

# SY-486

## *Access Control Terminal - Controller*

# Product Manual



Manual dated 9/4/2010 Catalog no. 610486 Part no. (SY-486-A-222-01)

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# 1. Introduction

The SY-486 is an access controller for control of up to two doors, gates or other barriers. Two separate readers may be connected. Each badge reader may be used to open and record the use of a different door, or both may be connected to different sides of the same door for independent control over entrances and exits.

A variety of readers can be connected to SY-486, these readers can hold an organization badge list. Furthermore, an optional PPrintX unit can be connected for biometric validation purposes. Two separate sensors may be connected to verify passage and door closure, or for other purposes.

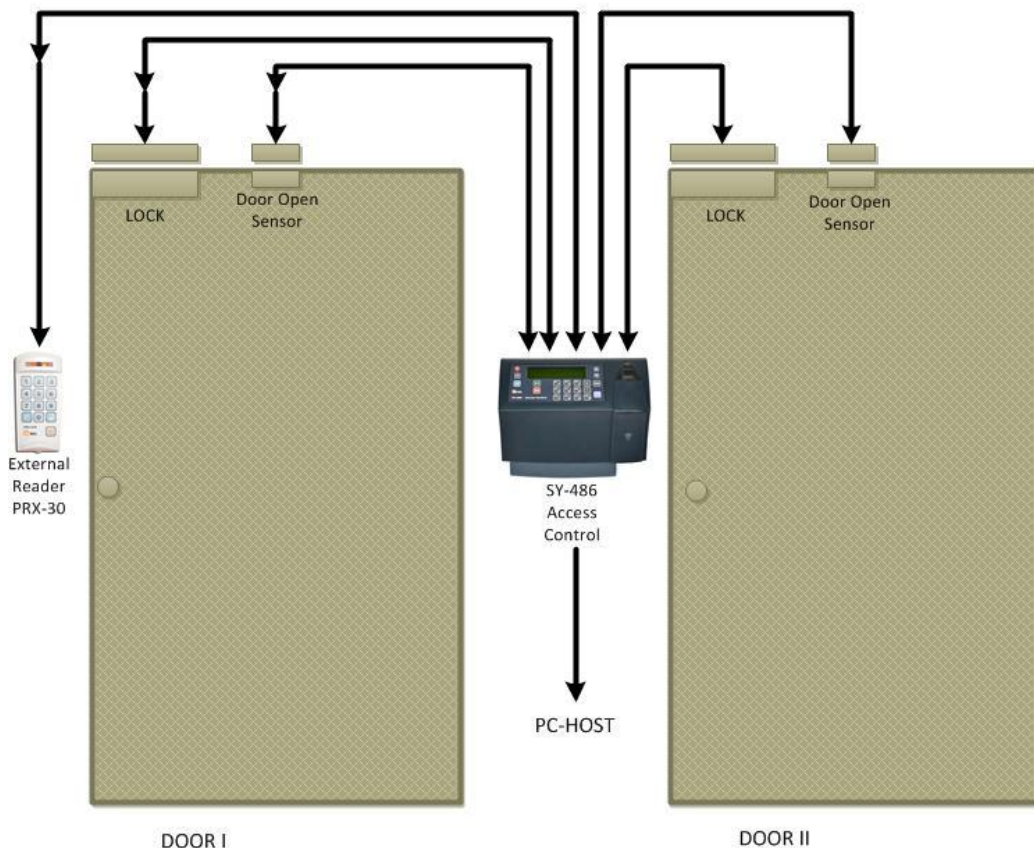
The SY-486 is designed to be installed with connections through a wall, which secures them. Alternate connections may be used for installations where there is no threat of unauthorized disconnection and free access to these connections is desired.

SY-486 design particularly emphasizes on external devices fast-connection, such as readers, I/O, communication. This mode of connection without product disassembly is provided for quick and simple maintenance purposes.

## 1.1 Standard configurations

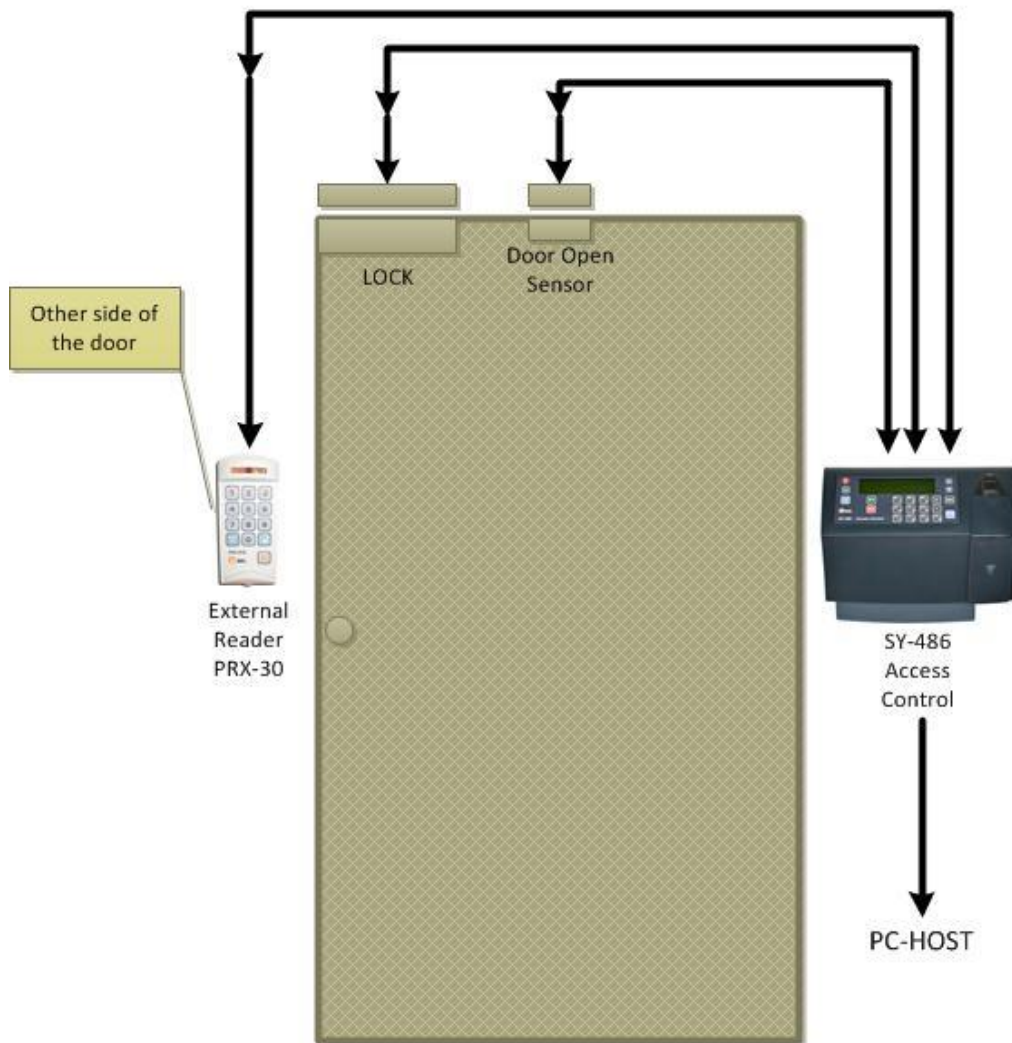
Control over two different entrances as portrayed below:

Control over two different entrances as portrayed below:



This configuration requires the use of only one relay and one sensor.

Control over two different directions of a single door:



## 2. Technical Specifications

### 2.1 Technical and interface specifications

- Two connectors for badge readers (PRX-30, SY-10/M, SY-10/B, reader unit)
- Connector for external PPrintX, Connector for RS232/485/422 comport, RJ45 connector for Ethernet
- 512K of protected RAM
- Protected Real Time date/time clock
- Backup battery for the memory and Real time clock
- RS-232 and RS-485 communication
- Two relays for bell, door, etc.
- Two sensors (door monitoring)
- Variable baud rate - 1200 to 19200 bps
- Net connection (Ethernet)
- Flexible, well- developed IP protocol stack
- Ethernet (10BASE- T or AUI) (STP/ UTP)
- Telnet and SNMP management

#### 2.1.1 Options

- 2400 bps internal modem or 14,400 bps
- Wifi card
- Blue Tooth Card
- POE Card.

### 2.2 Physical characteristics

Dimensions:

- Height - 17.0 cm
- Width – 25.cm.
- Depth – 9.5 cm.

## 2.3 Power requirements

### 2.3.1 Power Supply

- Input Voltage: 9.5VDC
- Input Current: 2A

### 2.3.2 External Power Supply Requirements:

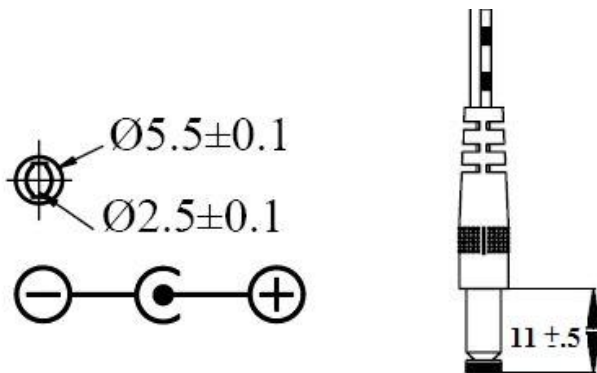
#### Input Requirements

- Input Voltage: 100 (-10%) VAC to 240 (+10%) VAC
- Input Frequency range: 47 Hz to 63 Hz
- Input Power Consumption at no load: 0.5 W MAX
- Input Current 0.6 A MAX

#### Output Requirements

- Output Voltage: 9.5 VDC
- Output Regulation: -10%, +10%
- Output Load: 2 A

Connector Type: TIP 5.5 \* 2.5



## 2.4 Terminal Features

Memory	256
Function keys	3
Numeric keys	10
Control keys	4
Fingerprint	Yes
Magnetic reader	Yes
Wiegand reader	Yes
Bluetooth	Yes
Modem	Yes
TCP/IP	YEs

## 2.5 Communication and configurations

### 2.5.1 Communication parameters

Communication between the host and terminals is performed under an asynchronous mode. The baud rate is programmable, enabling rates from 1200 to 19200 bps.

### 2.5.2 Multiple terminal configuration

RS-485 communication enables you to connect up to 32 terminals to a single COM port and/or to extend the cabling distance to up to 1,000 meters (3,280 feet) using 9600 baud via an RS-485 multi-drop line. RS-485 communication uses two wires as opposed to RS-422 communication, which uses four wires.

### 2.5.3 Port to port configuration

A single SY-486 terminal, equipped with RS-232 communications, can be connected directly to an asynchronous RS-232 port. If RS-232 communication is used, only one terminal may be connected to each COM port and cabling distances should not exceed 50 meters (160ft).

### 2.5.4 Network connections

The terminal can be connected to one of the following communication networks:

**Ethernet** - For this type of communication, an IP address is defined for every terminal, enabling communication with each terminal in TCP/IP protocol.

**Bluetooth** - For this type of communication, a pin number is specified, to authorize the connection.

**Technical Specification Table**

Card access current	~5V
Module current	~3.3V
Idle power consumption	15mA
Working power consumption	40-75mA
Ripple on card	5m V P-P
Ripple on module	5m V P-P
Pressure on power source at complete terminal capacity with an internal BT or BAT reader without an FPU or external reader	~7.36V
Complete power consumption from power source at complete terminal capacity with an internal BT or BAT reader without an FPU or external reader	~350mA I(JP11)<1A(~250mA) I(V1)<<1A(small) I(BAT)~100mA

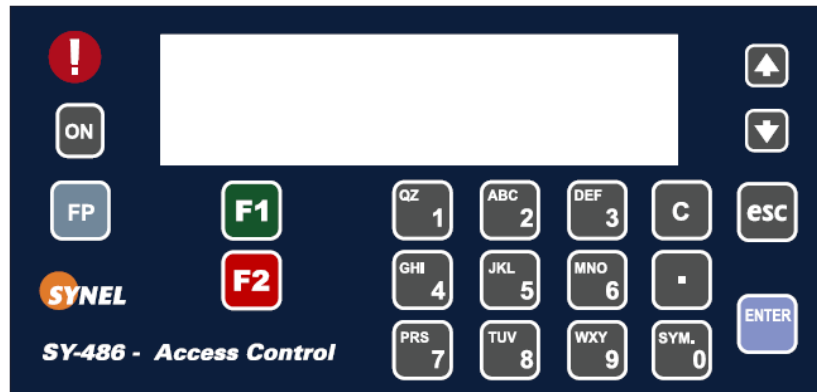
## 2.5. Selection of the data entry function

The terminal is ready for operation when a data entry function has been selected (after it was programmed). The prompt of the selected function will be displayed on the second line. To select a function, press the desired function key prior to entering the data.

## Apparatus

The SY-486 terminal and controller is enclosed in a rugged plastic molded casing and are secured to the wall using four screws and a removable panel.

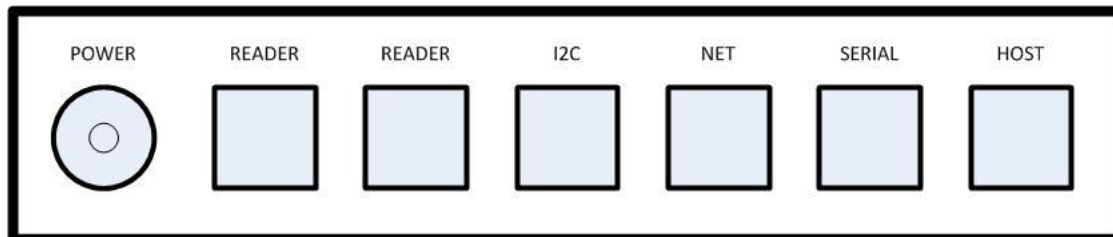


**Front panel:**

1. A 32 character LCD with a back light display is located in the upper part of the front panel. Two arrow keys are located to the right of the display panel for line up and line down maneuvering.
2. Two function keys are located on the left, below the display, and are F1 & F2.
3. Numeric keys.
4. The **Alarm** light is located to the left of the display. The alarm light is a LED that lights when at least half of the memory is used; it blinks when the memory is full or when the terminal has not been programmed.
5. The **ON** button enables a 15 seconds (modifiable using program) manual operation.
6. FP button for (Enroll, Delete and Check)
7. A Biometric fingerprint reader of FPU-s type which supports thousands fingerprints templates (9090 for FPU-s) for verification and identification. FPU is minutia based and uses the following technology:
  - Optical sensor
  - Capacitance sensor
  - Authentic sensor

## Bottom connector panel

The connector panel is located at the lower part of the casing, withholding the socket openings for all external connections as follows:



### Connectors:

1. Power supply 9.5 VDC connector
2. Two external readers
3. I2C for future connection
4. Network RJ45
5. Serial Comport RS232C
6. Host RS-232/485

## 2.3. Internal components

### 2.3.1 Battery back-up modules

The SY-486 terminal has two back-up battery modules, one for the real time clock memory and the other for operation during a power failure. The standard memory back-up module is a lithium battery, which will keep the internal clock running and the memory intact, for 30 days during a power failure. The back-up battery provided (in addition to the standard memory back-up) is a self-recharging system which allows the terminal to be operated during a power failure. The battery provides power for one and a half net hours of use. A shutdown timeout feature enables the terminal to operate for more extended periods of time. There are two types of timeout shutdowns:

- The firmware default timeout of 15 seconds. This option is used if the terminal has not been otherwise programmed (to a different timeout), if the application specifying otherwise has not been loaded or if there is an error in the application
- The user defined timeout shutdown defined by programming the terminal using the SY protocol. Once this option is uploaded to the terminal it is used at starting the terminal at Power On. The default firmware battery shutdown timeout is 15 seconds. This timeout is used unless a different timeout has been programmed to the terminal using the Synel Protocol and uploaded to the terminal. During a power failure, the user presses the battery key to activate the terminal. Data can then be entered and stored in the SY-486 terminal memory. The timeout will cause the terminal to shut down automatically after the last use of the terminal, until the battery key is pressed again.

### 2.3.2 Memory

The terminal contains a 256 Kbyte user memory.

### 2.3.3 RS-232/485 internal Card

This card provides an RS-232/485 serial interface.

## Unpacking

*Note: Do not throw away the box or packing materials.*

Check the box and contents for signs of damage that may have occurred during shipment. After checking the box, carefully unpack and check for the following items:

## 3.1. Contents

The package contains:

- 1 terminal
- Mounting panel / Connector cover
- Short TCP/IP communication bridge cable (included only when network communication is available)
- Four Phillips flat head 3.5x30mm and anchors, for terminal mounting purpose
- Regulation & sampling instruction for fingerprint (document number 650403)

## Installation

### 4.1. Selecting the Terminal Location

When selecting a place to install a terminal with wireless network communication you need to consider environmental factors that affect the connection. The optimal location is where:

- Communication to the terminal is not blocked by walls or metal obstacles.

This can be done by standing at the location where the terminal is to be installed and viewing the area to make sure that it is clear.

- Antennas should be positioned so that they are parallel to one another. If there are obstacles between the terminals, antennas should be positioned for the best clear connection between them. For example, at floor level below the obstacle or at ceiling level above the obstacle, especially with metal obstacles.
- For Bluetooth, use the terminal Quality option to check the connection quality. See “Technician Mode (Setup)” on page -19.
- Do not install the terminal in a location where people gather and linger since they, too, block the connection and also as to not expose them to radiation.

## 4.2. Mounting the terminal on a wall

Make sure the unit is not plugged into a power source. If you have already connected your terminal to a PC, disconnect it. You can reconnect it after you have completed mounting the unit.

**Caution:** *The terminal contains computer components. It should not be mounted where it will be exposed to extreme heat or cold, water, steam, violent vibrations, high electromagnetic radiation including high voltage power lines and electrical equipment.*

Step 1: Select a location for the terminal. The following guidelines will help you find the best place for the terminal:

- The terminal should be placed by an easily accessible power outlet.
- Make sure that there is enough space around the terminal for the communication cabling.
- Do not place the communication cable near a source of electromagnetic radiation or radio interference such as power lines, large machinery, etc.
- If the communication cable is to be wired through the wall, make sure that it is safe to drill a hole at the desired location.
- For best usability the terminal should be mounted at employee height. The recommended height is 140cm (4'7").

Step 2: Remove the back mounting panel by sliding it to the side and pulling it out.

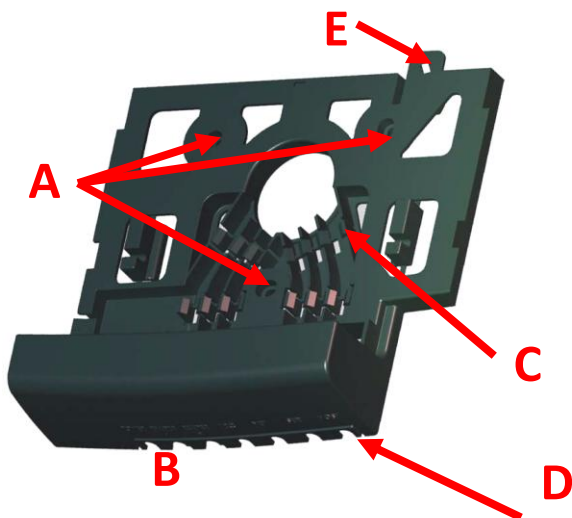
**A** - Screw holes - for screwing the mounting panel in place.

**B** - Entrance for cables wired from the wall.

**C** - Clasps for holding cables in place.

**D** - For cable entering terminal from below.

**E** - Security fastener.



Step 3: Prepare the wall for mounting by placing the panel on the wall as a template and mark the place for drilling the holes (A).

Step 4: Drill holes using a 6 mm. (1/4") drill bit.

The cables can be wired through the wall and positioned in the clasps (C) to the bottom of the terminal where that are connected, or be wired directly from the bottom of the terminal (D).

Step 5: Position the panel so that all of the wires are in place and screw the panel to the wall.

Step 6: Wire all of the cables through the mounting panel and position the electric socket in its place in the mounting panel (F).

Step 7: Connect the communication cables to the terminal. Plug one end of the communication cable into the communication socket of the terminal. If an internal modem has been added and the modem is used, plug the RJ-45 connector of a standard telephone cable into the telephone line. Do not use the communication cable.

Step 8: Slide the terminal into place.

Step 9: Screw the security fastener into place (E).

### 4.3. Communication connections

Step 1: Select a location for the connection box. The box must be positioned where both the communication line and the terminal can be connected to it. The SY-486 terminal should be placed near the connection box, and must be within the reach of the short RJ45 cable.

Step 2: Plug the communication cable from the SY-486 terminal into the connection box.

Step 3: Wire an additional connection for Ethernet.

## 5. Technician Mode (Setup)

SY-486 setup is performed using the programming display panel.

Power on the unit. In technician mode you can set-up:

- Real Time Clock (RTC) Calibration (Do not change)
- Baud rate
- Station ID settings
- Modem rings
- Internet connection

Step 1. Enter into the Technician Mode:

Option 1 – Terminal is programmed then swipe the technician card or 6 times in & out simultaneously.

Option 2 – Terminal is not programmed, a “no prog.” message is displayed. Press 6 times on the 0 key.

Step 2. Adjust the RTC (N/Y):

This adjustment option is for internal clock calibration purposes.

For detailed instructions refer to Paragraph Calibrating the Real Time Clock (RTC).

Step 3: **Set date and time:**

The date is in DD.MM.YYYY format

*Note: Setting date and time is enabled only when defining the system parameter*

*in the SYncomm software: **Edit Program--> System--> Badge***

***type choose S (System Administrator)!***

Step 4: **Adjust host baud rate:**

Available baud rates: 1200, 2400, 4800, 9600 (default) and 19200.

Step 5: **Adjust fingerprint unit baud rate:**

Available baud rates: 57600 (default), 9600, 19200 and 38400.

Step 6: **Adjust printer baud rate:**

The available baud rates are: 9600 (default), 1200, 2400 and 4800.

Step 7: **Adjust station ID:**

The Station (terminal) ID is the SY-486's address on a communication line. It enables multi-terminal communication. Any number from 0 to 31 may be used as the terminal ID. Again, scroll to the required **Station ID** number.

Step 8: **Adjust the amount of modem rings:**

Choose either the number of rings or **N** for no rings.

Step 9: **Network connection:**

Programming the network connection requires addressing several sub-topics. The main screen enables three modes: *N* for no connection, *A* (10Base) or *B* (10/100Base new card) for answering when the terminal has been addressed.

**Polling Y/N**

For polling the user will be asked to choose between *Y* and *N*. Then, the terminal will send data to the server as per the **Polling sec.** definition.

**Polling Sec**

Determines the frequency of data transmission to the SY-Server software. If your terminals are not in online (query) mode, define the polling time as approximately 10-20 sec. Otherwise, raise polling time to avoid network collisions. Use the numeric keys to define your required polling time.

**MAC SEND (Y/N)**

If you want to confirm sending your terminal's network MAC address to the host. Then after exiting technician mode the terminal will send the host a "Hardware configuration network" message informing it of its MAC address, IP etc.

**My MAC Address**

Displays your MAC address on your terminal's prompt. here your terminal's MAC address will be displayed.

**My IP Address**

Press line up/down to view the TCP/IP address of the terminal.  
Use the numeric keys to enter the IP Address.

**Gateway Address**

Press line up/down and key-in the required gateway address.

**Remote Address**

Press line up/down to view the TCP/IP address of the personal computer on which the SY-Server runs.  
Use the numeric keys.

**Subnet Mask**

The subnet mask is the network address plus the bits reserved for identifying the subnetwork. Use the numeric keys to determine the terminal's subnet mask affiliation within your local net.

**My Port**

TCP/IP enables connecting multiple applications via the same address. The port number selected here is the application identification number used by the computer when communicating with the terminal. Synel applications use the default port number = 3734 (a designated Synel port). However, you may change this according to your specific needs.

**Host Port**

Synel applications use the default port number=3734. However, you may change this according to your specific needs. Use the numeric keys to change the port number.

**Disconnect Sec**

Disconnect seconds defines the number of waiting seconds before reverting to offline mode. Click *03* to enable a fast disconnection.

**DHCP (Y/N)**

To automatically assign a dynamic IP address to your terminal choose Y.

Note: If no IP address was filled-in under **My IP Address**, then you must use DHCP, therefore the only option available will be Y!

User Field A field in which the user can fill-in 4 digits that will characterize that terminal. This data can also be sent to the terminal via a system table. This value is sent to the host when the **Status** command is used.

## 6. Host Computer Interfacing

There are a number of different communication standards through, which communication takes place, each with its own characteristics.

The SY-486 data collection terminal can be connected to the host computer using an RS-232 or an RS-485 connection with an asynchronous serial port.

The drawing below illustrates direct (RS-232) connection on the left and multi-drop (RS-485) connection on the right. RS-232 is used for single device, point to point connection, for distances up to 50 meters (160 ft).

RS-232 is the communication standard used by nearly all PCs and modems. It enables point to point connection of terminals. Cabling distance is limited to 50 meters (160 ft). Only one terminal can be connected to a COM port.

The RS-485 standard extends the potential cabling distance to 1,000 meters (3,280 feet) using 9600 baud and enables more than one device to be connected to the same COM port. It uses only two communication wires. The SY-65 communication adapter converts RS-232 to RS-485.

*Note: Most computers use DTE type connectors on their RS-232 ports. The SY-486 is equipped with an RJ45 (telephone jack) connector. Therefore, you will need a RJ-45 to D-Type adaptor between the terminal and the host.*

### 6.1 Communication cables characteristics

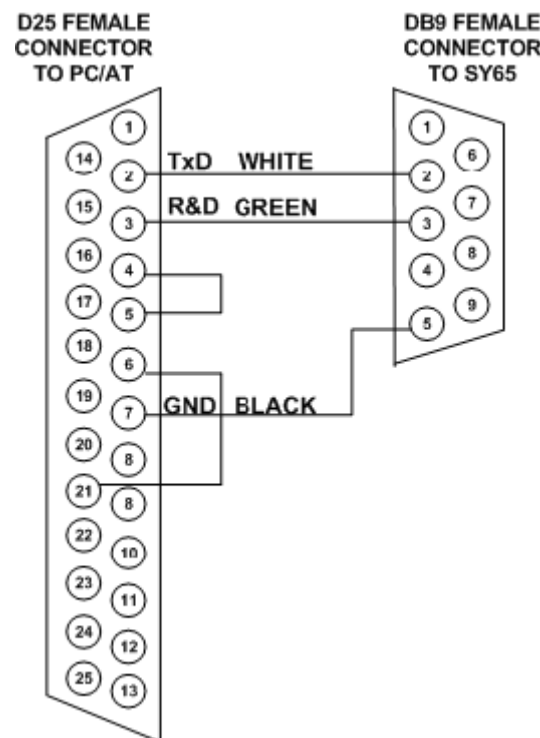
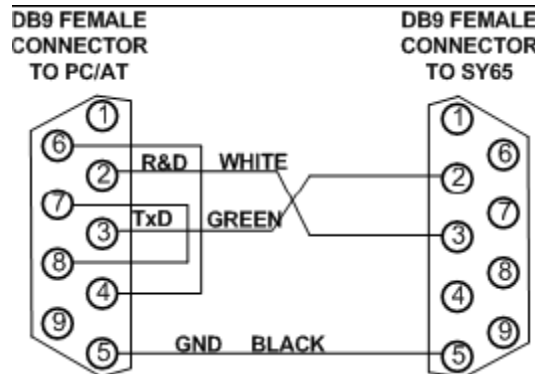
These guidelines should followed when installing the communications cables.

1. The cable should not be installed near EMI sources, such as:
  - Motors, generators, alternators, and transformers, Air conditioners, elevators, Radio/television transmitters, signal generators and internal communication networks
2. Cables should not be within 30 cm. (1 foot) of power lines < 5 KVA.
3. Cables should not be within 60 cm. (2 feet) of power lines in the 5-10 KVA range.
4. Cables should not be within 1.5 meters (5 feet) of power lines of more than 10 KVA.
5. The cables should not run parallel to power lines for more than 15 meters (49 feet).
6. It is best to use a single continuous cable for the communication line. If this is not possible, the cable should have only one connection, indoors, in one of these ways:
  - a Using two connectors with appropriate shielding and cover.
  - b. Using a connection box.
7. For aerial installation, use N.Y.Y. shielded cables.

### 6.2 Connecting your PC to the SY-65

The SY-65 must be set to one of the RS-485 modes, i.e. 4, 5, 6 and 7. For more information, refer to the manual for the SY-65 communication adapter.

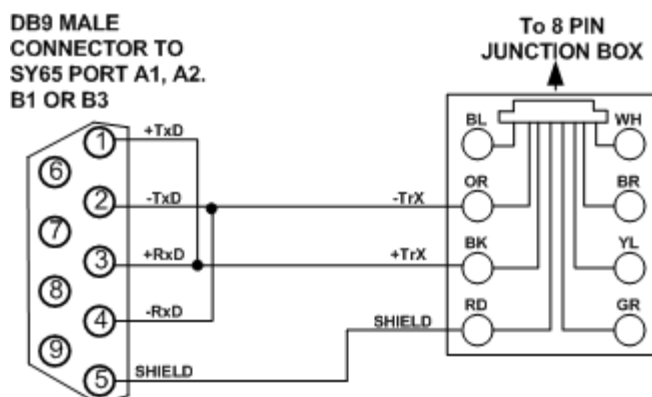
The diagrams below describe the pin outs for the cable used to connect your PC to the SY-65 communication adapter. If your PC contains a 9-pin connector refer to the first diagram, if it contains a 25-pin connector, refer to the second diagram.



*Note: RTS cannot be used with SYNMAN communication software.*

### 6.3 Connecting the SY-65 to 8 pin connection box

A 24 gauge, shielded two wire twisted pair cable should be used to connect the SY-65 to a connection box.



- Step 1. Open the connection box.
- Step 2. Connect the -TRX wire to the connection marked OR.
- Step 3. Connect the +TRX wire to the connection marked BK.
- Step 4. Connect the shield wire to the connection marked RD.
- Step 5. Close the connection box.

#### 6.3.1 If communication problems occur

1. Check if RTS Cable is disconnected.
2. Lower the baud rate, in both sides (SY-486 & Communication software).
3. Use cables with a heavier gauge conducting wire.
4. Connect 100 ohm resistors between the MRxD and PRxD, and also between MTxD and PTxD that are at the ends of the wire on the last terminal of the multi-drop line.
5. EMI protection is integrated into the terminal, but it is best to use an external protector for lightning problems.

### 6.4 Making a multi-drop connection

*Note: Terminal IDs are set at the terminal using the control badge. There is no procedure for hardwiring the terminal ID as in the SY-7XX and SY-4XX terminals.*

All terminals and their connection boxes are connected in exactly the same way, regardless of their terminal IDs. The multi-drop line may be created in one of two ways: creating a chain of connection boxes, using a junction box.

#### 6.4.1 Cable from the SY-486 to the host connection box

This is a standard 8 wire telephone cable with RJ45 connectors cable and is supplied with the SY-486 terminal.

**Method 1**

The SY-65 is connected to a connection box, which in turn connects to another connection box, thereby forming a chain.

**Method 2**

The SY-65 is connected to a junction box. A separate cable is connected from each connection box to the junction box.

## 7. Maintenance

### 7.1 Once a month

Clean the badge reader:

1. For **magnetic** badge readers use a special cleaning badge made of plastic with a polishing paper (made of Al<sub>2</sub>O<sub>3</sub>, with a grain size of approximately 16 microns) attached to the part of the badge where it contacts the magnetic head. Swipe the badge once or twice. Excessive polishing will result in wearing out of the magnetic reader head.
2. For **barcode** badge readers use an air gun to remove dirt/dust/a special optical cleaner (e.i.: used for eye glasses to wipe dirt and dust off).

**Caution:** *Alcohol based cleaning solutions must never be used to clean barcode readers.*

### 7.2 Once every six months

1. Check the voltage of the UPS battery. If it is less than 7 volts, change them. Also make a visual check for leakage.
  2. Clean all electrical contacts inside the terminal with a contact cleaner.
  3. If a magnetic badge reader is used, clean it with a cleaning solution (such as pure alcohol).
  4. Remove the JP7 jumper (1).
  5. Check the voltage of the memory back-up battery and make sure that it is between 2.8V and 3.1V.
  6. Replace the JP14 jumper (1).
  7. Tighten the screws holding the power cable to the CPU card.
- Verify that the components which have been assembled in the sockets are well adjusted.

### 7.3 Calibrating the Real Time Clock (RTC)

**Warning:** This operation must be performed by qualified and authorized personnel only! This operation requires that you work with an open unit. Make sure to unplug the unit wherever the instructions call for it. Take extreme care during the stages where the terminal is plugged into a power source. Failure to heed this warning may result in harmful contact with electrical current.

If your terminal gains or loses time, you will need to calibrate it using a Time Counter unit, which has at least 5 places to the right of the decimal point (100,000ths of a millisecond).

Refer to Jumper drawing (detailed)

1. Connect the programming panel.
2. Unplug the terminal and make sure that it is off.
3. Unscrew and remove the front panel.
4. Remove the JP12 jumper. This disables the Watchdog utility.
5. Plug the terminal into a power source and enter the technician mode.  
Refer to Technician Mode (Setup).
6. Make sure that the Time Counter is unplugged.
7. Connect the ground of the Time Counter unit to the ground pin at TP2 of the terminal's CPU board.
8. Reposition JP13 to 2-3 (calibration).
9. Connect the input of the Time Counter unit to the pin marked in JP13 jumper 2.
10. Plug the Time Counter unit a power source.
11. Set the Time Counter unit to test the period.
12. Press once on "in"; the message "adjust RTC yes/no" appears.
13. Press once on "out" for yes, ("in" for no).
14. Calibrate the RTC of the terminal to 3.90625 milliseconds + 0.00003 by turning the screw on the variable capacitor at C18.
15. Disconnect Jumper 2 pin at JP13.
16. Replace the JP13 jumper to 1-2 position.
17. Disconnect the connector from TP2 of the terminal's CPU board.
18. Return the JP12 jumper to re-enable the Watchdog utility.
19. Unplug the terminal.
20. Replace the front panel.
21. Unplug the Time Counter.

## 7.4 How to cause a memory crash

Warning: This operation must be performed by qualified and authorized personnel only! This operation requires that you work with an open unit. Make sure to unplug the unit wherever the instructions call for it. Take extreme care during the stages where the terminal is plugged into a power source. Failure to heed this warning may result in harmful contact with electrical current.

- Step 1. Unplug the terminal and make sure that it is off.
- Step 2. Unscrew and remove the front panel.
- Step 3. Remove the JP4 jumper from the 1-2 position to 2-3 position.
- Step 4. Reposition JP4 to (1-2).
- Step 5. Plug the terminal back into a power source and make sure that MEM CRASH reappears on the programming panels display.

### 7.5 Formatting the memory if a crash occurs

If the memory crashes the following message will appear on the programming panel display: **“CRASH:”** You will need to clear the terminal’s memory and return the terminal to the NO PROGRAMMING state according to the procedure below.

Step 1. Connect the programming panel.

Step 2. Press 6 times on the 0 key. An asterisk appears for each time that this key is pressed.

Step 3. Press once on the Enter key.

Step 4. Press 3 times on the F1 key.

Step 5. Press twice on the F2 key.

Step 6. Press 3 times on the F1 key. The message CLEAR MEMORY? will appear on the display.

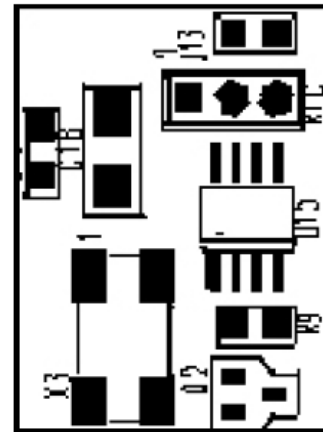
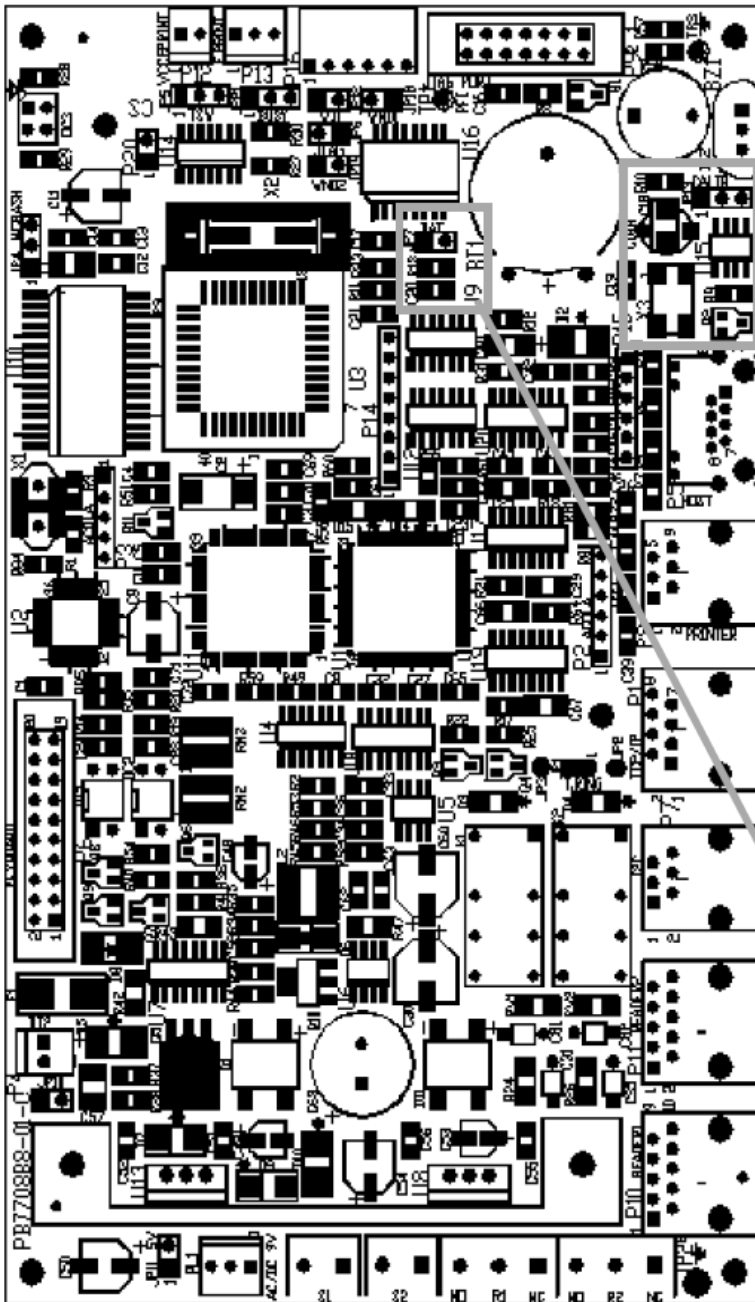
Step 7. Press once on the F2 key for confirmation.

The message MEMORY CLEARED will appear on the display.

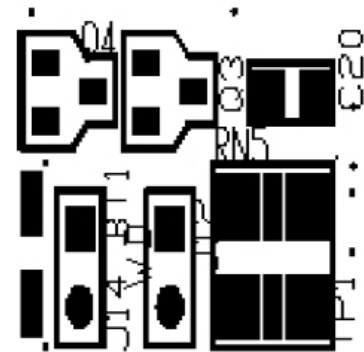
This will cause the terminal to enter the technician mode. The message on the display will alternate between TECHNICIAN MODE and the date and time in the following format: DD/DW hh:mm:ss where DW represents the day of the week.

If you make an error during steps 3 through 6, the terminal will revert to the state just prior to step 3. If you find yourself unable to complete this operation, exit the technician mode by pressing the F2 key until F2 appears on the display, then press the F2 key. Then begin again from step 1.

### 8. Connectors & Jumpers layout Components side (PCB no. 770888-01-C)



RTC



Battery

Synel Industries Ltd.  
2 Hamada St. POB 142, Yokneam Industrial Park, Israel, 20692  
Tel: +972-4-959 6777 Fax: +972-4-959 0729  
Site: [www.synel.com](http://www.synel.com)  
Tel-Aviv Branch Tel: +972 9 775 0400  
UK Branch Tel: +44-181-900 9991  
NA Branch Tel: +1-905-678 2605