SY-780
Product Manual

Synel Industries Ltd. **Ver-1.1**

Manual 6/24/01. Part no (SY-780-222-01) 650-135

Terminology used in this manual

Warning

To warn readers about possible damage to equipment or data or about potential problems in the outcome of what they are doing.

Caution

To warn readers about the possibility of minor injury to themselves or others.

Note

To emphasize points or remind readers of something, or to indicate minor problems in the outcome of what they are doing.

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1.0 Introduction

The Synel SY-780 Terminal is the latest addition to the ever-growing range of Time and Data Collection Systems developed and produced by Synel Industries Ltd. The SY-780 is the newest member in the family of the 7XX series.

The newly developed SY-780 is designed for effective Time & Attendance monitoring, Production Floor Control, Job Costing, and Access Control Applications. In addition, SY-780 offers four mediums of access input: Fingerprint Verification, Magnetic Card, Bar Code, and Proximity readers.

The SY-780 communicates in **real time** with other databases through Ethernet/token ring, using TCP/IP protocol by way of an SY-server. This fact transforms the SY-780 into a comprehensive interactive system, and a leader in the field of time and data collection. The SY-780 interactive terminal provides on-line system management of employee reports as well as communication of current data to employees.

Terminal communication programming employs Synel's state-of-the-art user-friendly interface provided by SYncomm or other advanced applications. This wide range of compatible communication applications supported by the SY-780 terminal enables you to customize the terminal's functionality to meet your unique requirements. Flexible programming is made possible by Synel's SAL compiler.

The physical design of the SY-780 offers powerful yet easy programming while the back light and 32 character display allow for quick and easy reading. The strong plastic casing and overall rugged structure makes it possible to install the SY-780 in a totally industrial environment.

2.0 Technical Specifications

2.1 Technical and interface specifications

- 32 character LCD with back light display
- Eight programmable function keys
- Ten numeric keys
- Four special function keys: Escape, Return, dot and clear
- Two browsing keys
- Badge Reader (Magnetic, Bar code or proximity depends on the terminal type).
- 512K of protected RAM
- Protected Real Time date/time clock
- Rechargeable backup battery (one month capacity) for the memory and Real Time clock
- Rechargeable backup battery for operation with auto shut-off for use during power outages
- RS-232 and RS-485 communication
- Two relays for bell, door, etc …
- Two sensors (door monitoring)
- Variable baud rate - 1200 to 19200 bps

2.1.1 Options

- Fingerprint reader
  - Template size – 400 bytes
  - Response time – 3 seconds max
  - Security level – 5
  - Template storage - 4000
  - False accept/reject - 0.001
- Bar-code slot reader model (Code 128, code 2 of 5, Code 39)
- Magnetic (Track II, Track I)
- Proximity reader (125 KHz)
- Wiegand 26bit, 37bit (Ver 5.01)
- 2400 bps internal modem (N/A)
- Net connection (Ethernet & Token Ring)
  - Flexible, well- developed IP protocol stack
  - Ethernet (10BASE- T or AUI) or Token Ring (STP/ UTP)
  - Telnet and SNMP management

2.2 Physical characteristics

- Dimensions:
- Height - 17.0 cm
- Width - 25.0 cm.
- Depth – 9.5 cm.

2.3 Power Requirements

- Voltage: 115/230 VAC
- Back-up battery - rechargeable, included

2.4 Communication and configurations

2.4.1 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.

2.4.2 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.

2.4.3 Port to port configuration

A single SY-780 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).

2.4.4 Network connections

The terminal can be connected to an Ethernet communications network or Token Ring. For this type of communication, an IP address is required for every SY-780 terminal, making it possible to communicate with each terminal in TCP/IP protocol.

2.5 Selection of the data entry function

The SY-780 terminal is always ready for operation with a data entry function already selected. The selected function is determined by programming. The prompt of the selected function will be displayed on the second line. To select a different function, press the desired function key prior to entering the data.

2.6 Back panel for mounting

The SY-780 comes with a removable square back panel with a hole in each corner. This panel is used for hanging the unit on the wall.

2.7 Audible responses

When SY-780 reads a fingerprint or a card, an audible response notifies the acceptance or rejection.

2.7.1 Approval tone

This is a long high pitched beep that will sound when the SY-780 terminal accepts an employee clock-in.

2.7.2 Error tone

This is a series of short high pitched beeps that will sound when a problem occurs with a clock-in attempt.

3.0 Physical Description

The SY-780 series terminal is enclosed in a rugged plastic molded casing and is secured to the wall using four screws and a removable panel.

3.1 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. Eight function keys are located on the left, below the display, and are marked as follows: *IN*-  ,*OUT*-  , F1, F2, F3, F4, F5, and F6.
3. A numerical keyboard of fourteen keys, including Return, Escape, and Clear are located in the lower center of the front panel.
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. On button provides for a 15 seconds (modifiable using program) manual operation.
6. On the right side of the SY-780 is the fingerprint pad.
7. Just below the fingerprint pad is the internal badge reader/ bar code/proximity.

3.2 Bottom connector panel

The connector panel is located at the bottom of the casing. Located therein, are socket openings for all external for the connections:

1. Power supply
2. External secondary Reader
3. I^2C – I/O Extension (N/A)
4. Network
5. Serial I – Serial port connection for printer
6. Host – RS-232/RS-485

3.3 Internal components

3.3.1 Battery back-up modules

The SY-780 contains two battery back-up 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 battery back-up module, 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 shut down timeout feature enables the terminal to operate for more extended periods of time.

During a power failure, the user presses the battery key to activate the terminal. Data can then be entered and stored in the SY-780 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.

3.3.2 Memory

As a standard feature, the SY-780 Terminal contains a 512 Kbyte user memory, providing storage for data from more than 10,000 simple operations. This number depends on the length of the programming tables contained in the memory, and the complexity of the data being collected.

3.3.3 RS-232/485 internal Card

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

4.0 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:

4.1 Contents

The SY-780 package contains:

- 1 SY-780 terminal.
- Mounting panel
- 1 control badge.
- 1 connecting/splitter box (included only when TCP/IP is not available).
- Short RS-232/485 communication cable (included only when TCP/IP is not available).
- Short TCP/IP communication bridge cable (included only when TCP/IP is available).
- Four Phillips flat head 3.5x30mm and anchors, for terminal mounting purpose.
- Mounting template.

5.0 Installation

5.1 Mounting the SY-780 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 it on the wall.

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 an appropriate location for the SY-780 terminal.
It should be mounted at a height where employees can see the display clearly and can easily press the keys and implement the chosen reader type. The power plug serves as a method of disconnecting the terminal from the power source. The terminal should therefore be placed near an easily accessible power outlet. Make sure that you have a safe path for the communication cable. The communication cable should not be placed 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. Recommended height above ground is 140cm (4’7’’).

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

Warning

Live wires in the vicinity may contain 115V or 220V. Make sure not to drill into any live electric wires. failure to need this warning may result in harmful contact with electrical an current.

Step 3: Prepare the wall for mounting by placing the panel on the wall as a template and mark the place for holes to be drilled.

Step 4: Drill holes using a 6 mm. (1/4") drill bit. If the communication cable is to be wired through the wall, place one end of the cable into the wall.

Step 5: Screw the panel to the wall.

Step 6: Slide the SY-780 terminal over the panel.

Step 7: Connect the communication cable.
Plug one end of the communication cable into the communication socket of the SY-780 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 SY-780 communication cable.

Step 8: Plug the SY-780 into the power socket.

5.2 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-780 should be placed near the connection box, and must be within reach of the short RJ45 cable.

Step 2: Plug the communication cable coming from the SY-780 terminal into the connection box.

Step 3: Add an addition connection for Ethernet and Token Ring connections

6.0 Technician Mode (Setup)

Technician Mode can be entered by swiping an authorized badge or by pressing both the line up/down keys six times simultaneously. Scrolling between screens is done using the  Enter Key, scrolling between options within the selected screen is performed using the line up/down keys. To scroll to the previous screen use the C key. To exit the Technician mode press twice on Enter key. Entrance to the technician mode enables setting up of:

- Real Time Clock (RTC) Calibration
- Baud rate
- Finger print unit Baud rate
- Printer Baud rate
- Station ID settings
- Modem rings
- Network connection

Step 1: Enter into the Technician Mode
The display screen flashes for a five seconds interval and displays the Version then flips to display the *TECHNICIAN MODE* and time and date alternately, (time and date are adjusted from the PC).

Step 2: Adjust the RTC (N/Y)
This adjustment option is for internal clock calibration purposes.

Step 3: Adjust the baud rate
The available baud rates are: 1200, 2400, 4800, 9600 (default) and 19200.

Step 4: Adjust the Finger print unit baud rate
The available baud rates are: 57600 (default), 9600, 19200 and 38400.

Step 5: Adjust the printer baud rate
The available baud rates are: 9600 (default), 1200, 2400 and 4800.

Step 6: Adjust the Station ID
The Station (terminal) ID is the SY-780 terminal's address on a communication line. It enables you to add several SY-780 terminals to the communication port on your PC. In this way, you can expand your system to meet your organization's needs in the future. Any number from 0 to 31 may be used for the terminal ID. As before, scroll until you have reach the Station ID number of your choice.

Step 7: Adjust the amount of modem rings
Choose either the number of rings you prefer or choose *N* for no rings.

Step 8: Network connection
Programming the network connection requires addressing several sub-topics. In the initial screen there three available options: *N* for no connection, *Y* for answering when terminal has been addressed, and *P* for Polling, which means that a connection will be made whenever required.

Polling Sec

This parameter determines how often you want to transmit data to the SY-Server. If your terminals are not set to an Online (query) check, define the polling time as approximately 10 - 20 seconds.

If otherwise, raise the polling time to avoid network collisions.

Use the numeric keys to select the polling seconds you want, then press Enter to accept the settings.

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 you want then press Enter to accept the settings.

Gateway Address

Press line up/down and use the numeric keys to enter the gateway address you want. Press Enter to accept the setting.

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 to enter the Remote Address you want then press Enter to accept the settings.

Num Host Bits

Use the numeric keys to enter the number of host bits you want, depending on your network mask. Press Enter to accept the setting.

My Port

TCP/IP enables you to connect a number of applications on 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 = 5000. However, you may change this according to your specific needs. Use the numeric keys to change the port number, then press Enter to accept the settings.

Host Port

Synel applications use the default port number=5000. However, you may change this according to your specific needs. Use the numeric keys to change the port number, then press Enter to accept the settings.

Disconct Sec

Disconnect seconds defines the number of seconds you want to wait before reverting to offline mode. Press *03* to enable a fast disconnection. Press Enter to accept the settings.

Send Ping

To verify that the connection to the host is in order, you can transmit a fixed message. The result displays the number of milliseconds between the time of transmission and time of receipt.

Ping Address

If you selected to send a ping in the previous parameter, you must define the Ping address. Access the Ping address, use the numeric keys to enter the address you want. Press Enter to accept the settings.

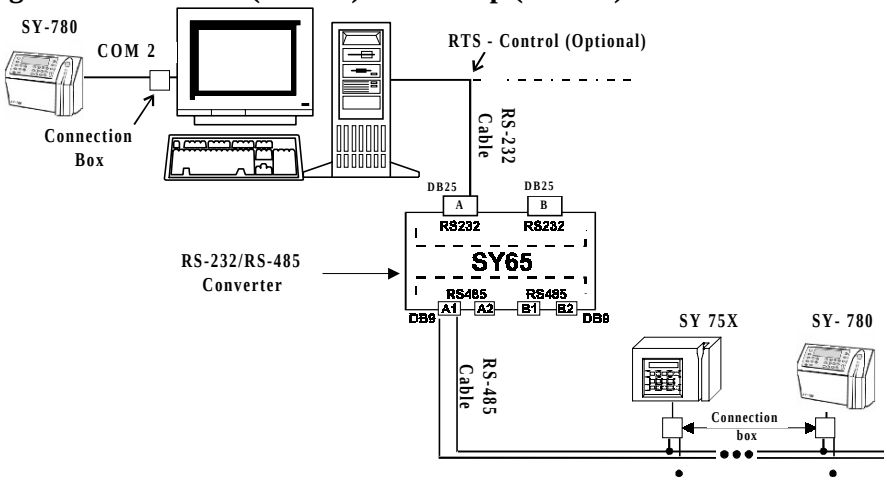
7.0 SY-780 - Host Computer Interfacing

There are a number of different communication standards through, which communication takes place, each with its own characteristics. The SY-780 data collection terminal can be connected to the host computer using either an RS-232 or an RS-485 connection with an asynchronous serial port. 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) and only one terminal may be connected to the same 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-780 is equipped with an RJ45 (telephone jack) connector. Therefore, you will need a connection box between the terminal and the host.

Figure 7.1: Direct (RS-232)/multi-drop (RS-485) connection



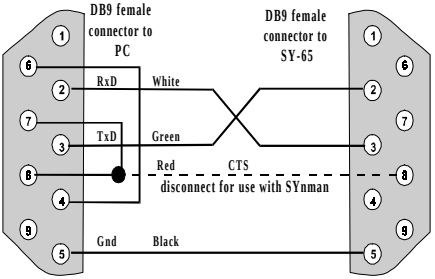
7.1 Installing communication cables

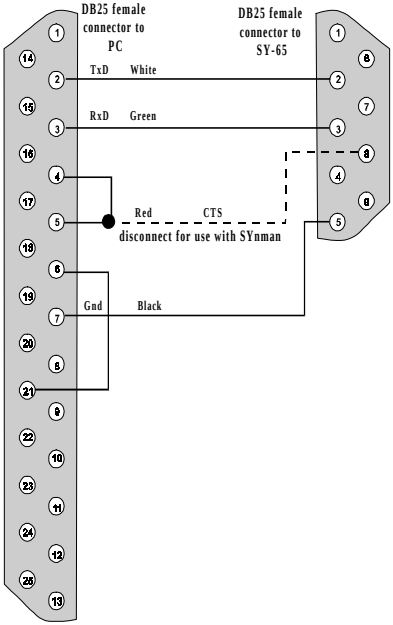
These guidelines should followed when installing the communications cables.

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 of less than 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.

7.2 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.



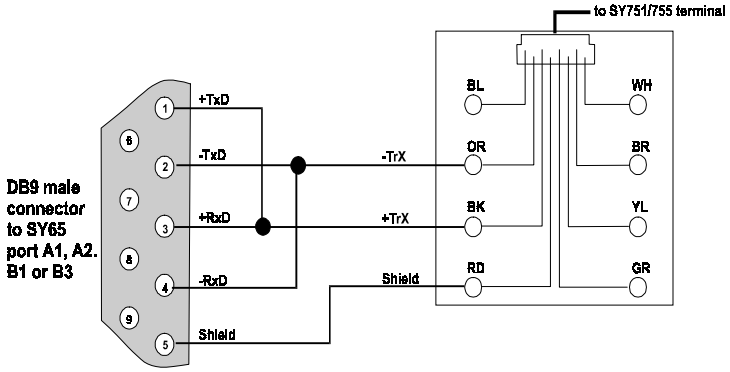


Note

RTS can not be used with SYNMAN communication software. The use of RTS is recommended with SCOMM communication software.

7.3 Connecting the SY-65 to a 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.***

7.3.1 If communication problems occur

1. Lower the baud rate.
2. Use cables with a heavier gauge conducting wire.
3. Connect 100 ohm resistors between the MRxD and PRxD, and also between MTxD and PTxD that are at the ends of the wire of the following two connectors:
   a. The connector on the computer.
   b. The connector on the last terminal of the multi-drop line.
4. EMI protection is integrated into the terminal, but it is best to use an external protector for lightning problems.

7.4 Making a multi-drop connection

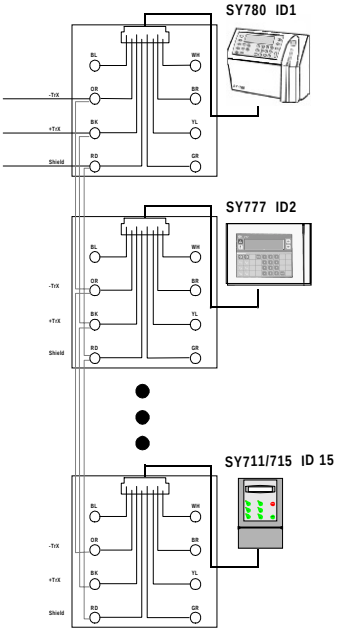
Note

Terminal IDs are set at the terminal using the control badge. There is no procedure for hardwiring the terminal ID as in the SY-1XX and SY-4X 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.

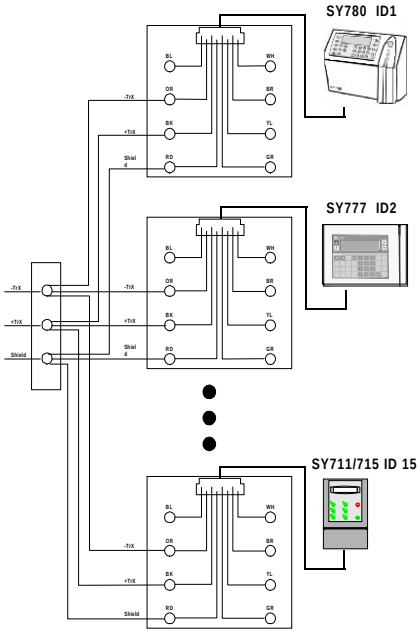
Method 1

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



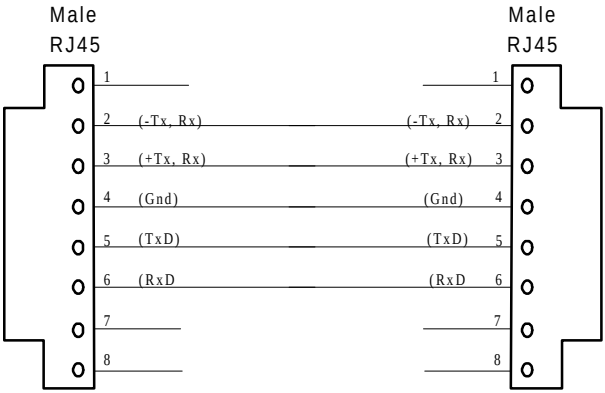
Method 2

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



7.4.1 Cable from the SY-780 to the connection box

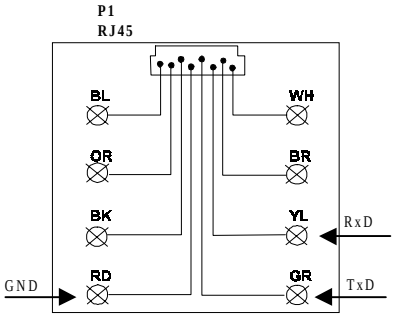
This is a standard 6 wire telephone cable with RJ45 connectors cable and is supplied with the SY-780 terminal. The pin outs are illustrated below to allow you to prepare such a cable. The length of the cable should not exceed 30 meters (98feet).



The RJ45 connector on the terminal side must be a short (12.35mm) RJ45 connector in order to enable the SY-780 connector case that hides the connectors to close.

7.5 SY-780 to the RS-232 PC port direct connection

Step 1: ***Open the connection box.***
Step 2: ***Connect the TXD wire to the connection marked GR.***
Step 3: ***Connect the RXD wire to the connection marked YL.***
Step 4: ***Connect the ground wire to the connection marked RD.***
Step 5: ***Close the connection box.***



8.0 Maintenance

8.1 Terminal Maintenance

8.1.1 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_2O_3, with a grain size of approximately 16 microns) attached to the part of the badge where it contacts the magnetic head. Pass the badge through one or two times. Excessive polishing will result in wearing of the magnetic reader head.
2. For **bar code** badge readers use an air gun to blow dirt and dust off or use a special optical cleaner solution such as that used for eye glasses to wipe dirt and dust off.

Caution !

Alcohol based cleaning solutions must never be used to clean bar code readers.

8.1.2 Once every six months

1. Check the voltage of the UPS battery. If the voltage is less than 7 volts, change them. Also make a visual check for leakage.
2. Clean all electrical contacts inside the terminal with contact cleaner.
3. If a magnetic badge reader is used, clean it with a cleaning solution (such as pure alcohol).
4. Remove the J14 jumper (**1**).
5. Check the voltage of the memory backup battery and make sure that it is between 2.8V and 3.1V.
6. Replace the J14 jumper (**1**).
7. Make sure that the screws holding the power cable to the CPU card are tight.
8. Verify that the components which have been placed in sockets are firmly connected.

8.2 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 Components side drawing.

1. Unplug the terminal and make sure that it is off. The backup battery automatically supplies power for approximately 15 seconds.
2. Unscrew and remove the front panel.
3. Remove the J12 jumper. This disables the Watchdog utility.
4. Plug the terminal into a power source and enter the technician mode.
5. Make sure that the Time Counter is unplugged.
6. Connect the ground of the Time Counter unit to the ground pin at TP2 of the terminal's CPU board.
7. Reposition J13 to 2-3 (calibration).
8. Connect the input of the Time Counter unit to the pin marked in J13 jumper 2.
9. Plug the Time Counter unit a power source.
10. Set the Time Counter unit to test the period.
11. Press once on Enter; the message "Adjust RTC N/Y" appears.
12. Press once on Enter, for N (no). Use line up/down to scroll when selecting the Y (yes) option.
13. Calibrate the RTC of the terminal to 3.90625 milliseconds $\pm$ 0.00003 by turning the screw on the variable capacitor at C18.
14. Disconnect Jumper 2 pin at J13.
15. Replace the J13 jumper to 1-2 position.
16. Disconnect the connector from TP1 of the terminal's CPU board.
17. Return the J12 jumper to re-enable the Watchdog utility.
18. Unplug the terminal.
19. Replace the front panel.
20. Unplug the Time Counter.

8.3 How to cause the memory to 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.

8.3.1 Location of jumpers

Step 1: ***Unplug the terminal and make sure that it is off.***
The backup battery automatically supplies power for approximately 15 seconds.

Step 2: ***Unscrew and remove the front panel.***

Step 3: ***Remove the J4 jumper from the 1-2 position to 2-3 position.***

Step 4: ***Reposition J4 to (1-2)***

Step 5: ***Plug the terminal back into a power source and make sure that*** *MEM CRASH* ***reappears in the terminal display.***

8.4 Formatting the memory if a crash occurs

If the memory crashes the following message will appear on the 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: ***Press 6 times on the 0 key.***
An asterisk appears for each time that this key is pressed.

Step 2: ***Press once on the Enter key.***

Step 3: ***Press 3 times on the line up key.***

Step 4: ***Press twice on the line down key.***

Step 5: ***Press 3 times on the line up key.***

The message *CLEAR MEMORY?* will appear on the display.

Step 6: ***Press twice on the line down key.***

Step 7: ***The message*** *MEMORY CLEARED* ***will appear on the display.***

Step 8: ***You receive a*** *NO PROG* ***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 twice the Enter key. Then begin again from step 1.

8.5 Fingerprint sensor cleaning and care

Sensor is a rugged solid- state device designed to provide years of trouble-free service. Although maintenance and handling requirements for the sensor are few in number, observance of a few basics in caring for it will help to ensure a high level of performance over the life of the sensor.

8.5.1 Cleaning the Fingerprint Sensor

Oily deposits from your finger accumulate on the surface of the fingerprint sensor after repeated use. These deposits can inhibit the functionality of the sensor.

Scheduled cleaning:

Cleaned at least once per week, but it should also be cleaned anytime an oily residue is visible on the sensor surface.

Use Isopropyl alcohol (rubbing alcohol) and a clean cotton cloth or tissue paper to remove oily deposits.

Caution !

Do not use a soiled cloth or tissue paper to clean the sensor. A clean cotton cloth or tissue paper will absorb the deposits, but a soiled cloth will smear the deposits over the sensor surface.

Rubbing alcohol is the preferred cleaning solution because it dissolves the oily residue and evaporates quickly.

The use of nylon brushes or scouring pads, abrasive cleaning fluids or powders, or steel wool is not recommended.

8.5.2 Caring for the Fingerprint Sensor

The sensor can be damaged by a discharge of static electricity from your body. However, the fingerprint sensor is typically surrounded by conductive plastic, which is connected, to a ground plane. You should always touch the conductive plastic before touching the sensor in order to safely discharge any static electricity that may be present on your skin or clothing.

Caution !

Do not place the fingerprint sensor close to a heat source, such as a radiator or hot plate.

Do not subject the fingerprint sensor to heavy shocks or vibrations.

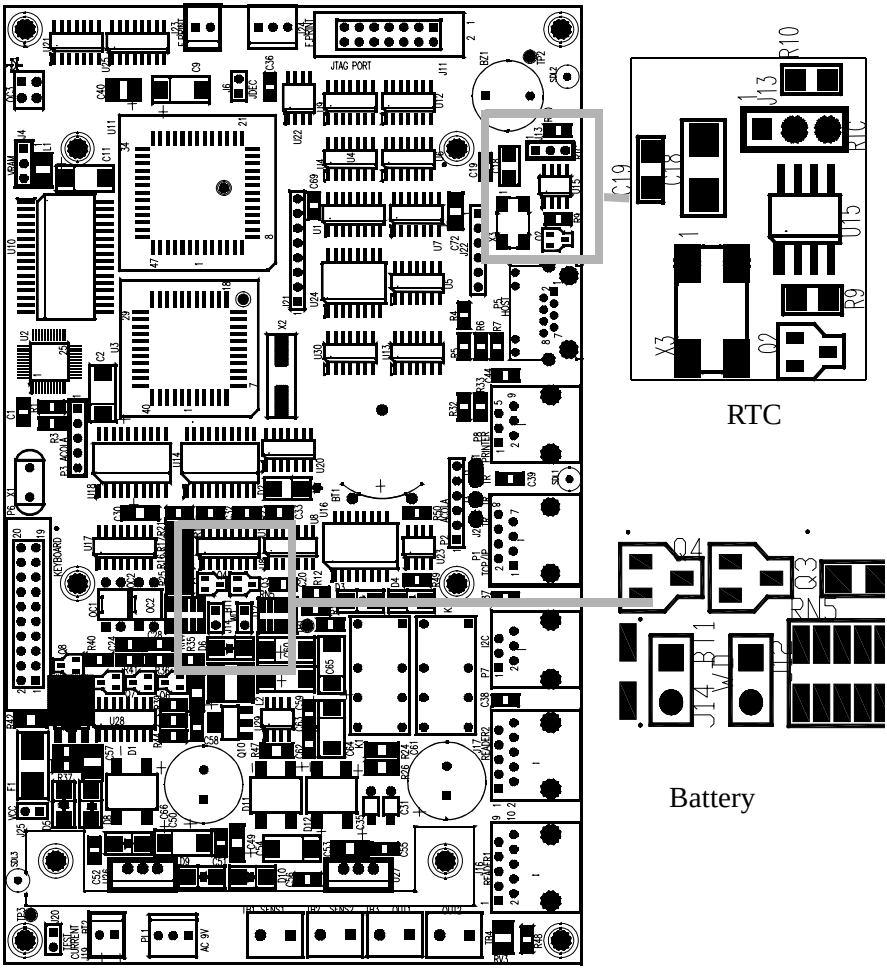
Do not allow the sensor to come in contact with metallic objects.

The sensor can be stored in temperatures ranging from -65^0C to $+150^0$C, and can operate in temperatures ranging from 0^0C to $+60^0$C.

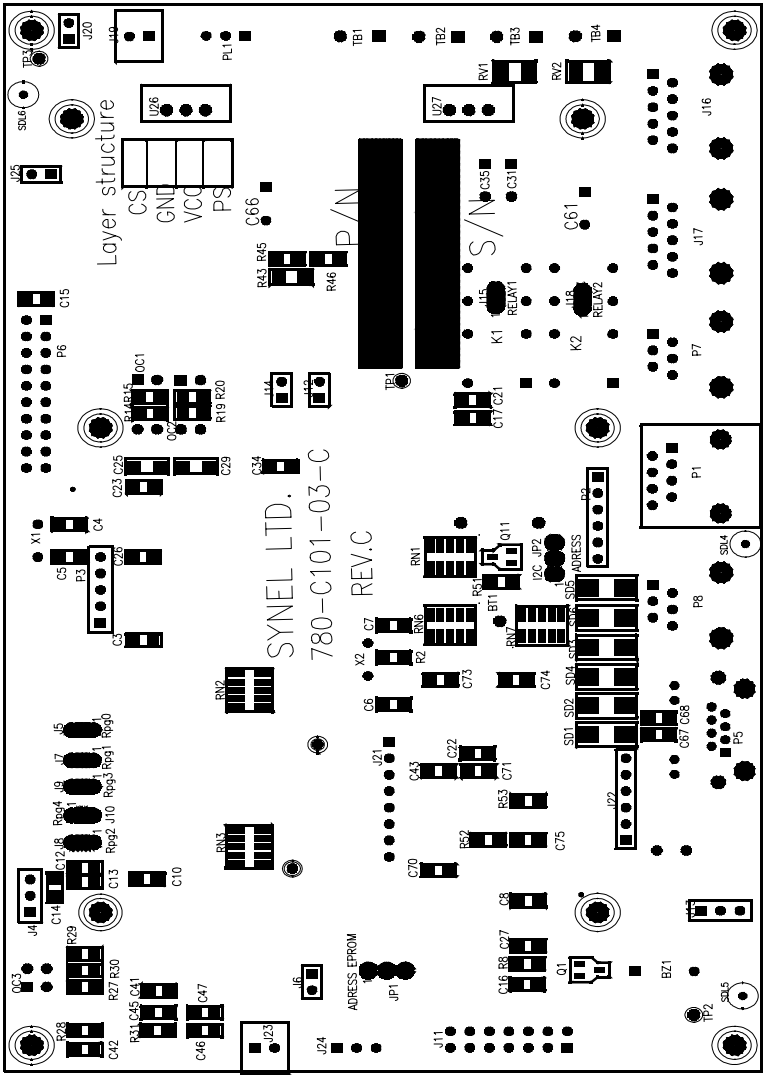
In addition, the sensor should not be exposed to rain or excessive moisture. The sensor can operate within a range of 5% to 95% relative humidity (non-condensing). With the exception of isopropyl alcohol, do not spill any liquids on the sensor.

9.0 Connectors & Jumpers layout

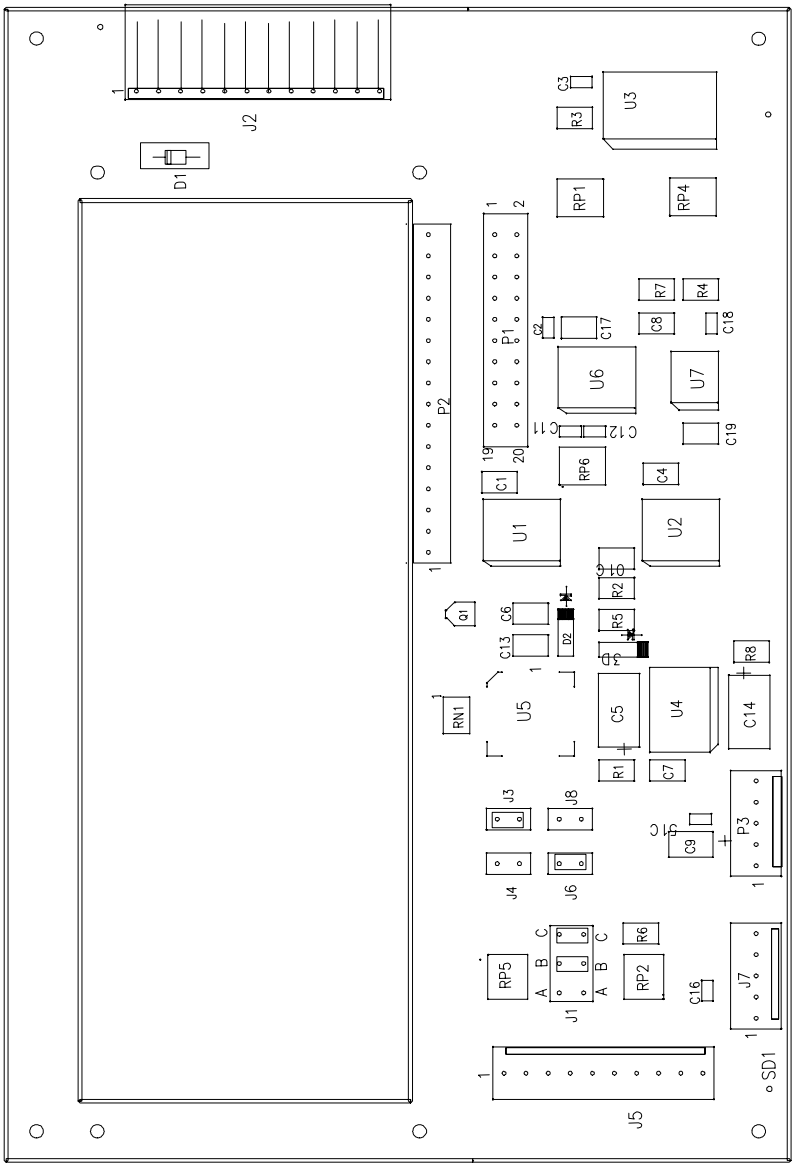
Components side



Printed side



Display card



Appendix - A
External Connectors

HOST RJ-45 (8 pin)
Communication with Host computer

Pin	Signal	Value	Remarks
1	NC		
2	RS-485 (-TRX)	0-5 Volt	
3	RS-485 (+TRX)	0-5 Volt	
4	GND		
5	RS – 232 (TXD)	-12:+12Vdc	
6	RS – 232 (RXD)	-12:+12Vdc	
7	NC		
8	NC		

Ser I - RJ- 11 (6 Pin)
Secondary serial channel for printer, scales etc

Pin	Signal	Value	Remarks
1	Transmit data	TX	Finger print
2	GND	0	
3	Receive data	RX	Finger print
4	RS - 232 TXD		Printer
5	RS – 232 RXD		Printer
6	Vcc	5Volt	

NET RJ-45 (Ethernet / Token Ring / Modem)
Ethernet (Set J1, J2 and J3 for Ethernet)

Pin	Signal	Value	Remarks
1	Transmit data	TX+	
2	Transmit data	TX-	
3	Receive data	RX +	
4	NC		
5	NC		
6	Receive data	RX -	
7	NC		
8	NC		

Token Ring (Set J1, J2 and J3 for Token Ring)

Pin	Signal	Value	Remarks
1	NC		
2	NC		
3	Transmit data plus	TU +	
4	Receive data plus	RU +	
5	Receive data minus	RU -	
6	Transmit data minus	TU -	
7	NC		
8	NC		

Modem (Set J2 and J3 as Token Ring)

Pin	Signal	Value	Remarks
1	NC		
2	NC		
3	NC		
4	Ring	OP -	
5	TIP	OP +	
6	NC		
7	NC		
8	NC		

I^2C Bus – RJ 11 (6 Pin)

Pin	Signal	Value	Remarks
1	Serial Clock	SCL	
2	NC		
3	NC		
4	NC		
5	NC		
6	Serial data	SDA	

External Reader 1 (Magnetic /Bar code) RJ-45 (10 pin)
External Reader 2 (Magnetic /Bar code) RJ-45 (10 pin) (Optional)

Magnetic reader

Pin	Signal	Value	Remarks
1	Data -		For RS-485 signal only
2	Led 1		
3	Led 2		
4	VCC		
5	GND		
6	Led 3		
7	Clock		Clock + , For RS-485
8	DATA		Data + , For RS – 485
9	VS		
10	Clock -		For RS 485 signal only

Bar code reader

Pin	Signal	Value	Remarks
1			
2	Led 1		
3	Led 2		
4	VCC		
5	GND		
6	Led 3		
7			
8	DATA		Data + , For RS – 485
9	VS		
10			

Appendix - B
Jumpers

Token Ring - Ethernet - Modem

No	Jumper	Description	Value	Default
1	J1	TU- Token Ring 2-3 RX - Ethernet		1-2 Ethernet
2	J2	RU + Token Ring	Open Ethernet Close T. Ring/ Modem	Open
3	J3	RU - Token Ring	Open Ethernet Close T. Ring/ Modem	Open

Ram

No	Jumper	Description	Value	Default
4	J4	Power supply	1-2 – Battery On 2-3 – GND (Crash)	1-2
5	J5	Bank select 16/ 32 K	Page 0 2-3 A14	Page 0 - 16K
6	J7	Bank select 16/ 32 K	Page 1 2-3 A15	Page 1 - 16K
7	J8	Bank select 16/ 32 K	Page 2 2-3 Page 0	Page 2 - 16K
8	J9	Bank select 16/ 32 K	Page 3 2-3 Page 1	Page 3 -16K
9	J10	Bank select 16/ 32 K	Page 4 2-3 Page 2	Page 4 - 16K

PSD Programming

No	Jumper	Description	Value	Default
10	J6	Jtag programming	Open – Normal work Closed - Programming	Open

Miscellaneous

No	Jumper	Description	Value	Default
11	J11	Jtag Port		Connector
12	J12	Watch Dog In	Open WDI Disable Closed Normal work	Closed
13	J13	RTC	1-2 Normal work 2-3 Calibration	Normal work
14	J14	Battery	Open Battery Off Closed Battery On	Closed

Relays

No	Jumper	Description	Value	Default
15	J15	Relay 1 – Output select	Normally Closed 2-3 Normally Open	Normally closed
16	J18	Relay 2 – Output select	Normally Closed 2-3 Normally Open	Normally closed

Connectors

No	Jumper	Description	Value	Default
17	J16	Reader 1		Connector
18	J17	Reader 2		Connector
19	J19	Back up Battery		Connector
20	J20	Charging current test	Close Normal work Open Test current	Closed
21	J21	Host communication		Socket
22	J22	Host communication		Socket
23	J23	Power for Finger print		Connector
24	J24	Comm. to finger print		Connector
25	J25	VCC	Closed VCC On Open VCC Off	Closed

Display card

No	Jumper	Description	Value	Default
1	J1	Keyboard Functions: Function, Numeric&Service keys	A=0 B=1 C=1	
2	J3	Reader 1 type	Bar code - Close	
			Magnetic - Open	
3	J4		Always closed	
4	J6	Reader 2 type	Bar code - Close	
			Magnetic - Open	
5	J8	Reader 2 type	Wiegand - Close	
			Magnetic - Open	

Appendix - C
Biometric concepts

Biometric Definitions

Enrollment is the operation of scanning a fingerprint, determining the quality of the fingerprint scan, and storing a good template with associated data within the memory of the MV1100.

Scanning an Image

When the MV1100 properly reads a fingerprint, it looks for image *quality* and fingerprint *conten*t. When a raw image is collected from the sensor during enrollment, verification or identification, the MV1100 searches for the fingerprint core**.**

Content scores are based upon the amount of non- ambiguous data in the region of the core. The higher the content, the greater the degree of useful information.

See Using Content and Quality for Enrollments for a thorough discussion of content

Quality scores are based on how well the ridge pattern is defined within the image. For best image *quality*, be sure that the sensor window is clear of dirt, residue, or other material that can block the MV1100's view of the fingerprint.

Once the image is scanned, the MV1100 then creates and stores the resulting fingerprint template.

Verification is the operation of entering a PIN #, requesting the user to place their finger on the MV1100, scanning the finger, comparing the current scan against stored fingerprint templates for that user, and then notification of a successful validation or a failure.

Identification is the operation of requesting the user to place their finger on the MV1100, scanning the finger, comparing the current scan against all stored fingerprint templates (regardless of user), and, if the user is in the database, identifying the user. Identification is only available on Searching MV1100's.

Fingerprint Template is the term used to describe the data stored on the MV1100 that mathematically represents the ridge pattern of an enrolled fingerprint. This data is not the raw image of the fingerprint, but the result of processing a raw image through our unique algorithmic process, preparing the data for later comparisons, and compressing the data for maximum storage. An image of the uncompressed template data does resemble the raw image, but whereas a raw image is 90K bytes, the compressed template is only 348 bytes.

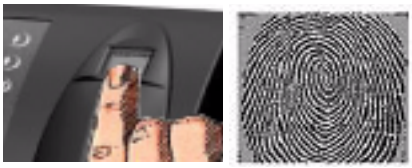
Fingerprint Core is the term used to describe distinguishing print characteristics usually found in the area of the print where the topography shows the tightest curvature. Although the entire fingerprint has significant data, the "core" is the most data- intensive area and therefore very important.

Proper Finger Placement

The basics for successful operation of the MV1100 are simple but important.

System performance improves dramatically with ***consistent finger placement.*** It is important to make sure that the position of the finger allows the MV1100 to record the unique features of the print. Here are the steps to follow for trouble-free fingerprint recognition.

- Bio ID has designed the Ridge-Lock and the Finger Guide to create "simple user instruction" and "consistent" finger position. With the fingertip raised, position the finger so that the Ridge- Lock rests comfortably within the first indentation of the finger. Next, lower the finger onto the sensor and apply moderate pressure. This figure illustrates proper finger placement and the resulting image of the scanned fingerprint.



Common mistakes

Correct finger placement is a significant component for reliable fingerprint imaging. The following figures illustrate some common mistakes to avoid.

- Sliding the fingertip into place instead of lowering it onto the sensor will cause distortion of the fingerprint and will degrade image quality. Keep the fingertip raised while locating the Ridge- Lock, then lower the fingertip.
- Rotating the finger into position will also cause distortion of the fingerprint, subsequently making verification less reliable.
- Placing your finger as if punching a button will not provide adequate information and will degrade system performance. Proper sensor height and angle along with consistent use of the Ridge- Lock deters this behaviour.
- Positioning the finger to one side and leaving a portion of the sensor exposed will degrade image quality. This figure demonstrates how poor finger placement degrades the image of the fingerprint. Notice how the core is well off- centre and the sensor is not fully covered.

- Placing the finger at an angle to the finger guide, as shown below, is another common mistake. Rotation of the fingertip will not provide a reliable image of the fingerprint.

- Not using the Ridge- Lock will prevent the MV1100 from imaging the main features of interest. This figure illustrates the user neglecting the Ridge- Lock and resulting fingerprint image. Notice how the core is well below centre and the sensor is not fully covered.

Reasons for Low Scores

Some reasons for poor sampling results are listed below:

Possible Reason	Correction
Finger movement while sampling	Instruct the user to remain still while Veriprint is sampling.
Finger not positioned properly	With the fingertip raised, position the finger so that the Ridge- Lock rests comfortably within the first indentation of the finger. Next, lower the finger onto the sensor and apply very moderate pressure.
User might be pressing too hard	Too much pressure on the sensor will blur the fingerprint ridges. Allow the user to apply gentle pressure while sampling.
User might not be pressing hard enough	You must apply gentle pressure when enrolling. The fingerprint should lay flat upon the sensor surface.
Finger too moist or wet	If the user washed their hands, but failed to completely dry the finger that is sampled, excessive moisture may cause the sample to be more difficult to obtain. Dry wet or moist fingers before sampling.
Finger too dry	Depending upon the geographical area, the season, and the skin type of the user, their fingerprint might be excessively rough or dry. Excessively dry skin may affect the sample quality. Try applying skin moisturizer a few minutes before enrolling to improve image quality.

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