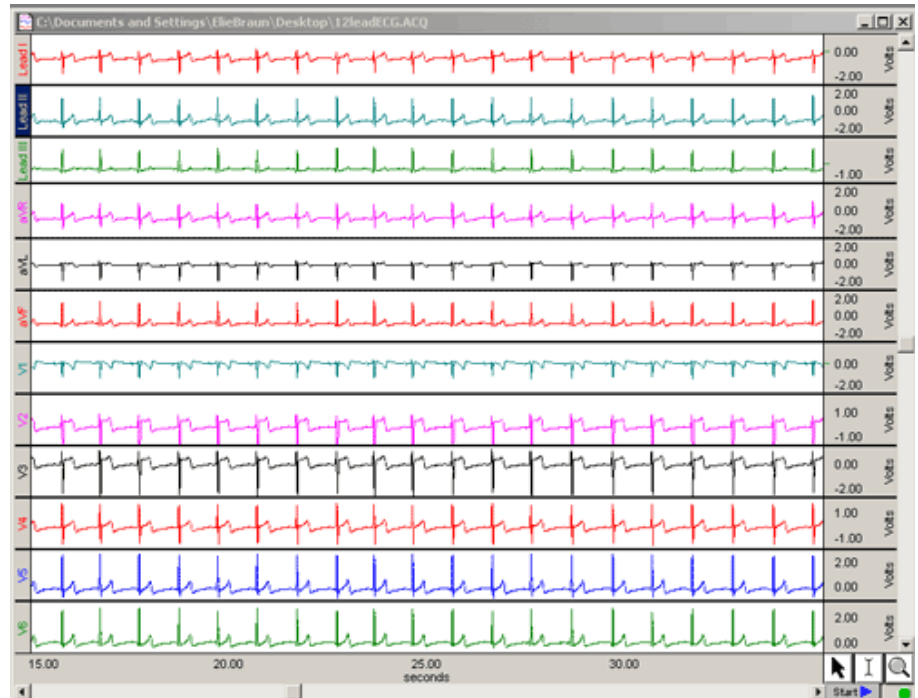


Application Note 206

Continuous 12-lead ECG Using Wilson Terminal (WT100C)



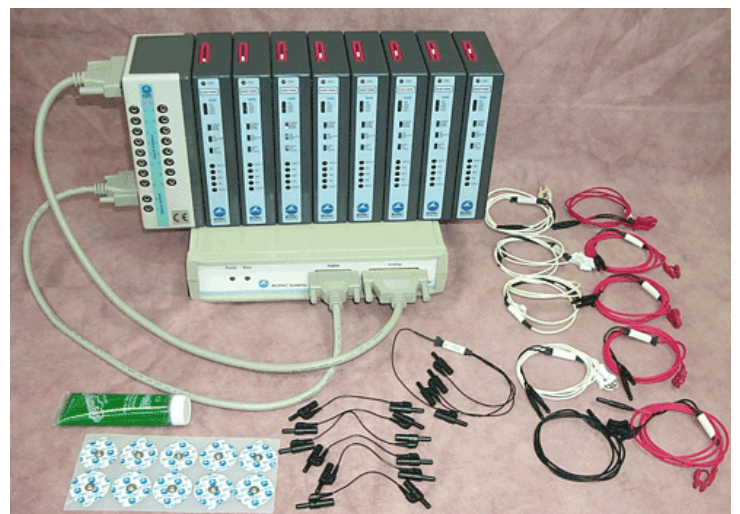
To record a continuous 12-lead ECG, use a **Wilson Terminal** (WT100C) to create a virtual reference electrode when measuring the transverse plane (i.e. precordial) ECG components [V1, V2, V3, V4, V5, V6]. The virtual reference is created by the summation of the Right Arm (RA), Left Arm (LA) and Left Leg (LL) electrode leads.

To measure all six transverse plane components, six ECG100C amplifiers are required. Use five jumper connectors (JUMP100C) to tie together the reference (Vin-) inputs of these amplifiers. This common reference connects to the virtual reference created by the WT100C.

For full, simultaneous, 12-lead ECG recording, eight ECG100C amplifiers are required. Two of the ECG100C are used to generate Leads I and III, and the software will simultaneously calculate and display Lead II, aVR, aVL and aVF. The remaining six ECG100C are used to record the six precordial leads.

Equipment Needed:

- BIOPAC MP160, MP150 or MP100 data acquisition system
- Eight (8) ECG100C amplifiers
- One (1) WT100C Wilson Terminal
- Six (6) JUMP100C stackable jumper connectors
- Nine (9) LEAD110S shielded 1-meter leads (preferably 5 red and 4 white)
- One (1) LEAD110 unshielded 1-meter lead (black)
- Ten (10) EL503 disposable electrodes



Hardware Settings:

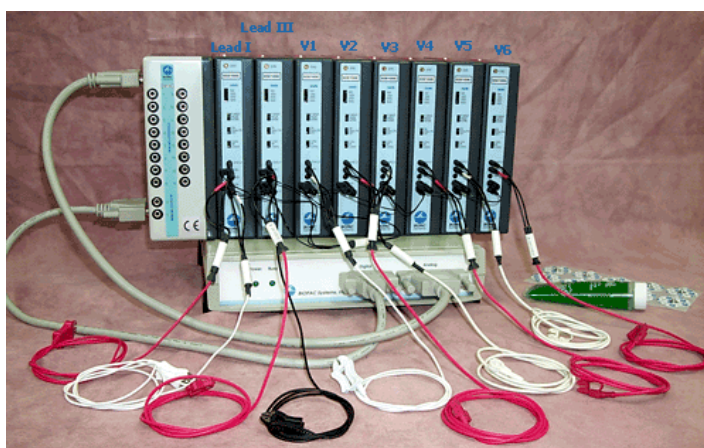
ECG100C amplifiers x 8

- Set the channel switches on top of amps to the following, starting with the amp closest to the HLT100C/AMI100D or UIM100C and moving out: 1, 3, 4, 5, 6, 7, 8, 9
- Set GAIN: 1000
- Set MODE: NORM
- Set 35HzLPN: ON
- Set HP: 0.5 Hz



Cables

- Wilson Terminal: WT100C x 1
 - Attach the single end to VIN- of the V1 precordial amplifier (third from the HLT100C/AMI100D or UIM100C)
 - Attach the three other ends in any order to:
 - VIN- of Lead I (RA) amplifier
 - VIN+ of Lead III (LA) amplifier
 - VIN- of Lead III (LL) amplifier
- Stackable jumper connectors: JUMP100C x 6
 - 1st JUMP100C: from VIN+ of Lead I amplifier to VIN- of Lead III amplifier
 - 2nd JUMP100C: from VIN- of V1 amplifier to VIN- of V2 amplifier
 - 3rd-6th JUMP100C: Connect the VIN- from the previous amplifier to the next one by stacking the JUMP100C between V2-V3, V3-V4, V4-V5, V5-V6.
 - V2-V6 amplifiers (4-8 from HLT100C/AMI100D or UIM100C) should all be connected via VIN-
- Shielded 1-meter leads: LEAD110S x 9 (preferably 5 red and 4 white)
 - Lead I amplifier: LEAD110S-R connects to VIN+, LEAD110S-W connects to VIN- (Shields must also be connected)
 - Lead III amplifier: LEAD110S-R connects to VIN+
 - Precordial amplifiers: LEAD110S connect to VIN+ (preferably alternating white and red)
- Unshielded 1-meter lead: LEAD110 (black) x 1
 - Connects to GND (ground) on Lead III amplifier



Software Setup: Note that the AcqKnowledge Q23 Quickstart Graph Template can be used in lieu of manual setup.

Acquisition Setup:

1. **Record** and **Save once** to **Disk**
2. Acquisition Sample Rate: **250** samples/second
3. Total Length: [Set as desired]

Analog Channel Setup:

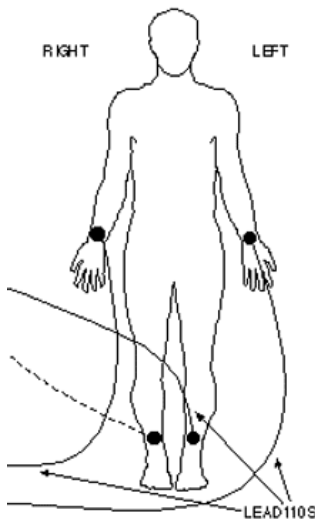
- | | |
|--|--|
| 1. Channel: A1 Label: Lead I Sample Rate: 250 | 5. Channel: A6 Label: V3 Sample Rate: 250 |
| 2. Channel: A3 Label: Lead III Sample Rate: 250 | 6. Channel: A7 Label: V4 Sample Rate: 250 |
| 3. Channel: A4 Label: V1 Sample Rate: 250 | 7. Channel: A8 Label: V5 Sample Rate: 250 |
| 4. Channel: A5 Label: V2 Sample Rate: 250 | 8. Channel: A9 Label: V6 Sample Rate: 250 |

Calculation Channel Setup:

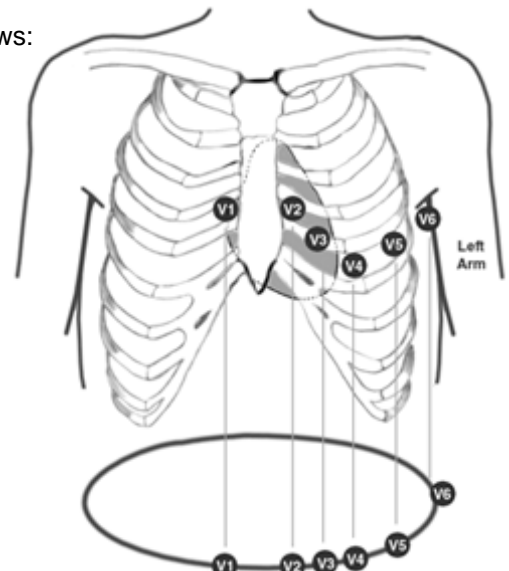
1. Channel: **C0** Label: **Lead II** Preset: **New > Math**
Setup...: Source 1: A1, Lead I Operand: +, addition Source 2: A3, Lead III
2. Channel: **C1** Label: **Lead aVR** Preset: **New > Expression**
Setup...: Expression: [-(A1 + C0) / 2]
3. Channel: **C2** Label: **Lead aVL** Preset: **New > Expression**
Setup...: Expression: [(A1 - A3) / 2]
4. Channel: **C3** Label: **Lead aVF** Preset: **New > Expression**
Setup...: Expression: [(C0 + A3) / 2]

Lead Configurations:

- Attach ten (10) EL503 disposable electrodes to the subject as follows:



Leads 1-6 Electrode Placements



Precordial Electrode Placements (Leads 7-12)

- Attach leads to the electrodes as follows:

