

**CASI-RUSCO...*Security Solutions for the 21<sup>st</sup> Century***

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# **Secure Terminal Interface (STI) Installation Guide**

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# Introduction

This manual is an installation guide for the CASI-RUSCO Secure Terminal Interface (STI).

The STI is designed as a plug-in replacement for Cardkey™ STI-C and STI-S with additional features such as F/2F, Strobe/Data interfaces, Wiegand formats, longer cable length to the microcontroller (6000 feet versus 2000 feet), and more flexibility in connecting to the microcontroller (directly or via a nearby STI). The STI allows for an easy upgrade of a Cardkey system to a CASI-RUSCO system. In fact, the CASI-RUSCO STI has the same board size and mechanical mounting holes as the Cardkey STI.

**CAUTION** You must have a CK8RP board in the Micro/5 that will be controlling your STI.



The CK8RP board must have firmware version 6 or later to be compatible with the STI firmware version currently shipped. To verify the CK8RP board firmware version, locate the label 58029800x, where x is the version number, on the integrated circuits. Contact the CASI-RUSCO RA (Return Authorization) department to arrange a CK8RP board firmware upgrade, if necessary.

# Product Features

The CASI-RUSCO Secure Terminal Interface (STI) offers the following features.

- Designed as a plug-in replacement for CardKey STI-C and STI-S. Allows for the upgrade of a CardKey system to a CASI-RUSCO system.
- Requires a special board (CK8RP) in the Micro/5 microcontroller. The CK8RP board will support 8 STIs (8 readers).
- Uses the same mounting holes as the standard CardKey STI and has the same footprint.
- Interfaces to CardKey Wiegand readers and badges and other type readers (BaFe) with similar interfaces.
- Interfaces to readers with 2-wire Wiegand outputs and 2601, 2800, 2801, 2802, 2804, 3701, 4401 formats, 40-bit and 8-bit Indala keypad.
- Interfaces to readers with strobe/data (ABA Protocol) outputs.
- Interfaces to CASI-RUSCO F/2F supervised readers.
- Interfaces to CardKey's reader keyboard.
- Provides door alarm and exit request inputs.
- Provides six general-purpose alarm inputs including a selection for Supervised/Unsupervised.
- Provides 5 open collector outputs.
- Provides 5A door strike relay output.
- LED indicators to help in installation.
- Application software stored in flash memory, which can be updated from the micro.

# Installation Steps

The following is the general sequence of steps to follow in installing the STI. The steps that require additional information are explained in more detail in the sections that follow.

For technical and functional specifications, see page 25 and page 26, respectively.

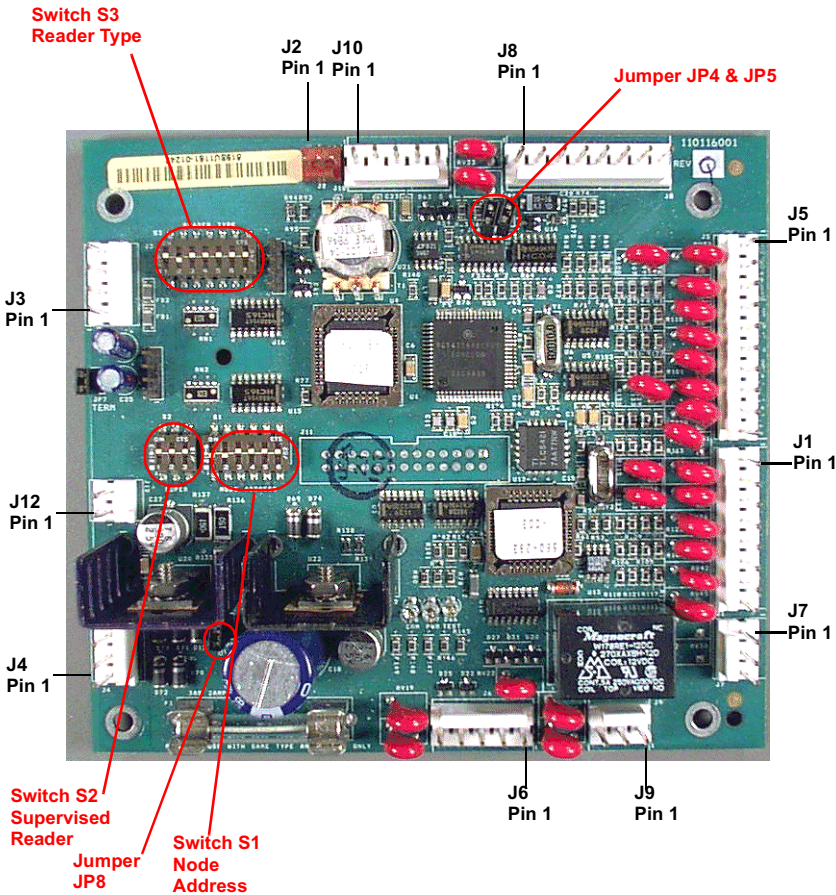
1. Verify that there is a CK8RP board in the Micro/5 cabinet which will control the STI.
2. If necessary, mount and connect the readers. See the reader's installation guide for more information.
3. Set the switches and jumpers on the STI. See "Switch and Jumper Settings" on page 4.
4. Mount and connect the STI. See "Mounting and Connecting the STI" on page 9.
5. Test the STI. See "Downloading Application Firmware to the STI" on page 21.
6. If necessary, refer to page 24 for troubleshooting information.

# Switch and Jumper Settings

Three banks of DIP switches and two jumpers located on the STI are used to select the Node Address of the STI, the reader output type, Supervised/Unsupervised mode for the general purpose alarm inputs, and input power.

The figure below shows the location of the DIP switches. The tables that follow the figure provide the switch settings.

**FIGURE 1: Location of Connectors, DIP Switches and Jumpers on the STI**





# Selecting Node Address

The STI unit's Node Address is selected using a six-position DIP switch labeled Node Address (See Figure 1 for location). The table below gives the switch settings for each Node Address.

**TABLE 1: Node Addresses**

Node Address	Switch 1					
	1	2	3	4	5	6
1*	OFF	ON	ON	ON	ON	ON
2	ON	OFF	ON	ON	ON	ON
3	OFF	OFF	ON	ON	ON	ON
4	ON	ON	OFF	ON	ON	ON
5	OFF	ON	OFF	ON	ON	ON
6	ON	OFF	OFF	ON	ON	ON
7	OFF	OFF	OFF	ON	ON	ON
8	ON	ON	ON	OFF	ON	ON

\* Node Address 1 is used for reader 1 on CK8RP board 1 or reader 9 on CK8RP board 2. Node Address 2 is used for reader 2 on CK8RP board 1 or reader 10 on CK8RP board 2 and so on.

# Selecting Reader Output Type

The STI unit's reader output type is selected using a seven-position DIP switch labeled Reader Type and jumper JP4 and JP5 (see Figure 1 for location). The table below gives the switch and jumper settings for each reader output type.

**TABLE 2: Reader Output Type DIP Switch Settings**

Reader Output Type	Switch 3							Jumpers JP4 & JP5
	1	2	3	4	5	6	7	
CardKey Wiegand	ON	ON	ON	OFF	ON	ON	ON	SHORT
2-wire Wiegand	ON	ON	ON	ON	ON	ON	ON	OPEN
Strobe/Data	OFF	ON	ON	ON	ON	ON	ON	OPEN
CASI-RUSCO Supervised F/2F	ON	OFF	ON	ON	ON	ON	ON	----
F/2F	ON	ON	OFF	ON	ON	ON	ON	----
CardKey L46	ON	ON	ON	ON	OFF	ON	ON	SHORT
*REX	----	----	----	----	----	OFF	ON	----

\* If Switch 6 is set to ON, the REX signal will unlatch the door regardless of the selection on the host. If Switch 6 is set to OFF, the host selection determines whether the REX signal unlatches the door.

Switch 6 functionality is available with flash firmware release 12 and later.

# Selecting Alarm Supervision and Door DI/REX State Monitoring

The STI unit's alarm supervision level is selected using a three-position DIP switch labeled Super (see Figure 1 for location). The table below gives the switch settings for supervised/unsupervised alarm handling, Door DI state selection and REX state selection.

**TABLE 3: Operating Parameter DIP Switch Settings**

	Switch 2		
	1	2	3
Unsupervised alarms			OFF
Supervised alarms			ON
REX NO Contact*		ON	
REX NC Contact*		OFF	
Door DI NC Contact*	ON		
Door DI NO Contact*	OFF		

\* REX and Door DI state selection is available with flash firmware release 15 and later.  
If you have an earlier release, set all three switch positions (SW2-1, SW2-2, SW2-3) to match SW2-3 setting, that is OFF for unsupervised or ON for supervised.

# Selecting Input Power

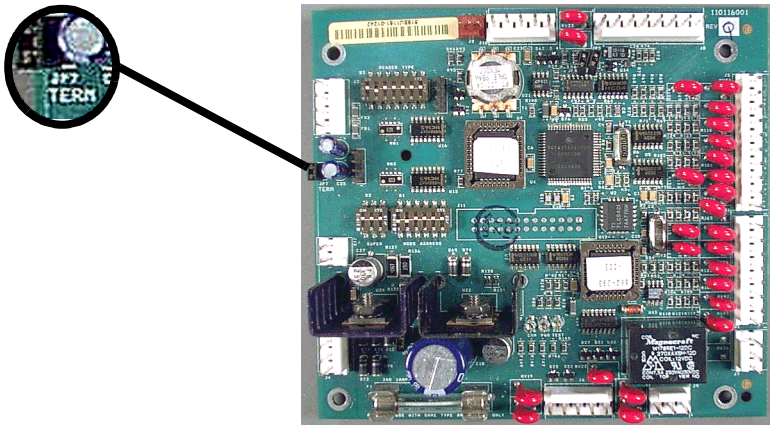
The STI unit's input power is selected using jumper JP8 (see Figure 1 for location). The table below gives the position for the jumper.

TABLE 4: AC Power Input Selection

	Jumper JP8
8VAC	SHORT
16VAC	OPEN

# Termination Jumper

The STI unit is assembled with a termination jumper (JP7) placed on the two pins above the label **Term**. This is the default condition.



# Mounting and Connecting the STI

## Mounting the STI

The STI board size and mechanical mounting is the same as the CardKey STI.

## Connectors on the STI

The tables that follow show the pinouts for the connectors on the STI. See Figure 1, “Location of Connectors, DIP Switches and Jumpers on the STI,” on page 4 for the location of the connectors.

**TABLE 5: J5 - DI Interface**

Pin	
1	Door DI (DI 1) Return
2	Door DI (DI 1)
3	REX (Request to Exit) Return
4	REX (Request to Exit)
5	DI 3 Return
6	DI 3
7	DI 4 Return
8	DI 4
9	Alternate REX (Request to Exit) Return
10	Alternate REX (Request to Exit)

**TABLE 6: J1 - DI Interface (Continued)**

Pin	
1	DI 5 Return
2	DI 5
3	DI 6 Return
4	DI 6
5	DI 7 Return
6	DI 7
7	DI 8 Return
8	DI 8

**TABLE 7: J7 - Door Strike Relay Outputs**

Pin	
1	Door Strike N.O. (Normally Open)
2	Door Strike COM
3	Door Strike N.C. (Normally Closed)

**TABLE 8: J9 - DO Interface**

Pin	
1	+5V
2	AUX3 (Not available in <b>Secure Perfect</b> )
3	AUX4

**TABLE 9: J6 - DO**

Pin	
1	Not Used
2	AUX2
3	+12V
4	Green LED
5	Red LED

**TABLE 10: J4 - AC Power Input**

Pin	Input Power	JP8
1,2	8VAC	SHORT
1,2	16VAC	OPEN
3	Ground	-----
4	Ground	-----

**TABLE 11: J12 Connector Pinouts\***

Pin		JP8
1	12VDC	-----
2	Ground	-----

\* Optional DC input power if AC power not available. Do **NOT** connect **BOTH** AC power and DC power.

**TABLE 12: J3 - Network Connection**

Pin	
1	NETA
2	NETB
3	Not Used
4	Not Used

**TABLE 13: J2-CardKey Wiegand/BaFe Interface**

Pin	Wiegand	F/2F	Strobe/Data	CardKey
1*	W0	F/2F	Strobe	Sig
2	+5V			
3	GND - Ground			

**TABLE 14: J10 - Reader Types**

Pin	Wiegand	F/2F	Strobe/Data	CardKey
1	W1	Not Used	Data	Not Used
2	+5V			
3	GND			
4*	W0	F/2F	Strobe	Sig
5	Not Used			

\* These pins have the same functionality. They are physically connected.



**TABLE 15: J8 - CardKey Reader's Keypad**

Pin		
1	Column	4
2		3
3		2
4		1
5	Row	4
6		3
7		2
8		1

## Connecting the STI

1. If 12VDC is used as input power, connect the 12VDC to J12-1 and power ground to J12-2.
2. If AC power is used, typically, the CardKey Panel has a step-down transformer with 8VAC and 16VAC secondary terminals. If the reader being interfaced to requires +12V for power (not including lamp power, i.e. CardKey Lamp Power) and this 12V output cannot go below 10V under low-line power and maximum cable length (250 feet), connect to the 16VAC tap of the transformer.
3. The J3 connector is the network connection. The NETA and NETB signals can be wired to the Micro/5 CK8RP board directly or alternatively to another STI board. The NETA and NETB signals are polarity insensitive, i.e. NETA in STI can connect to NETB in the micro or another STI and vice versa.

4. The J2 connector is the CardKey Wiegand/BaFe reader interface. Pin 1 is the single-wire Wiegand signal input, pin 2 is the +5V supply to the reader and pin 3 is ground. Make sure when single-wire Wiegand input is used that JP4 and JP5 jumpers are in place and Wiegand format is selected in the Reader Output Type switch. Pin 1 is also the F/2F signal interface.
5. The J10 connector has the regular two-wire Wiegand inputs W0/W1 and the +5V power to the reader. When using both W0 and W1 for the Wiegand interface, make sure that JP4 and JP5 jumpers are out and that the Reader Type Output switch is set to Wiegand. For a Strobe/Data interface, connect the Strobe signal to W0 and the Data signal to W1, making sure that JP4 and JP5 jumpers are out and that the Reader Type Output switch is set to Strobe/Data.
6. The J8 connector interfaces to the CardKey reader's keyboard.
7. J5 and J1 connectors are the DIs interface. Door (DI 1) and Exit REQ are Unsupervised; they can only report a switch Open or Closed. DI 3-8 can be Unsupervised and just report a switch Open or Closed, or, if using two 1K resistors in series with and across the switch, four states are reported. The Supervised/Unsupervised switch must be appropriately set.
8. The J7 connector is the Door Strike Output. It provides normally Open or normally Closed dry contacts (maximum 2 amps at 28VDC or 2 amps at 30VAC).
9. The J9 connector has two auxiliary DOs (AUX3 and AUX4). These DOs are open-collector outputs and are mapped to the **Picture Perfect** DOs. These outputs can be pulled to up to 60V and can sink 100mA.
10. The J6 connector has three DOs (RED, GRN, and AUX2). These DOs are open-collector outputs and are mapped to the **Picture Perfect** DOs. These outputs can be pulled to up to 60V and can sink 100mA. The output labelled GRN switches to ground when the door is commanded to Open and remains at ground until the Close command is received.

# Configuring with Other STIs

The CK8RP can support a total of 8 STIs in any combination from one to eight ports on the CK8RP. The configuration is dependent on total wiring length and installer preferences.

A basic rule to follow for determining wiring distances is to know that the total wire length connected to a connector pair (J2-J3, J4-J5, J6-J7, or J8-J9) cannot exceed 6000 feet. For examples, see the table below.

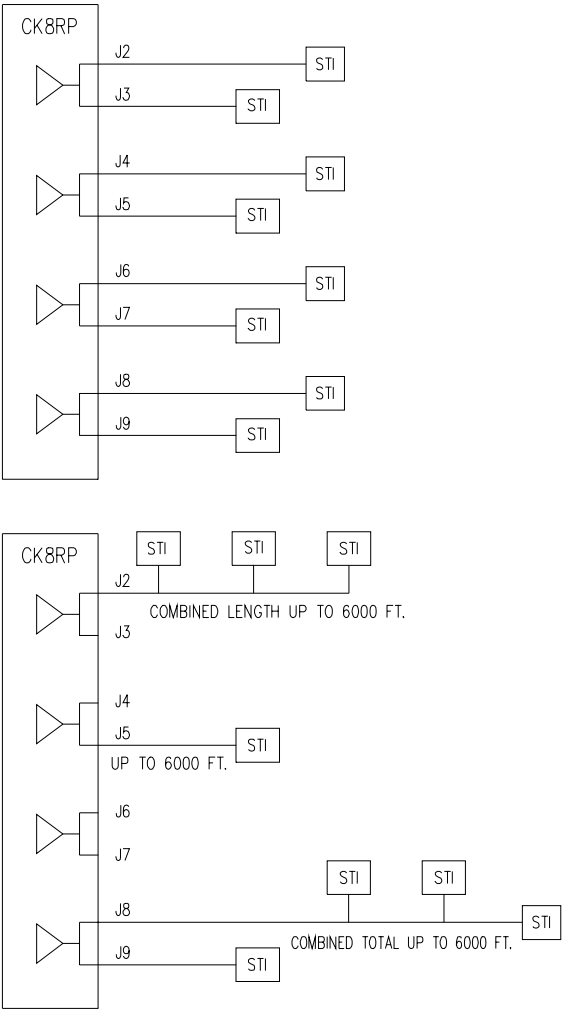
**TABLE 16: Example of Wiring Distances**

Connector	Example 1	Example 2	Example 3	Example 4
J2	3000 ft.	1500 ft.	6000 ft.	200 ft.
J3	3000 ft.	4500 ft.	0 ft.	5800 ft.
Total	6000 ft.	6000 ft.	6000 ft.	6000 ft.

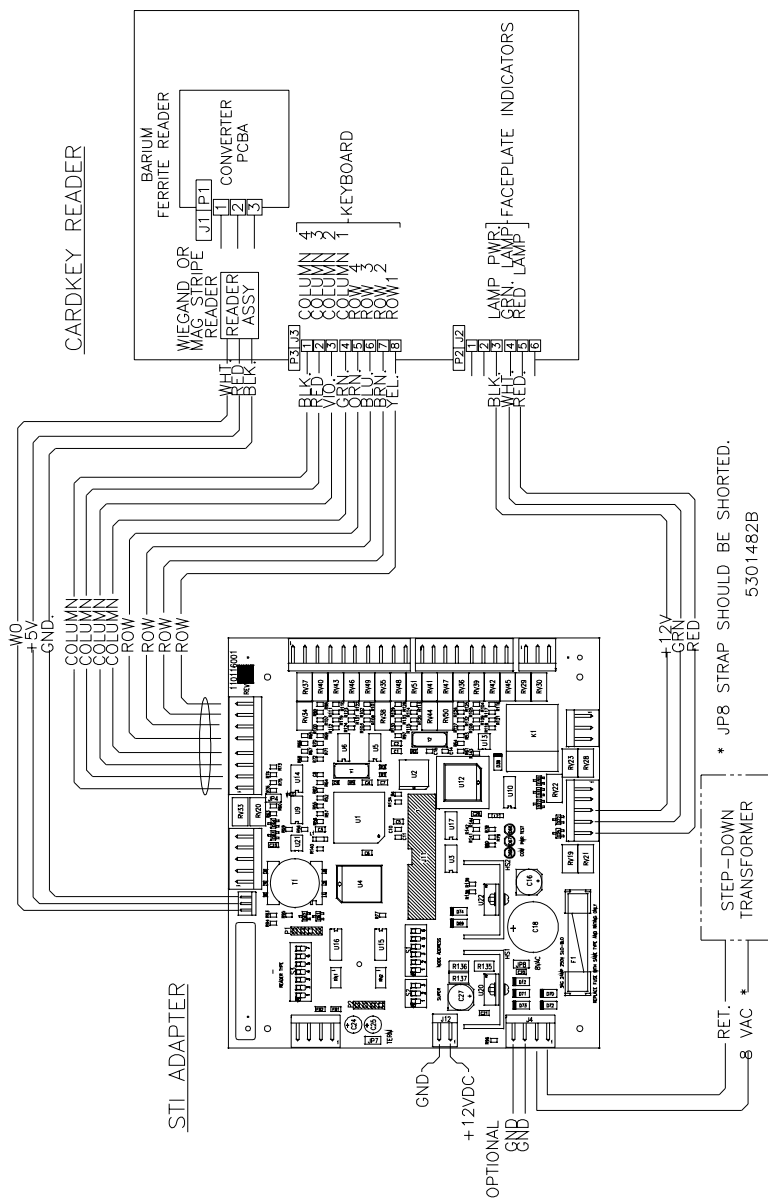
Each connector pair can drive up to 6000 feet, therefore a total of 4 separate 6000 total foot runs can be made from the CK8RP.

Figure 2 shows several examples of wiring configurations that are compatible with CK8RP/STI products.

**FIGURE 2: Examples of CK8RP/STI Wiring Configurations**



### FIGURE 3: Wiring the STI to a CardKey Reader



#### FIGURE 4: Wiring the STI to CASI-RUSCO Proximity Readers

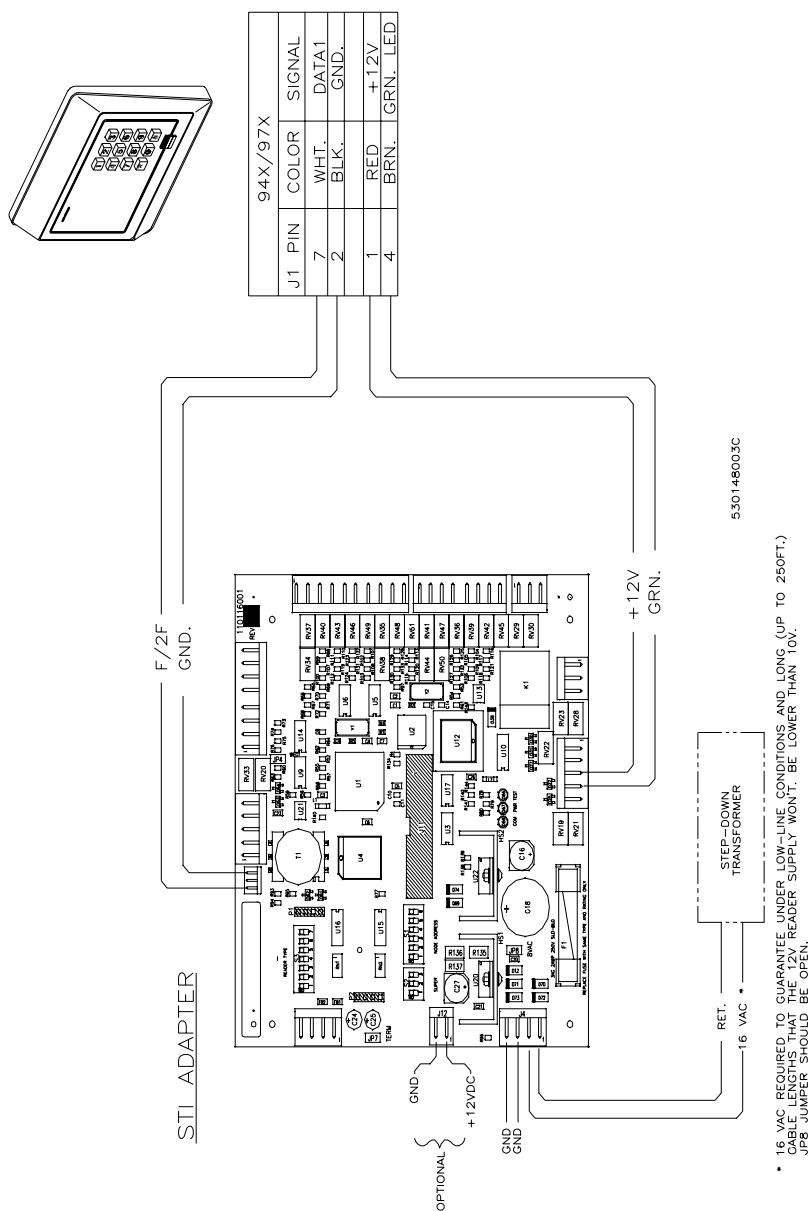


FIGURE 5: Wiring the STI to a Data/Strobed Reader

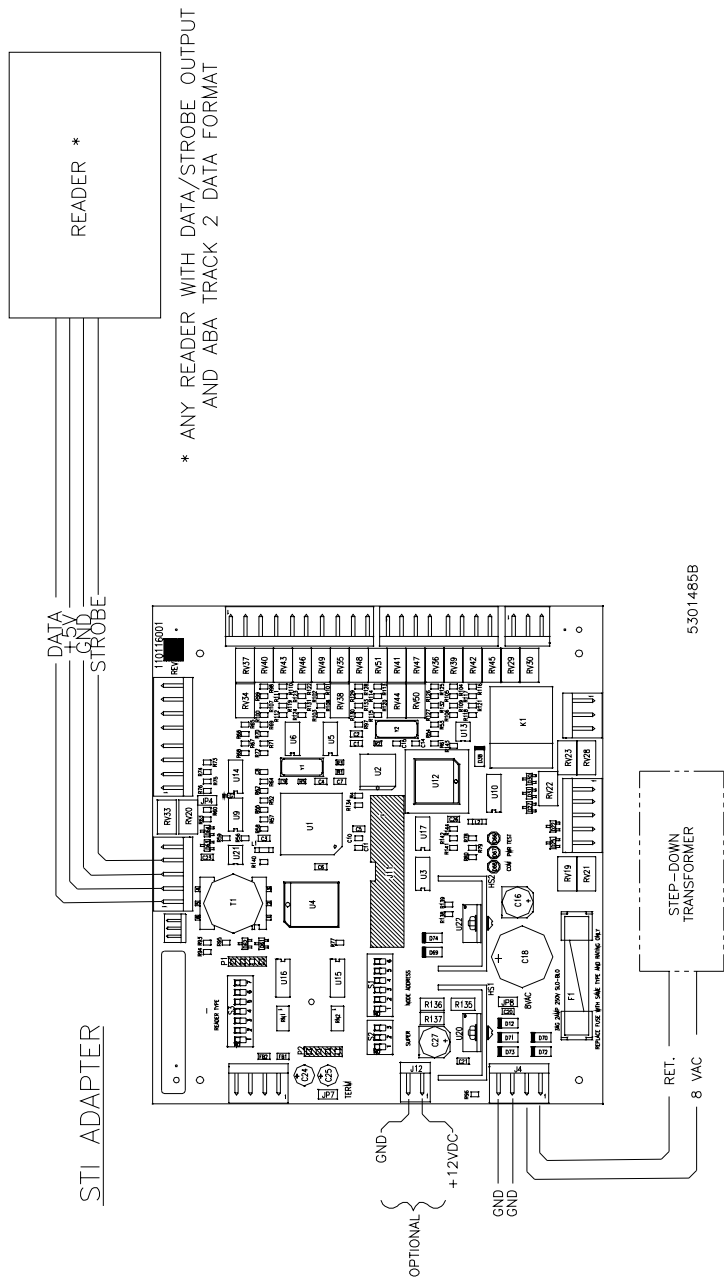
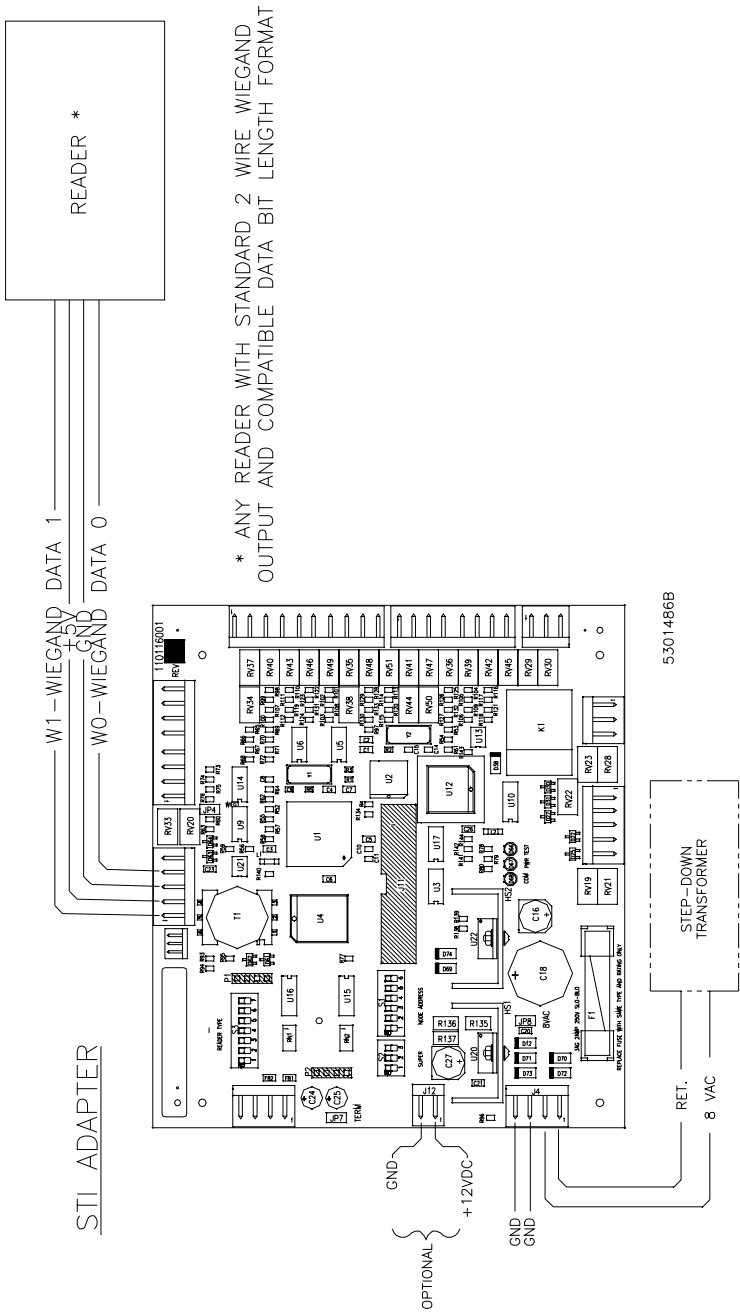


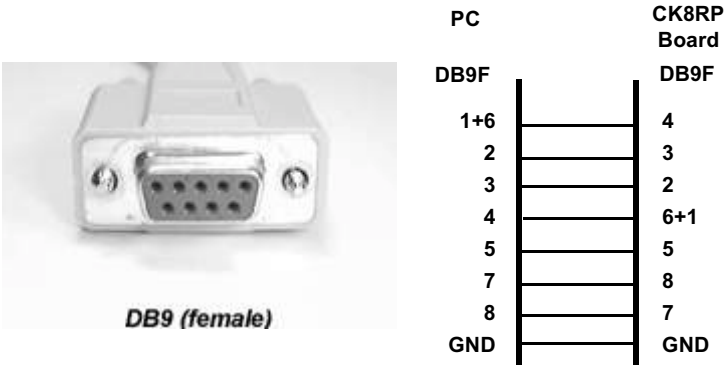
FIGURE 6: Wiring the STI to a Wiegand Reader





# Downloading Application Firmware to the STI

The STI firmware is downloaded to the STI, using the CK8RP board in conjunction with the CASH-RUSCO micro firmware installation tools. The CK8RP P1 9-pin connector is an RS-232 modem interface that must be directly connected to a PC running the micro installation tool, `mcutil`, using a null modem cable.



**CAUTION** The download procedure MUST be performed during a period of no activity. The STI being updated will not be operational for the entire downloading time; all other STIs will remain operational. If "9" is selected for the micro address, all STIs will be updated simultaneously, and all will be non-operational for the entire downloading time.

**NOTE** Version 7 and later of the STI application firmware allows you to determine the current version of STI firmware on your board by using the Microsoft Hyper Terminal utility. This utility can be accessed from your Windows Start menu, Accessories folder. Set up a local connection, using a 4800 baud rate. The CK8RP board will be polled and approximately every 5 seconds a message in the form STI- 0xx, where xx is the version number, will be returned for every STI board that is connected.

**CAUTION** STI firmware STI011 or later requires the STI processor to be version 5 or later. To verify the STI processor version number, locate the label 58029300x, where x is the version number, on the integrated circuits. Contact the CASI-RUSCO RA (Return Authorization) department to arrange an STI processor version upgrade, if necessary.



### **To upgrade the latest version of STI:**

Log on to the CASI-RUSCO Website, go to Support/Downloads/Micros/Service Packs and download the file **RAMxx.hex** where xx is the version number. Once it is downloaded, rename it to **RAM.HEX** and place it in the **MCUTIL** directory. Connect the computer to the CK8RP with a null modem cable that drives the subject STI and use the standard flash download procedure.

Before continuing, however, review the list below containing items to note:

1. Any host (Entry Perfect, Picture Perfect or Secure Perfect) can be selected.
2. The HEX file to be downloaded must be resident in the same directory as the micro firmware installation tool.
3. The micro address will correspond to the STI to be updated. For example, select micro address 1 to download to STI 1. Selecting 9 will update all STIs in the network.
4. The micro phone number and Version file field should be left blank.
5. The HEX file name should correspond to the download file.
6. The baud rate should be set to 4800.

# Testing the STI

Follow the steps below to verify that the STI is working correctly.

1. Check all cabling and electrical connections from the reader to the STI and the STI to the CK8RP board in the microcontroller.
2. Verify that the microcontroller is properly configured. See the appropriate CASI-RUSCO microcontroller manual.
3. Verify that the STI switches are properly set for addressing, Reader Output Type and Supervised/Unsupervised. See “Switch and Jumper Settings” on page 4.
4. Apply power to the STI and verify that the red LED is on. If the red LED blinks at a 1 second rate, the Node Address selection is a duplicate. Change the Node Address selection and wait for 1 minute for the red LED to become solid.
5. The green LED labeled TST will start blinking on/off at an 8-second rate to signify that the firmware is working properly.

# Troubleshooting Guide

If the operation of a component is in doubt, substitute a known good component and retry the system.

1. Always verify wiring against wiring diagrams before powering up the system.
2. If the red LED is off, check input power connections.
3. If the door DI, exit request, or any of the general purpose DIs are not operational, check wiring, switches, jumpers, voltage levels and configuration of the Picture Perfect or Secure Perfect host.
4. If the door relay output or any of the open collector outputs is not operational, check wiring, switches, jumpers, voltage levels and configuration of the Picture Perfect or Secure Perfect host.
5. If the red LED blinks at a 1-second rate, the Node Address selection is a duplicate. Change the Node Address selection and wait for 1 minute for the red LED to become solid.
6. If interfacing to a 94x/97x Proximity Reader and the reader is triple beeping, check the reader output switch selection and verify that Supervised F/2F is selected.

# Technical Specifications

**Operating Temperature Range:** 32° F to 122° F (0° C to +50° C)

**Humidity Range:** 20% to 80% without condensation

**Physical Dimensions:** 12cm X 13.3cm

**Maximum Cabling Distance:**

- To micro: 6000 feet
- To reader: 250 feet
- To DIs: 500 feet
- To keypad: 250 feet

**Input Voltage:**

- 16VAC, one input and proper selection
- 8VAC, one input and proper selection
- 12VDC, one input

**Reader Voltage**

**Output:**

- 12VDC, 200mA max., one out
- 5VDC, 100mA max., one out

**Communications:**

- **Media:** twisted pair, shielded, 22 AWG
- **Transmission:** transformer-isolated differential RS-485
- **Protocol:** LONWORKS
- **Speed:** 78 Kbaud

# Functional Specifications

**Application:** Intended for minimum rewiring when replacing the CardKey micro and host with CASI-RUSCO's micro and host.

**Reader Technology Types:** CASI-RUSCO F/2F Supervised, F/2F, Standard 2-wire Wiegand, CardKey 1-wire Wiegand, and Strobe/Data (magstripe).

**Wiegand Formats:** Sensor's and Indala 2601; CASI-RUSCO's 2800, 2801, 2802, 2804, 3701, 4401; CardKey's 34-bit (not encrypted); 40-bit; and 8-bit Indala keypad.

**Mounting:** The STI follows the same mounting as the CardKey STI-C and STI-S. See "Mounting and Connecting the STI" on page 9 for additional details.

**Indicators:** Red and green LEDs are incorporated into the STI unit.

- **Red LED:** Turns on continuously if there is power to the unit. Flashes if the Node ID selection is not valid, that is, there is more than one STI unit on the line with the same address.
- **Green LED:** Labeled TST, this LED blinks on and off every 8 seconds if the STI firmware is working properly. If the STI unit is not working, the LED will remain either ON or OFF.

**Keypad:** CardKey 4x4 matrix keypad, Wiegand keypad.

**Door Contact and Exit Request Inputs:** Both are not supervised.