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1 Legal Notice

1.1 Trademarks Information

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Cardiette Microtel is a trademark of Caridoline Spa.

1.2 Safety and Privacy

Only health professionals should use T-ECG Doctor. The program doesn't use or need any personal (private) data to be functional. The user is responsible for compliance with the privacy rules in force in each country.
2 Information notes
Read this chapter for information on system requirements, limitations, appropriate use and compatible devices.

2.1 Manual
This manual is intended for all users who want to learn how to use T-ECG. It explains how to achieve the desired objectives through detailed procedures.

2.2 Application
T-ECG is an application created to support transtelephonic ECG devices with enriching features such as display of ECGs, archive patients ECGs, data exchange by email and report generation.

2.3 Mobile system requirements
T-ECG runs on Smartphones and Tablets with Android 2.1 and up Operating Systems with audio recording/play back capabilities and external storage (SD Card).
## 2.4 Technical specifications

<table>
<thead>
<tr>
<th><strong>Signal Demodulation</strong></th>
<th><strong>Leads</strong></th>
<th><strong>Graphics</strong></th>
<th><strong>Patient record</strong></th>
<th><strong>Doctor Data</strong></th>
<th><strong>Report format</strong></th>
<th><strong>XML file data</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Type: FM</td>
<td>• Lead separation: 1 mV pulse of 0.1 s. with front and back porch.</td>
<td>• Reference signal pulse: 1 mV, 0.1 s</td>
<td>Name, Surname, Age, Sex, Notes and Diagnostic</td>
<td>Name, Surname and Prof. ID, graphic signature.</td>
<td>PDF format, 2 pages.</td>
<td>• File format: UTF-8 XML</td>
</tr>
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<td>• Center frequency: 1900 HZ</td>
<td>• Lead duration: 10 seconds for Rhythm and 2.5/4/10 s. for the others. Automatic detection of lost leads or incorrect duration time.</td>
<td>• Horizontal division: 0.2 s</td>
<td></td>
<td></td>
<td></td>
<td>• Patient data: uncompressed UTF-8</td>
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<td>• Modulation rate: 100 HZ/mV</td>
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<td>• Vertical division: 0.5 mV</td>
<td></td>
<td></td>
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<td>• ECG signal data</td>
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<td>• Max. deviation: ±250 HZ</td>
<td></td>
<td>• Horizontal scrolling view in detailed mode. Zoom in/out in PDF mode.</td>
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<td>• Format: signed 16 bit PCM</td>
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<td>• Compression: lzip</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>• Encode: Base64</td>
</tr>
</tbody>
</table>
2.5 Transtelephonic devices supported

T-ECG decodes the following devices audio signals:

- Aerotel HeartView LIIx10 + 12x2.5/4
- Cardiette Microtel 12x2.5 /LII x10
- Cardiette Microtel 12x10
- Other devices with same audio signal play back as one of the above.

2.6 Limitations and proper use

1. This software demodulates and digitalise the audio signal of 12 leads transtelephonic ECG devices.
2. The audio recording must be done in a noiseless environment.
3. Only cardiologist doctors can interpret or diagnose the chart.
4. The ECG acquisition must be done only by health care operators.

2.7 Language

At the moment T-ECG is only available in English

2.8 Version

This manual applies for T-ECG Doctor ver. 1.6 for Android.
3 Introduction
Read this chapter to learn how to configure T-ECG and set the type of device you will work with.

3.1 Launch T-ECG
The first time you launch T-ECG, you must be connected to internet. At launch, T-ECG, verifies the validity of your license against the Android Market. Once the license has been checked, the program displays the Home screen (see Fig.1).

Fig. 1
1. **Browse** button: to browse the list of archived ECGs.
2. **Doctor** button: to set the Doctor data and signature.
3. **About** button: to get program information and support.
4. **Record** button: to record a new ECG from a transtelephonic device.
3.2 Configuration

The first thing to do, as a doctor, if you want to identify and sign the charts, is to set your professional data and signature. You need to do this only once or when you data changes.

3.2.1 Doctor identification

![Fig. 2](image)

Fill the Name, Surname and ID fields on the Doctor screen.
3.2.2 Signature registration
You must register your signature if you want the exported documents (pdf) to be signed.

Fig. 3

1. **Signature** drawing frame. Draw your signature directly on the screen with your finger (or an appropriate pen);
2. **Clear** button: clears completely the drawing frame;
3. **Pen** button: to sign with a pen;
4. **Finger** button: to sign using your finger.
3.3 Setting the device type

The audio signal generated by the transtelephonic devices can be different from model to model; lead duration, center frequency/deviation and markers. Consult the technical data of your transtelephonic device about the audio format(s) it supports.

- Tap on Record button from the Home screen (see Fig. 1 button 4);
- Tap on Format button (see Fig. 4 button 2)

![Fig. 4]

1. List of supported formats.
2. Formats button: to display the list of supported formats and make your choice.
3. Start button: to start the recording
3.4 Operation

After you acquire the ECG with the transtelephonic device:

1. Launch T-ECG
2. Tap the Record button from the Home screen (see Fig. 1 button 4);
3. Tap on Format button (see Fig. 4 button 2);
4. Select the format (if not already set as default) compatible with the device you used to acquire the ECG and press OK.
5. Tap the Start button (see Fig. 4 button 3) to start recording.
6. Start the audio signal play back on the transtelephonic device.
7. Wait for the end of recording (see Fig. 5);
8. After the end of the recording process, if successfully, the Patient screen will be open automatically.

Fig. 5

The recording process may abort if T-ECG cannot identify all leads correctly. Normally it display the probable error: incorrect lead duration, incorrect number of leads, etc. Errors can be originated by: a noisy/bad quality recording of the transtelephonic device, ambient noise when playing back, incorrect device placement (too far, or too near from the mobile mic), incorrect device format setting.
4 Patient ECG interface

4.1 Patient Record

After the recording operation is finished, enter the patient data on this screen (see Figure 6). Every time you save a new recording chart you have to enter the patient data, even if you have done it before in a previous ECG. T-ECG is a ECG oriented database not Patient oriented.

The patient screen opens automatically after the successful recording of the ECG, otherwise you can access it from the Browse button (see Figure 7).

![Patient Screen](image)

**Fig. 6**

1. View ECG button: to open the ECG chart viewer.
2. Send button: to send PDF or XML files of the chart by mail.
3. PDF button: to view the PDF report.
4. Play button: to playback the audio signal
4.2 ECG Browser

It displays the list of ECG already recorded on the mobile. You can change the order criteria from Name to Date, ascending or descending, with the upper buttons (see Figure 7, buttons 1, 2)

Fig. 7

1. Name button: to order the list by patient surname, successive taps change from ascending to descending order and vice versa.
2. Date button: to order the list by date of recording (default) successive taps change from ascending to descending order and vice versa.
3. ECG list: list of recorded ECG
4.3 ECG viewer

Tap on this button to see the 12 leads ECG chart in 3x4 + Rhythm format (see Figure 8).

Fig. 8
Tapping on a lead sector will open a detailed view of the lead (see Figure 9).

The lead detail view can be scrolled if the lead time is longer than the time that fits in the screen.
4.4 ECG PDF report
Tap on the PDF button on the Patient screen. The PDF report will be generated and displayed (see Figure 6, button 3).

Fig. 10
5 Send and receive ECGs by mail

Fig. 11

1. PDF Document check box: check to attach the PDF file to the mail
2. ECG XML check box: check to attach the XML file to the mail

You need to have a valid mail account set on your device and be connected to internet to send the mail with the attachment(s).

5.1 Send PDF

You can send the PDF report when you finished the interpretation of the chart and and all the patient data is filled.

• On the Patient screen tap on the Send button (see Figure 6, button 2).
• Select/check the PDF Document option (see Figure 11).
• Press OK
• The mail composition screen will be open. Compose the mail normally an send it; the PDF file is already attached to the mail.
5.2 Send XML file

The XML file contains all the patient and signal data. It can be exported (sent as an attachment in a mail) or imported from a mail attachment by other device with T-ECG Doctor installed.

- On the Patient screen tap on the Send button (see Figure 6, button 2).
- Select/check the Ecg xml option (see Figure 11). Uncheck the PDF options if you don't want to attach also the PDF.
- Press OK
- The mail composition screen will be open. Compose the mail normally and send it, the XML file is already attached to the mail.

This option allows to T-ECG User users to send the ECG to be interpreted by a Doctor using T-ECG Doctor or to exchange ECGs between doctors. T-ECG User version doesn't allow to generated PDF files it only can send XML files to T-ECG Doctor users.

5.3 Receiving a XML file

The T-ECG XML file arrives as an attachment in a mail. From the mail inbox viewer program open the attachment (view or save). T-ECG Doctor will be opened, and after the import process, will display the Patient screen automatically.

If there is other xml reader/viewer app registered on the mobile, you must choose T-ECG Doctor as the app to complete the operation.
6 T-ECG audio play back

T-ECG can re-modulate the ECG signal in the same audio format as it was recorded. This function allows to transmit in acoustic mode the recorded ECGs to cardiologist receiving station as usually is done directly with the transtelephonic device.

• Tap on Play button in Patient screen.
• Once the audio file is generated
  • Call the receiving station as usual
  • Tap play symbol on T-ECG screen
  • wait until the audio finish, you will see a progress bar indicating the time remaining to play
  • End the phone call with the receiving station
• Done

Fig. 12