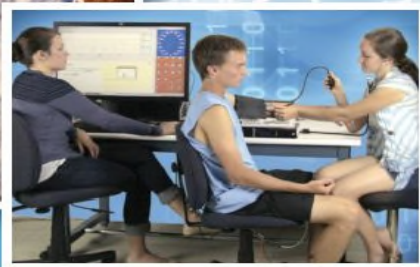
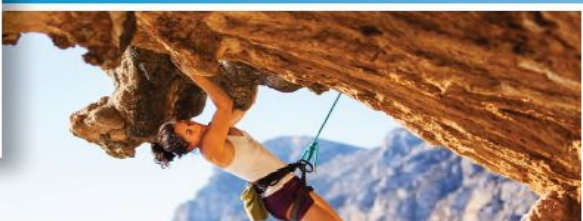


BIO PAC



BIOPAC
Systems, Inc.
Registered to ISO 9001:2008

*Inspiring people and
enabling discovery about life*

How to get Great Electrocardiography (ECG) Data

Frazer Findlay



Our Agenda Today

Setup

Hardware setup

Software setup

Participant setup

Quality

Data quality check

Analysis

Analysis

Q and A

How to get great ECG Data

Hardware Components

MP150 – Wired



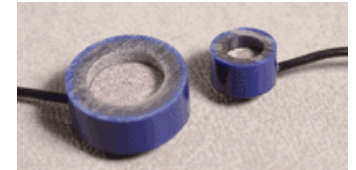
MP150

ECG100C



MEC110C

Reusable:
[EL250-series](#)



Disposable:
[EL500-series](#)



[LEAD110-series](#)



How to get great ECG Data

Hardware Components

MP150 – Wired 6-LEAD



MP150

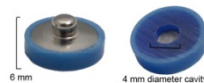


3 x ECG100C



TSD155C

Reusable:
[EL650-series](#)



Disposable:
[EL500-series](#)



[LEAD110-series](#)



How to get great ECG Data

Hardware Components

MP150 – 12-LEAD ECG



MP150

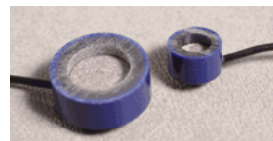


8 x ECG100C



WT100C

Reusable:
[EL250-series](#)



Disposable:
[EL500-series](#)



[LEAD110-series](#)



How to get great ECG Data

Hardware Components

MP150 - wireless



MP150

BN-RSPEC /
BN-ECG2



RSPEC-T /
ECG2-T



BN-LOGGER



Components:

BN-RSPEC / BN-ECG2
BN-EL30-LEAD3



EL500-series /



EL650-series /



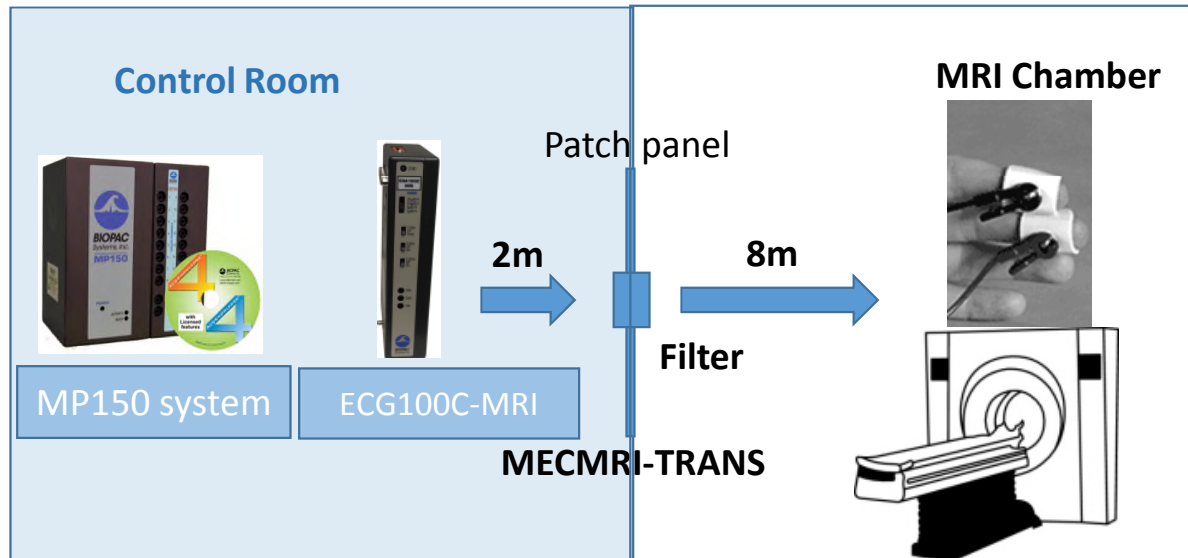
BN-BIOSHIRT



How to get great ECG Data

Hardware Components

MP150 - MRI



Components:

Amplifier: ECG100C-MRI,
Cables and filter: MECMRI-TRANS
Leads: 3xLEAD108B
Electrodes : EL508

How to get great ECG Data

Hardware Components

MP36R



MP36R



SS2LB



SS1LA

Reusable:
EL600-series



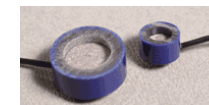
Disposable:
EL500-series



Reusable:
EL600-series



Reusable:
EL250-series



How to get great ECG Data

Hardware Components

MP36R – 6-LEAD



SS29L

Reusable:
EL600-series



Disposable:
EL500-series



How to get great ECG Data



Hardware Setup

MP150 - wired

Mode - Norm

Gain 2000

Low Pass Filter
35Hz

High Pass Filter
1Hz

Unique channels

How to get great ECG Data

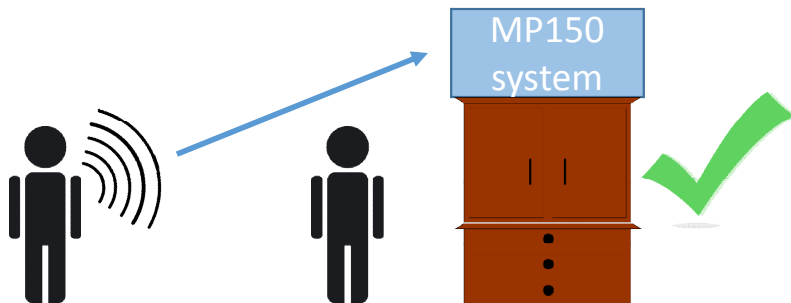


Hardware Setup

MP150 - wireless

Battery level

Signal transmission



How to get great ECG Data



Hardware Setup

MP150 - MRI

MRI safe/conditional

Only carbon fiber

Safe use of gel

Test outside

Filter grounding

CBL205-MRI

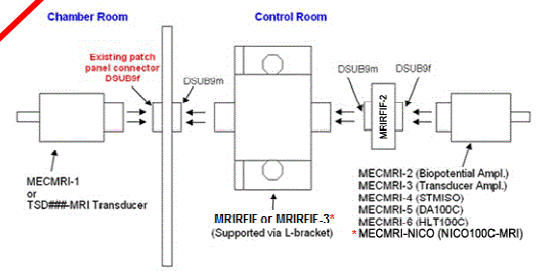
Details
Support

COMPATIBILITY

- Biopac Science Lab Systems
- BSL MP36 Systems
- BSL MP45 Systems
- MP150 Research Systems
- MP36R Research Systems

MRI Use: Conditional to 7T-

Condition: Up to 7T, any scanning sequence; up to 9T on animals. Use with LEAD108 series only. (See Specifications for components.)



How to get great ECG Data

Additional Hardware

BioHarness
Telemetry and
Logging System



Mobita 32-
Channel
Biopotential
System



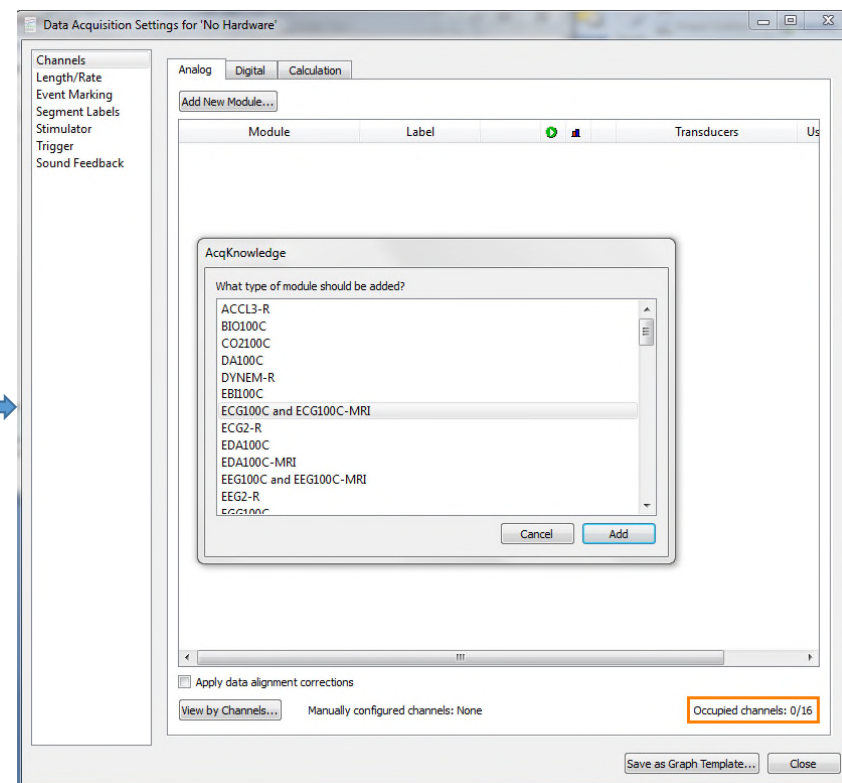
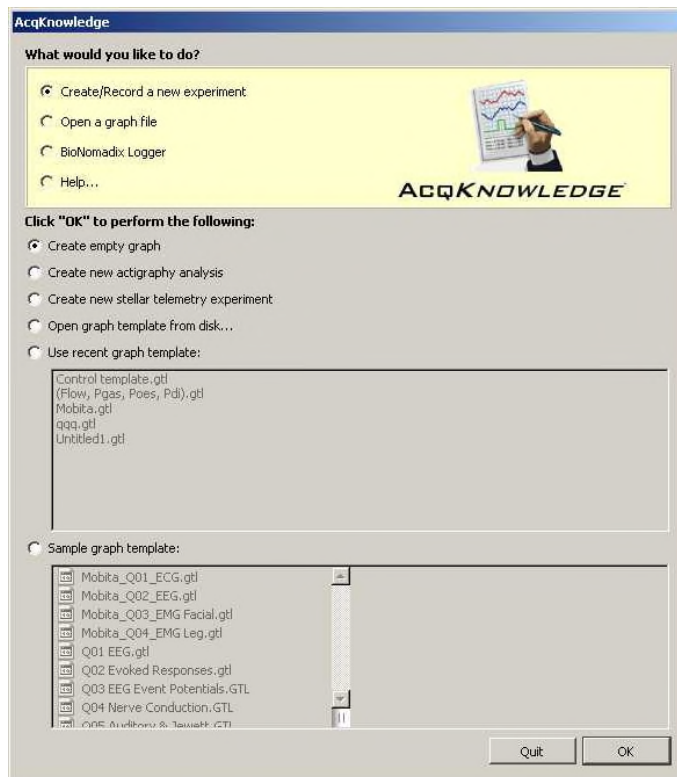
B-Alert Wireless
EEG System



How to get great ECG Data

Software Setup

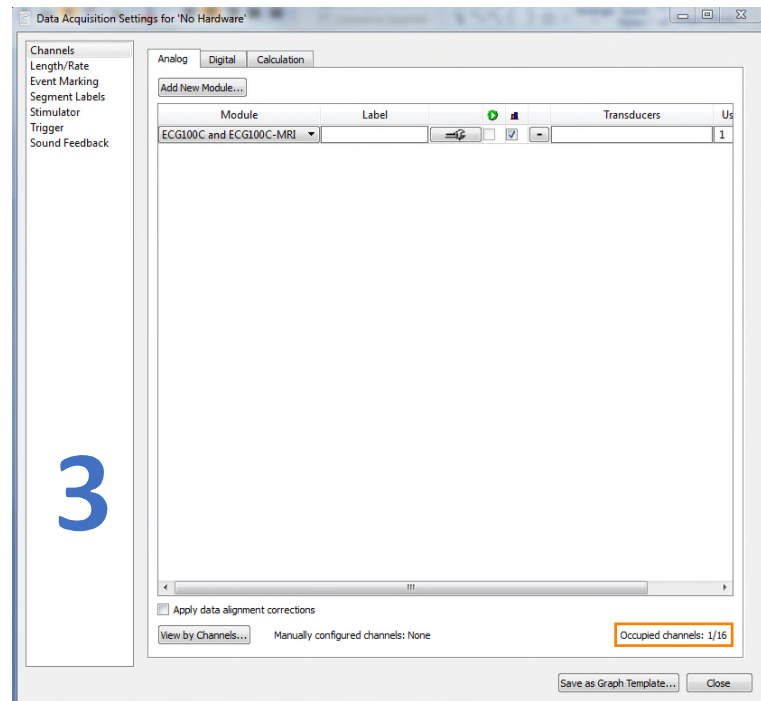
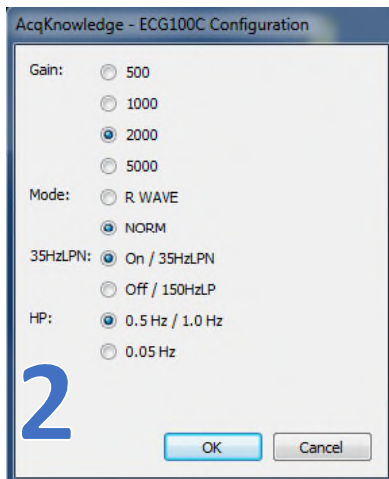
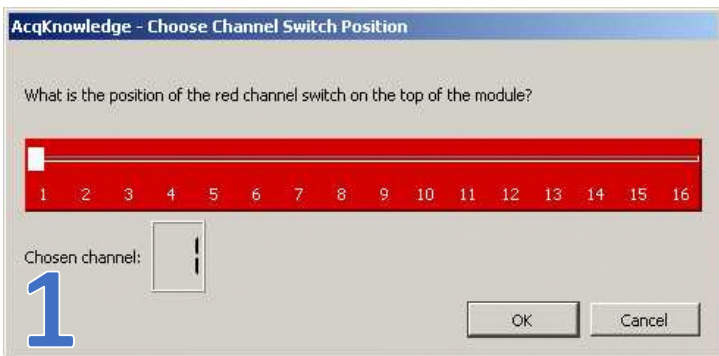
Channel setup MP150



How to get great ECG Data

Software Setup

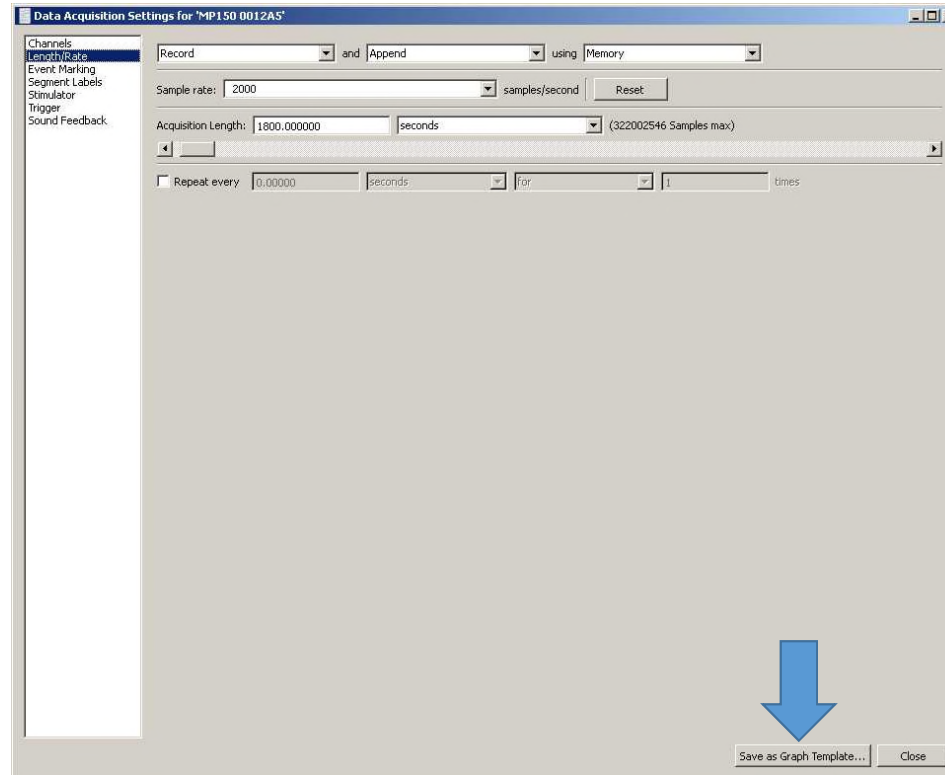
Channel setup MP150



How to get great ECG Data

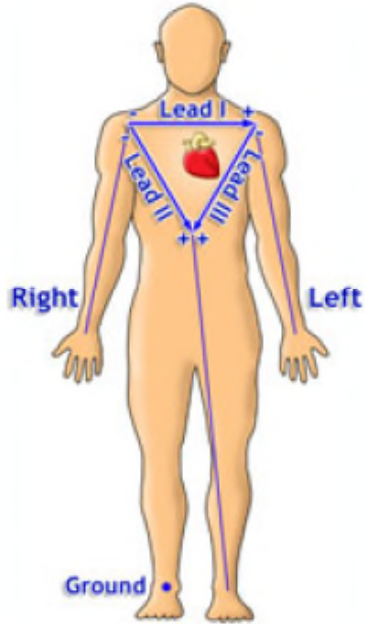
Software Setup

Channel setup MP150



How to get great ECG Data

Lead Configuration

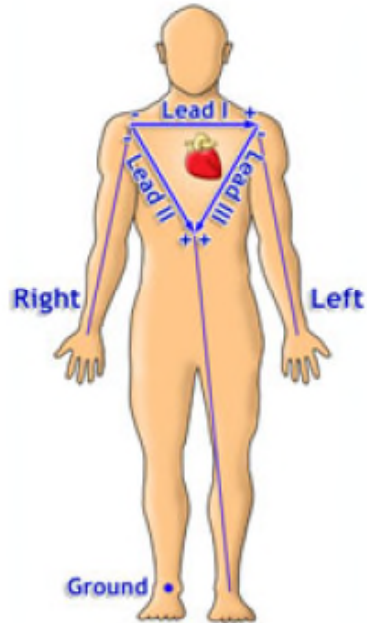


Lead	Polarity
Lead I	right arm (-) to left arm (+)
Lead II	right arm (-) to left leg (+)
Lead III	left arm (-) to left leg (+)



How to get great ECG Data

Lead Configuration



If you record LEAD I and LEAD III, you can calculate LEAD II

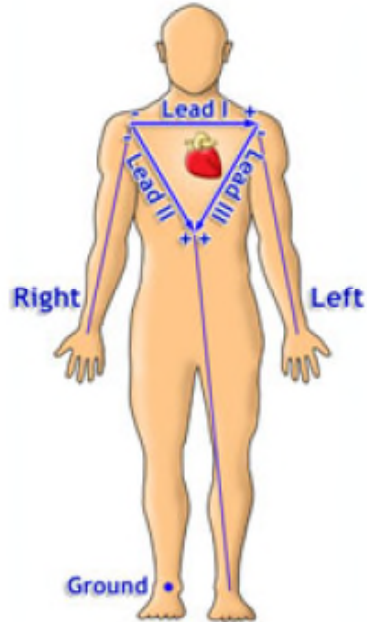
$$\text{LEAD I} + \text{LEAD III} = \text{LEAD II}$$

Use the Expression calculation to calculate the 3rd Lead, plus the Augmented leads.



How to get great ECG Data

Augmented LEAD Calculations



$$aVR = (\text{Lead I} + \text{Lead II})/2$$

$$aVL = (\text{Lead I} - \text{Lead III})/2 = \text{Lead I} - ((\text{Lead II})/2)$$

$$aVF = (\text{Lead II} + \text{Lead III})/2 = \text{Lead II} - ((\text{Lead I})/2)$$



How to get great ECG Data

Subject Preparation



ELPAD



GEL100



EL-CHECK

How to get great ECG Data

Subject Preparation



TAPE1

How to get great ECG Data

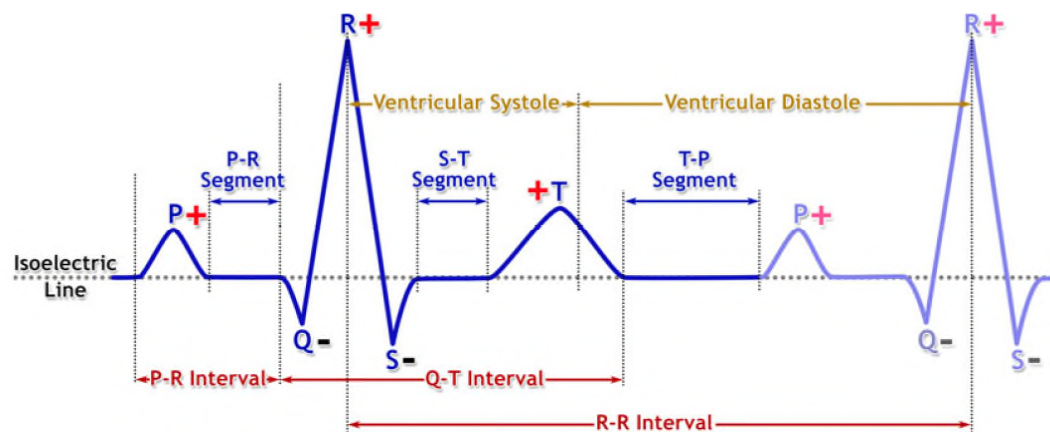


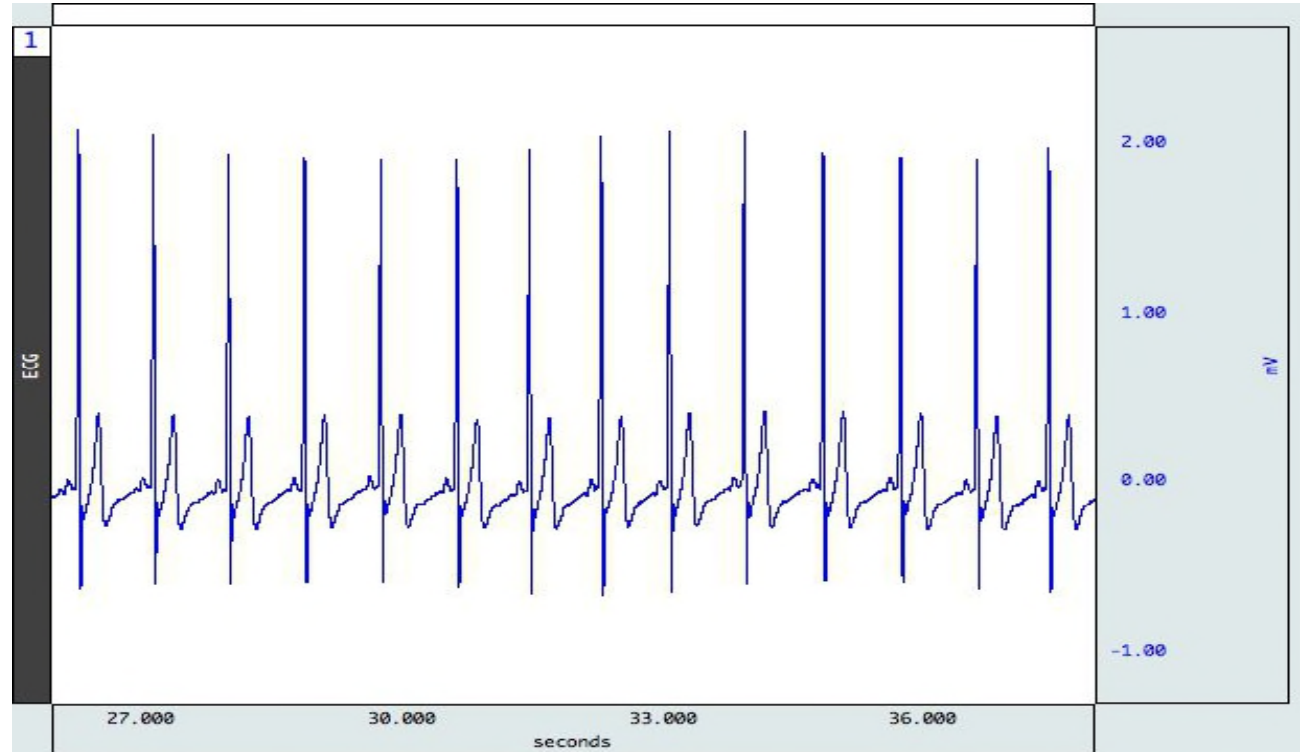
Fig. 5.2 Components of the ECG & Electrical and mechanical events of the cardiac cycle

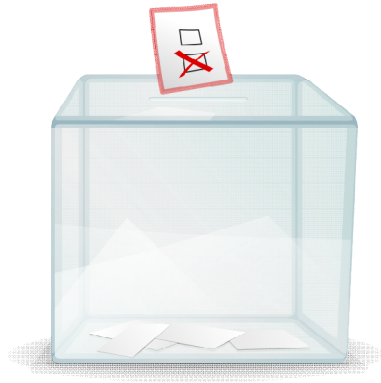
How to get great ECG Data

ECG COMPONENT		Measurement area...	Represent...	Duration (seconds)	Amplitude (millivolts)
Waves	P	begin and end on isoelectric line (baseline); normally upright in standard limb leads	depolarization of the right and left atria.	0.07 – 0.18	< 0.25
	QRS complex	begin and end on isoelectric line (baseline) from start of Q wave to end of S wave	depolarization of the right and left ventricles. Atrial repolarization is also part of this segment, but the electrical signal for atrial repolarization is masked by the larger QRS complex (see Fig. 5.2)	0.06 – 0.12	0.10 – 1.50
	T	begin and end on isoelectric line (baseline)	repolarization of the right and left ventricles.	0.10 – 0.25	< 0.5
Intervals	P-R	from start of P wave to start of QRS complex	time from the onset of atrial depolarization to the onset of ventricular depolarization.	0.12-0.20	
	Q-T	from start of QRS complex to end of T wave	time from onset of ventricular depolarization to the end of ventricular repolarization. It represents the refractory period of the ventricles.	0.32-0.36	
	R-R	from peak of R wave to peak of succeeding R wave	time between two successive ventricular depolarizations.	0.80	
Segments	P-R	from end of P wave to start of QRS complex	time of impulse conduction from the AV node to the ventricular myocardium.	0.02 – 0.10	
	S-T	between end of S wave and start of T wave	period of time representing the early part of ventricular repolarization during which ventricles are more or less uniformly excited.	< 0.20	
	T-P	from end of T wave to start of successive P wave	time from the end of ventricular repolarization to the onset of atrial depolarization.	0.0 – 0.40	

* Notes: Tabled values represent results from a typical Lead II setup (wrist and ankle electrode placement) with Subject heart rate ~75 BPM. Values are influenced by heart rate and placement; values for torso placement would be different.

How to get great ECG Data





Poll: What is the environment
for your experiment?

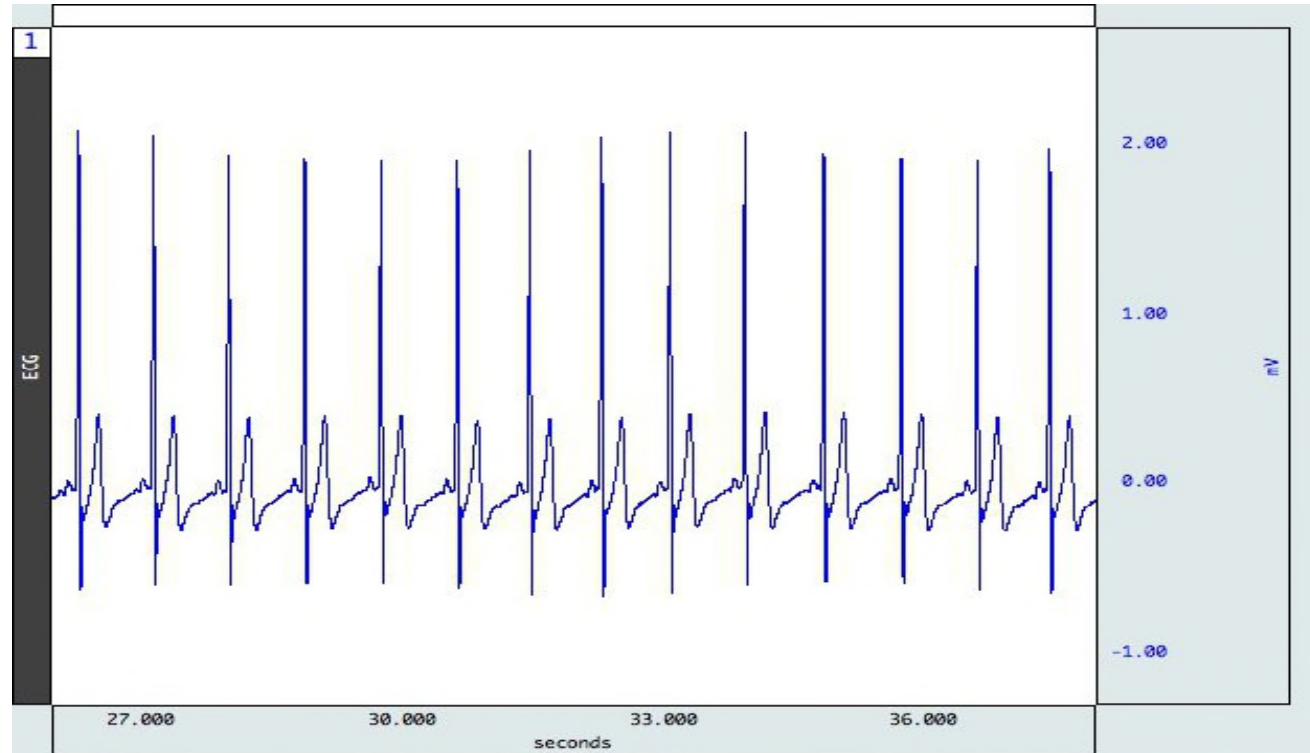
How to get great ECG Data

**Software
Setup**

Sample rate

1 kHz minimum

Live Example



How to get great ECG Data



Questions and Answers

For more information:

www.biopac.com
info@biopac.com



-Join us on Thursday, July 28th @ 8am Pacific
-Register at www.biopac.com/webinars

Thank you for your time and attention!