



TLC5000/TLC9803

Dynamic ECG Systems

Service Manual

Contec Medical Systems Co.,Ltd.

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Service Policy

All of our products have passed strict production guard, quality inspection and got high-normal quality certification. For the problems about payment ,consignment and quality in the production and management process, our company will try our best to give proper solution actively with the attitude that "Be serious and responsible to seek long cooperation".

Product Quality Promise:

- 1.Our company will give free repair for product's quality problems during warranty period , (which do not contain improper use or human damage) , or directly replace by customers.
- 2.For products beyond warranty period ,our company will repair , but charge for accessories and upkeep ,taking the circumstances into consideration.
- 3.For product failure caused by improper use or human damage, we will try our best to repair , but charge for accessories and upkeep ,taking the circumstances into consideration.
- 4.When it is necessary to replace parts during repair and adding part cost, we will give user prior notice and ask for agreement. After the failure disappears, we will return you the parts replaced.

Convention

 **Warning**  **Points some information you should know to avoid injury to patient and medical staff.**

 **Caution**  **Points some information you should know to avoid damage to the device.**

 **Note**  **Points some important information you should pay attention to.**

To be familiar with the device is prerequisite to repair, so please read the *User Manual* carefully before servicing.

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Chapter1 Safety

General Safety Information

Warning

- ❖ Before disassembling, ensure the external power supply, namely USB data line, has been cut off.
- ❖ There may be electrical shock when opening the device enclosure. All servicing to the device must be carried out by personnel trained and authorized by our company.
- ❖ Servicing personnel must wear corresponding apparatus (such as static bangle, etc).

Caution

- ❖ Before disassembling, please pull out the USB data line, and disassemble all the peripheral equipments, for some circuit and equipments are still working in the instance of power off and direct disassembling will cause damage to some circuitry.
- ❖ When disassembling the circuitry boards, avoid directly pulling and drawing and make sure not to curve the pins, without strong force.
- ❖ Use proper tools, such as screwdriver and tweezer, etc, and be careful during operation to avoid any human damage to the device.
- ❖ After repair, do necessary maintenance to device.

Note

- ❖ For most parts or accessories of this device are tiny, such as screw and washer, etc, it is important to strictly record the location, size and specification for each part and accessory, and put the parts disassembled in sorts, which will help improve service efficiency.
- ❖ Disassemble the device strictly according to correct steps described in the manual.
- ❖ Please refer to the user manual for safety information.
- ❖ Other important safety information is located in this manual where is appropriate.

Chapter2 Overview

2.1 Brief Introduction

TLC5000 or TLC9803 Dynamic ECG Systems consists of electrode, lead line, recorder and analysis software. The features of this system are 12-channel or 3-channel leads collection, ECG waveform record and storage, analysing and printing with PC and printer prepared by users, recording and analysing dynamic ECG of 24 hours.

2.2 Functions and Performance

2.2.1 Main Technical Specification:

1. Calibration Voltage: $1\text{mV} \pm 5\%$
2. Sensitivity: $10\text{mm/mV} \pm 5\%$
3. Noise level: $\leq 30\mu\text{V p-p}$
4. CMRR: $\geq 60\text{dB}$
5. Frequency response: 10Hz as benchmark , $0.5\text{Hz} \sim 55\text{Hz}$; -3dB .
6. Low frequency Characteristics: $\geq 3.2\text{s}$
7. Sweep Speed: $25\text{mm/s} \pm 5\%$
8. Resistance to Polarization Voltage: Add $\pm 300\text{mV}$ DC polarization voltage, and the deviation is less than $\pm 10\%$
9. Minimum test signal: $50\mu\text{V p-p}$
10. Interfere among channels: The mark deflexion in any channel caused by interfere among channels is less than 0.5mm .

2.2.2 Main Performance

1. Collecting 12-lead or 3- lead ECG simultaneously.
2. The time of continuous collecting and recording is more than 24 hours
3. Playing back collected ECG wavefrom.
4. Analysing cases after they have been played back with software.

2.3 Operation Environment

Operation Environment:

Temperature

Working: $10^{\circ}\text{C}-45^{\circ}\text{C}$;

Transport and Storage: $-40^{\circ}\text{C}-+55^{\circ}\text{C}$;

Humidity

Working: $\leq 85\%$, no condensation;

Transport and Storage: $\leq 85\%$;

Atmospheric Pressure

Working: 860hPa-1060hPa;

Transport and Storage: 860hPa-1060hPa.

Power Supply

Two dry cells of size 5

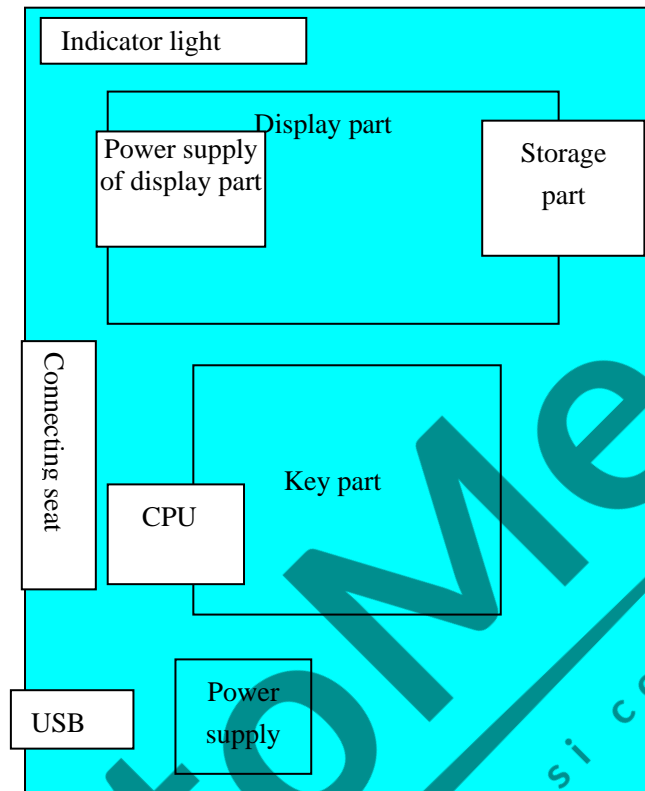
Safety Classification: interior power supply, B applied part

2.4 Intended Purpose and Reader

This manual contains module assembling and disassembling, troubleshooting, and is used to direct professional technical personnels to repair the device.

Chapter3 Operation Principle

3.1 Main Board



Note: The white parts denote reverse side.

3.2 Module Introduction

Display part: it's used to watch precollecting ECG waveforms to ensure every lead connects well.

Key-press:key-press is used to open memory mode, and switch different leads ECG waveforms you are watching.

LED indicator light:Judging whether it is on the collection state on the basis of indicator light. If the indicator light is flickering, it shows that device is on the collection state.

Power supply:Powering for each circuit part.

Connecting seat: Transmitting the collected ECG signal to CPU.

CPU:Processing collected ECG signal and communicating with PC.

USB: Transmitting the stored data to PC by the data line.

Chapter4 Device Disassembling/Assembling

⚠ Note ⚠ Please read *Chapter1 Safety* carefully before any operation.

4.1 Disassembling

Use the screwdriver to prize gently on the positions indicated in the **Figure 4-1**, and then the top enclosure of recorder box can be open. (you'd better prize upper right flute first, then prize the flutes on left and right sides).

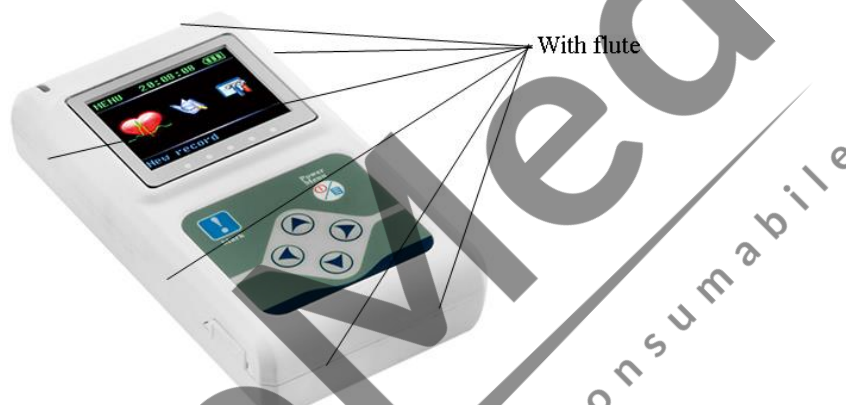


Figure 4-1

After taking off the top enclosure, use cross screwdriver to take off the screws in the four corner to finish disassembling

4.2 Assembling

1. Use 4 screws to fix the main board in back enclosure.
2. Set the USB cushion on the USB joint, and button up the top enclosure (please fasten two inferior flutes first, then fasten other flutes from left to right in turn.)

4.3 Maintenance

Please do not place the device in environment with damp or near heat source, or it will damage the device. When clearing the dust away, you should pull out the USB data line firstly and avoid use liquid scour to clean the enclosure, while you can use wet cloth instead to wipe clean. When raining and thundering or no use for long period, pull out PC power socket from the receptacle to avoid possible damage to device parts.

Chapter5 Failure Analysis and Troubleshooting

5.1 Failures about Battery

Trouble	Analysis	Solution
The recorder has no response and the indicator isn't light after the battery is put in.	1.The battery is used up(or one cell of the battery is used up).	change battery.
	2.The cell can't collect with reed well. The height of positive electrode of some brands' cell is too low, and the positive electrode of inserted cell can't touch the reed, which causes the current off.	Use another brand of cells.
	3.Set the battery in error direction.	Set battery properly again.
The recording time of recorder box is less than 24 hours.	1.The quality of battery is bad or the storage time is too long, which results in the short of battery's capability.	Change for the battery of high quality
	2.Undercharge if using chargeable battery.	It is advised to use the battery with capability of over 1000mAh. If using nickel-cadmium battery, in order to conquer its memory effect, please discharge it until the voltage is lower than 1V before charge it. The charger with discharge set can finish this work automatically to assure to charge enough every time.
	3.The batteries have different performance and trademark, obvious difference, or too much internal resistance, which influence operating voltage and discharging current.	Please change for new battery.
Data can't be cleared absolutely.	1.Electrolyte in the battery ever exuded, causing part of recoeder has been damaged.	Please contact with our company.

	2.Because of the bad quality, when the batteries is connected in series, the discharging voltage is more than 3.5V, exceeds the safe working voltage of recorder, which causes part of hard disk has been damaged.	Please contact with our company.
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5.2 Failures about Skin Treatment and Electrode Affixion

Trouble	Analysis	Solution
Too much waveform interference, bad quality of ECG signal.	1.Wrong skin treatment and electrode affixion.	1.Please treat and affix again.
	2.The quality of one-off electrode is bad or the time of storage is so long that the conductance glue dried up and conductance is bad.	2.Please use new electrode with high quality.
	3.The patient moves overly to cause EMG false.	Please enjoin patient from moving overly.
ECG waveform amplitude of some leads are too small to analyse well.	Lead line is fractured	Please change lead line.

5.3 Failures about Lead Line and Input Plug

Trouble	Analysis	Solution
Waveforms from recorder is beeline.	1.The recorder is not collected well, which causes bad contact.	Check if there are bended fractured or missing pins. If the plug is fine,please connect properly again.
	2.Lead line is broken.	Please contact with our company.
	3.The recorder is broken.	Please contact with our company.

Some ECG waveform is disturbed a lot, has too much false and the quality of ECG signal is poor.	1. Lead line is not fixed well or buffering length is not enough, or general condition of lead line fixation is bad, which causes too much drag, thereby bringing interference.	Please follow the operation instruction to fix the lead line well.
	2. Lead line damage causes too low voltage of collected ECG and the serious interference.	Please contact with our company.
	3. Bad quality of one-off electrode results in bad contact and unordered waveform.	Please change for one-off electrode with high quality.

5.4 Other Failures

Trouble	Analysis	Solution
Data communication fails.	USB line has some trouble.	Please change the USB line.
	USB port can't match with the recorder.	Please use USB2.0 port.

Appendix

Product Failure Feedback Table					
Client Name		Linkman		Telephone	
Product Name		Product Model		Purchase Date	
Product Number					
No.	Failure Description(attached figure)	Frequency	Date		
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

⚠ Note ⚠ This table is used for failure information feedback to help our company deal with new failures in time and give good solution. Please fill in carefully.

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