #2 (top 2 pins).
4. This procedure will reset the CPU. The BAT OK LED will blink three (3) times to indicated that the CPU has been Initialized (zeroized).
5. Remove the shorting plug from pins #3 and #4.
6. Again, initiate a momentary short between pins #1 and #2. This will initiate a system reset.

6.0 Programming Worksheet SC4000 Radio Communicator Account Setup

Radio Communicator # (3 digit number assigned by the Central Station Operator):

CPU Serial # (9 digit S/N from the SC4000 label):

Product ID (4 digit PID number from the SC4000 label):

Framer (assigned by the Central Station Operator):

Channel (assigned by the Central Station Operator):

Poll Interval (assigned by the Central Station Operator):

Vline (assigned by the Central Station Operator):

Vaccount (assigned by the Central Station Operator):

Notes (account information, name, address, install date):

Backpoll (no longer used) 00:00:00

Report Battery Trouble? (assigned by the Central Station Operator):

Intercept Digital Dialer? (see this manual):

Enable Auto Fallback? (see this manual):

Make Dial Tone? (see this manual):

Allow Dial Pause? (see this manual):

Digital Format (see this manual):

Digital XLAT (see this manual):

	1	2	3	4	1X	2X	3X	4X
Input Expanded?								
Delay Short								
Fault Short								
Mask Short								
Delay Open								
Fault on Open								
Mask Open								
XLAT								
Output Type								
XLAT								

SC4000

Programming Worksheet

7.0 Limited Warranty

Warranty Coverage and Duration

Radionics warrants to the original purchaser its Radionics manufactured “SAFECOM" products ("Product") against **defects** in material and workmanship under normal use and service for a period of one year from the date of purchase.

During the applicable warranty period, at no charge, Radionics will, at its option, either repair, replace or refund the purchase price of this Product, provided it is returned in accordance with the terms of this warranty to the place of purchase. Repair, at the option of Radionics, may include the replacement of parts, boards or other components with functionally equivalent reconditioned or new parts, boards or other components. Replaced parts, boards or other components are warranted for the balance of the original applicable warranty period. All replaced items shall become the property of Radionics.

RADIONICS MAKES NO GUARANTY OR WARRANTY THAT THE PRODUCT WILL PREVENT OCCURRENCES, OR THE CONSEQUENCES THEREOF, WHICH THE PRODUCT IS DESIGNED TO DETECT.

This express limited warranty is extended by Radionics to the original end-user purchaser only, and is not assignable or transferable to any other party. This is the complete warranty for SAFECOM products manufactured by Radionics, and Radionics assumes no obligation or liability for additions or modifications to this warranty. In **no case does** Radionics warrant the installation, maintenance or service of the Product.

Radionics is not responsible in any way for any ancillary equipment not furnished by Radionics which is attached to or used in connection with SAFECOM products, or for operation of the Product with any ancillary equipment, and all such equipment is expressly excluded from this warranty. Because of wide variations in topographical and atmospheric conditions, which may require availability of repeater stations or of particular radio frequencies, Radionics assumes no liability for range, coverage or suitability of the Product for any particular application. Buyer acknowledges that Radionics does not know a particular purpose for which buyer wants the Product, and that buyer is not relying on Radionics’ skill and judgment to select or furnish suitable goods.

This warranty applies only within the fifty (50) United States and the District of Columbia.

What this Warranty does NOT Cover

a) Defects or damage resulting from use of the Product in other than its normal and customary manner.

b) Defects or damage from misuse, accident or neglect.

c) Defects or damage from improper testing, operation, maintenance, installation, alteration, modification or adjustment.

d) Disassembly or repair of the Product in such a manner as to adversely affect performance or prevent adequate inspection and testing to verify any warranty claim.

e) Any Product which has had its serial number removed or made illegible.

How to Receive Warranty Service

To obtain warranty service, deliver or send the Product, transportation and insurance prepaid, to the place of purchase along with your proof of purchase and Product serial number. Alternatively, call (800) 538-5807 or (408) 757-8877.

General Provision

This warranty sets forth the full extent of Radionics’ responsibilities regarding the Product, Repair, replacement or refund of the purchase price, at Radionics' option, is the exclusive remedy.

THIS WARRANTY IS GIVEN IN LIEU OF ALL OTHER EXPRESS WARRANTIES. ANY APPLICABLE IMPLIED WARRANTIES, INCLUDING WITHOUT LIMITATION THE IMPLIED WARRANTY OF MERCHANTABILITY, ARE LIMITED TO THE DURATION OF THIS LIMITED WARRANTY. TO THE FULLEST EXTENT PERMITTED BY LAW, RADIONICS DISCLAIMS ANY LIABILITY FOR DAMAGES IN EXCESS OF THE PURCHASE PRICE OF THE PRODUCT, FOR ANY LOSS OF USE, LOSS OF TIME, INCONVENIENCE, COMMERCIAL LOSS, LOST PROFITS OR SAVING OR OTHER INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE OR FAILURE OF SUCH PRODUCT.