

Electrocardiography Assessment Manual

Technicians' Manual

Jackson Heart Study (JHS)

JHS Central ECG Reading Center (CERC)

Epidemiological Cardiology Research Center (EPICARE)

Department of Epidemiology and Prevention

Division of Public Health Sciences

Wake Forest University School of Medicine

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PREFACE

This manual describes the ECG acquisition for JHS. Along with the HeartSquare DVD which could be requested from EPICARE, this manual should be used as a reference for JHS ECG technicians throughout the study. For more information on topics or issues not covered by this manual, please contact the JHS Central ECG Reading Center (CERC), EPICARE, Division of Public Health Sciences, Wake Forest University School of Medicine, Winston-Salem, NC.

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NOTE

THIS MANUAL IS NOT INTENDED AS A REPLACEMENT FOR THE MANUAL 5 IN JACKSON HEART STUDY PROTOCOL, RATHER IT IS A HANDY REFERENCE THAT CONTAINS INFORMATION ONLY ON ECG ACQUISITION PROCEDURE THE ECG TECHNICIANS NEED TO KNOW.

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I.BACKGROUND AND PURPOSE

The Jackson Heart Study (JHS) is a single-center prospective observational study of African-American residents of Jackson, Mississippi. The ECG recording in JHS in this 3rd exam visit will document the development of new cardiovascular disease (CVD) including silent myocardial infarction, myocardial ischemia, left ventricular hypertrophy, prolonged QT interval and arrhythmias as well as the development of subclinical ECG findings that are determined to be associated with a poor prognosis i.e. The ECG in JHS will be used to detect new (incident) cardiac disease.

III. FIELD CENTER PROCEDURES

The field center procedures include ECG acquisition and transmission to the CERC, and local ECG reading by the clinic physician. The ECG transmission will be detailed under data management procedures (III.3)

Two categories of resting ECGs are collected for the JHS cohort:

1. Standard ECG for every participant at the baseline visit.
To determine prevalent baseline ECG findings with regard to myocardial ischemia, left ventricular hypertrophy, arrhythmias and conduction delays for each JHS participant.
2. Ancillary ECGs (A-ECGs) for participants having ECGs recorded outside the clinic and including ECGs recorded in-hospital and at local medical facilities.
To determine if new coronary heart disease event(s) occurred.

III.1. Standard ECG acquisition

Each participant will have one resting 12-lead ECG recording. The ECGs will be stored at the CERC for processing at a later date, to be determined by the Principle Investigator (PI).

III.1.1 Electrocardiograph

The electrocardiograph to be used for ECG acquisition and transmission for JHS is the GEMSIT MAC 1200 portable electrocardiograph. The internal set up of the ECG machines must be done according to the instructions established by CERC. [NOTE: Contact the CERC before making any changes to the internal setup of the ECG machine]. It is intended that the MAC1200 ECG be used for resting real-time ECG recording not for use as a vital signs physiological monitor. Although designed as a portable device, it should be powered from a wall power outlet unless in transit. The unit should be used exclusively for the JHS study and not shared between studies; otherwise ID labeling error will occur.

III.1.2 Equipment and supplies needed for recording

Table 1 summarizes the equipment and supplies needed for recording and transmitting ECGs.

Table 1

Equipment	Supplies (always order in advance)
<ul style="list-style-type: none"> • GEMSIT MAC1200 Electrocardiograph with its 10 lead acquisition module and attached modem • HEARTSQUARE • Telephone jack cable • Scissors • Felt tip non-toxic washable markers • The CERC contact list (Appendix A) • Reference guides for “Patient Data Entry” (Appendix B) • Reference guide for “Transmission of ECG” (Appendix C) • GEMSIT MAC1200 operation manual 	<ul style="list-style-type: none"> • MAC1200 ECG paper • GEMSIT disposable silver chloride electrodes • Alcohol swabs and gauze pads • Cotton surgical tape • Examining table disposable paper

III.1.3 Preparation for ECG recording

All ECGs should be recorded on participants while fasting at least 8 hours (overnight fasting). Prior to electrode placement, there are some steps and precautions to be followed:

- Participant should be relaxed and comfortable in supine or semi-recumbent position.
- Examination table/bed should be adequate to comfortably accommodate the participant. Supply drape for exposed upper torso. An additional covering may be needed to prevent the participant from becoming chilled.
- Make sure ankles and wrists are accessible for electrode application.
- ECG electrode placement should always be performed with the technician standing to the participant's left side.
- Reference guide for “Participant Data Entry” instructions should be available to insure accuracy.
- Supplies needed for ECG acquisition should be assembled and arranged efficiently.

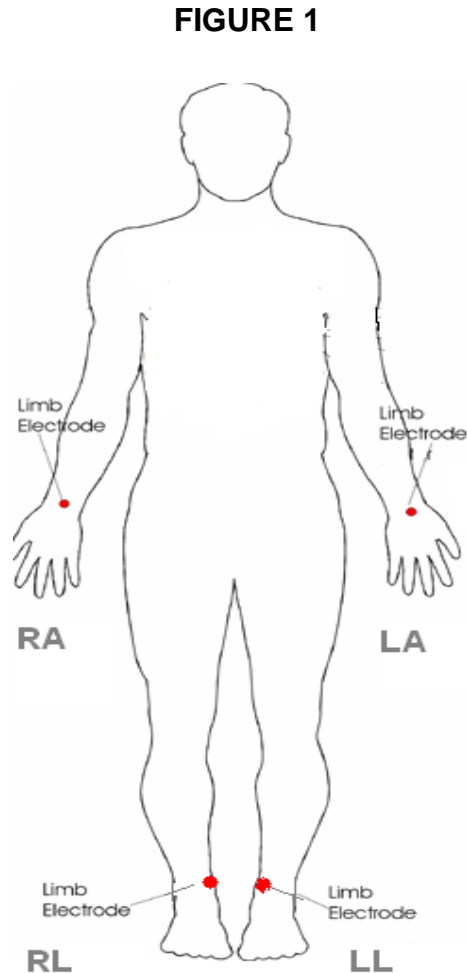
III.1.4 Location of the ECG electrodes
III.1.4.1 Location of limb electrodes (Figure 1)

RIGHT LEG (RL) AND LEFT LEG (LL):

- The right leg electrode serves as a ground connection, and problems there will influence all other leads.
- On the inner side of the right leg (RL), above the ankle, rub briskly an area about 1-2 inches in diameter with an alcohol swab using firm, circular motions
- Mark the position to place the electrode later.
- Repeat this procedure for the left leg (LL).
- In amputees, the leg lead electrode may be placed higher up on the torso.

RIGHT ARM (RA) AND LEFT ARM (LA):

- Rub the inner side of the right arm (RA) above the wrist similar to what you did with the right and left legs.
- Mark the position to place the electrode later.
- Repeat the process for the left arm (LA).
- In amputees, the arm electrode may be placed on the shoulder, below the clavicle.



III.1.4.2 Location of chest electrodes

V1 AND V2:

- First locate the sternal angle about the width of your 3 middle fingers below the sternal notch (Figure 2).
- Feel the sternal angle between the index and middle fingers of your right hand, keeping the fingers wide apart and moving your fingers firmly up and down. While feeling the sternal angle, move your fingers to the left side of the sternum and feel the 2nd rib between your fingers where it joins the sternal angle.
- Move your middle finger to the interspace below the second rib and with your index finger locate the interspace below the next rib (3rd) and again below the next (4th) rib. This is the 4th intercostal space. Mark an X at this level at the midsternal line. X is the reference level for V1 and V2. Mark their locations at the right and left sternal border (Figures 2 and 3).

FIGURE 2

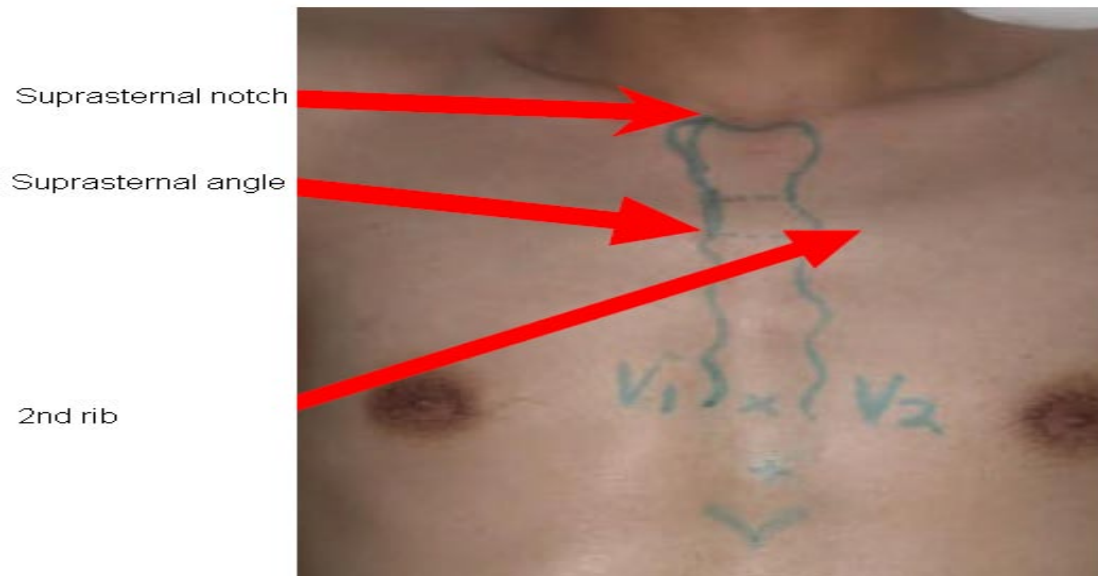
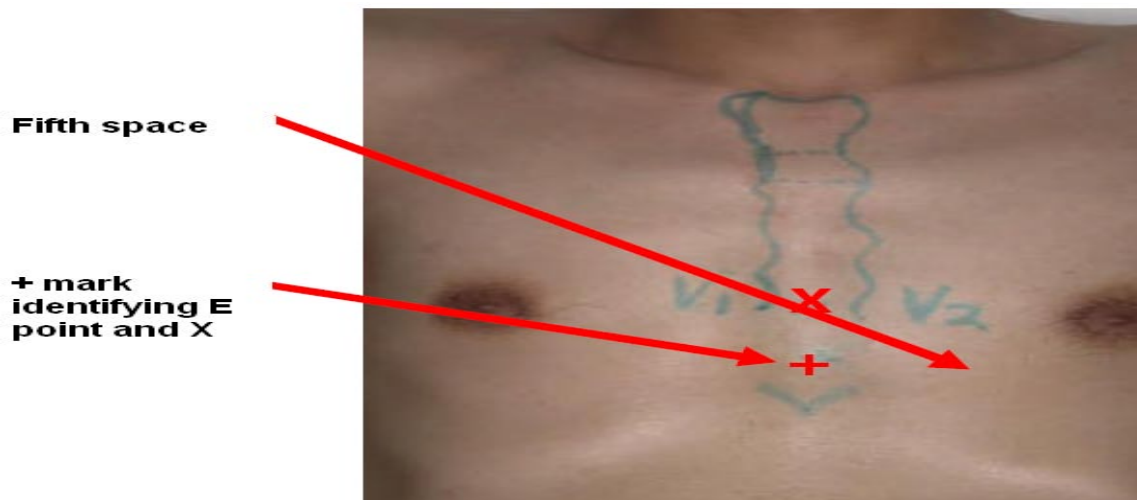


FIGURE 3



REFERENCE POINT "E" FOR LOCATING V4, V5, AND V6

- From the location of V2, palpate with the middle finger of your right hand the intercostal space and follow it laterally outside the sternal border and at a slight angle down. Feel the 5th rib between your index and middle fingers and feel the 5th intercostal space with your index finger.
- At the level of the 5th intercostal space, mark a + at the midsternal line below your x mark for V1-V2 level. This + is the reference level "E" for V4, V5, and V6 (Figure3).

- In overweight persons and in women with tender breast tissue, it is often difficult to locate the 5th intercostal space. In such a case, mark the + for E point 1 ¼ in (3 cm) below your reference level X for V1 and V2 (in smaller adults, 1 inch. (2.5 cm) is enough).

APPROXIMATE LOCATION OF V6

- Move the left elbow laterally without moving it anteriorly or posteriorly, while observing the anterior and posterior axillary folds. The left elbow must be supported properly.
- Follow a line exactly in the vertical midplane of the thorax (mid-axillary line - Figure 4) down where the line meets the horizontal plane of e point. Using your marker, make a vertical one inch long line there as an approximate location of V6.

EXACT LOCATION OF V6

- Exact location of V6 is determined by using the HeartSquare (Chest-Square).
- Place the HeartSquare horizontally with the wider arm (E arm) at level e point (Figure 4).
- Slide the V6 arm of the HeartSquare towards the midaxillary line until the arrow points to the mark at the midaxillary line. Mark the exact location of V6 at the level of the arrow on the V6 arm.

FIGURE 4

E point

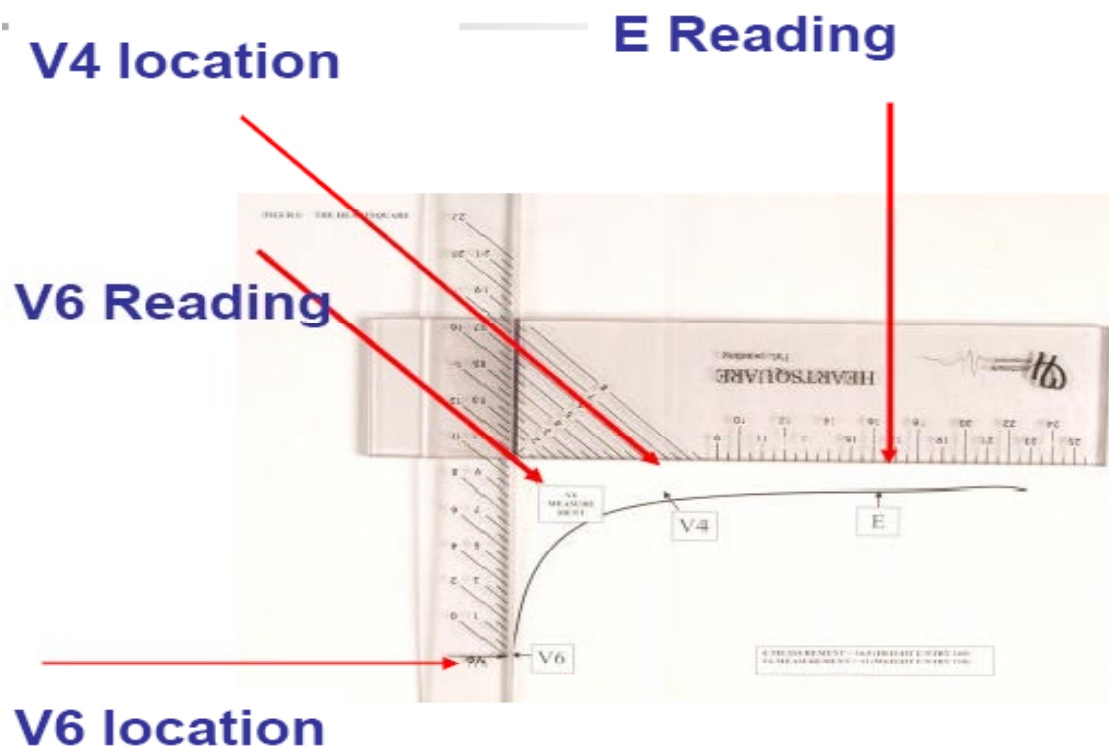


Exact V6 location

EXACT LOCATION OF V4

- While keeping the HeartSquare in the horizontal position with the arrow on the V6 arm pointing toward the V6 position, observe the reading at E point. (Figure 5)
- Use this E reading on the centimeter scale on the V6 arm, and follow this same E reading along the 45 degree lines towards the torso to locate the exact position of V4.
- Now that you have located V6 and V4, secure the V6 arm with your thumb to prevent it from sliding. Note the V6 reading which is the distance from the arrow on the V6 arm to where this arm intersects the E arm at right angles. You may then remove the HeartSquare.
- Enter the E and V6 measurements as three digits. Figure 5 shows that the E entry is 160 and the V6 entry is 120 for the readings of 16.0 cm and 12.0 cm, respectively. Enter the 160 for E in the height field of your Mac 1200 and 120 for the V6 measurement in the weight field (DO NOT ENTER THE HEIGHT AND WEIGHT OF THE PARTICIPANT).

FIGURE 5



LOCATIONS OF V3 AND V5

- Mark V3 exactly halfway between V2 and V4.
- Mark V5 exactly halfway between V4 and V6. (Figure 6)

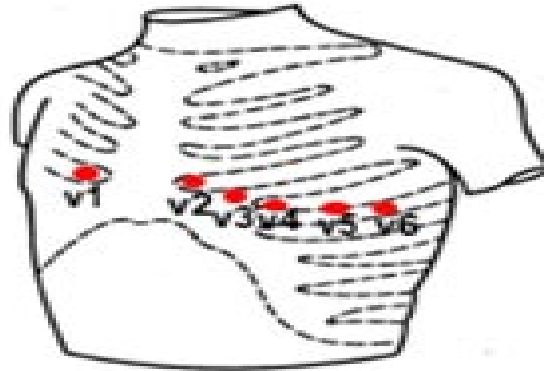


FIGURE 6

III.1.4.3 Attaching the electrodes:

- After you have marked electrodes positions and rubbed them with Alcohol swabs, you may apply the electrodes.
- Do not place electrodes directly over bone.
- Attach lead wires in the same, correct order every time to establish routine and to eliminate lead swaps.
- Position the MULTI-LINK on the participant's abdomen.
- Grasp each lead at the MULTI-LINK attachment point.
- Follow lead wire to the electrode attachment end.
- Attach wire to electrode, making sure clip is not in contact with electrode adhesive.
- Make sure lead wires have some slack and are hanging loosely.
- You may secure the lead wire to the skin by applying paper tape 1-inch below the clip, especially if the ECG shows baseline noise despite careful preparation.

III.1.5. ECG recording

- Once the Electrocardiograph is initiated, the machine will go into self-testing.
- The ECG machine is set up to simultaneously acquire 12 leads of ECG for a period of 10 seconds.
- Before you start recording the ECG, participant data must be entered. Table (2) summarizes the data entry process.
- Re-check all participant data entries.
- For the ECG recording, press the "start" key. The machine will print a copy of the ECG and will automatically store the data electronically for later transmission to the CERC.
- Inspect the record immediately for quality. Repeat the recording if you see any quality problems. (see examples of the common ECG problems that affect quality and possible solutions)

Table 2: Participant data entry

New Patient	Select Yes
Participant Last Name	Enter the first 4 letters of the last name
Participant First Name	Enter the visit number [For this third visit, enter 003]
Date of Birth	Enter participant's date of birth
Participant ID	Enter participant's study identification number decided by the CC.
Secondary ID	Enter the Participant's identification number (as above)
Pacemaker	Select Yes or No
Gender	Enter Male or Female
Height	Enter E measurement of HeartSquare (e.g., if E=16.0, enter 160). Do not enter participant's actual height
Weight	Enter V6 measurement of HeartSquare (e.g., if V6= 12.0, enter 120). Do not enter participant's actual weight.
Race	Use Race codes defined in MAC1200
Referred by	No action required. Pre-programmed into machine
Technician ID	Choose "Other" and highlight technician's name
Location	No action required. Pre-programmed into machine

III.2. Local ECG reading

Because there are no available diagnostic statements from the CERC except as monthly measurement reports to the Coordinating Center and because the diagnostic statements printed on the ECG by the MAC 1200 are not always correct, the local clinic reading of the ECGs is essential for safety purposes. All of the study ECGs should be seen by the study clinic physicians after recording and before the participant leaves the clinic. Minor, clinically insignificant ECG findings do exist in general population samples although many of these do not need immediate attention. All ECG findings along with other clinic results will be passed along to participants and their physicians at a later date. "ALERT" ECGs, in particular, should be reviewed by the clinic physician at any scheduled JHS study visit and evaluated for possible cardiology referral.

The list of ECG alerts of conditions needing closer scrutiny includes:

- Heart rate \leq 40 beats per minute
- Heart rate \geq 150 beats per minute
- Atrial fibrillation (Figure 7)
- Atrial flutter (Figure 8)
- Ventricular tachycardia (Figure 9)
- Acute (not old) myocardial infarction (Figure 10)
- Ventricular pre-excitation or Wolff-Parkinson-White (WPW) syndrome (Figure 11)
- Complete atrioventricular block (Figure 12)
- Left bundle branch block (Figure 13)
- And/or cardiac pacemaker (Figure 14)

Figure 7. Atrial fibrillation.

Diagnosis key points: irregular QRS complexes (heart rate) and absence of the P wave

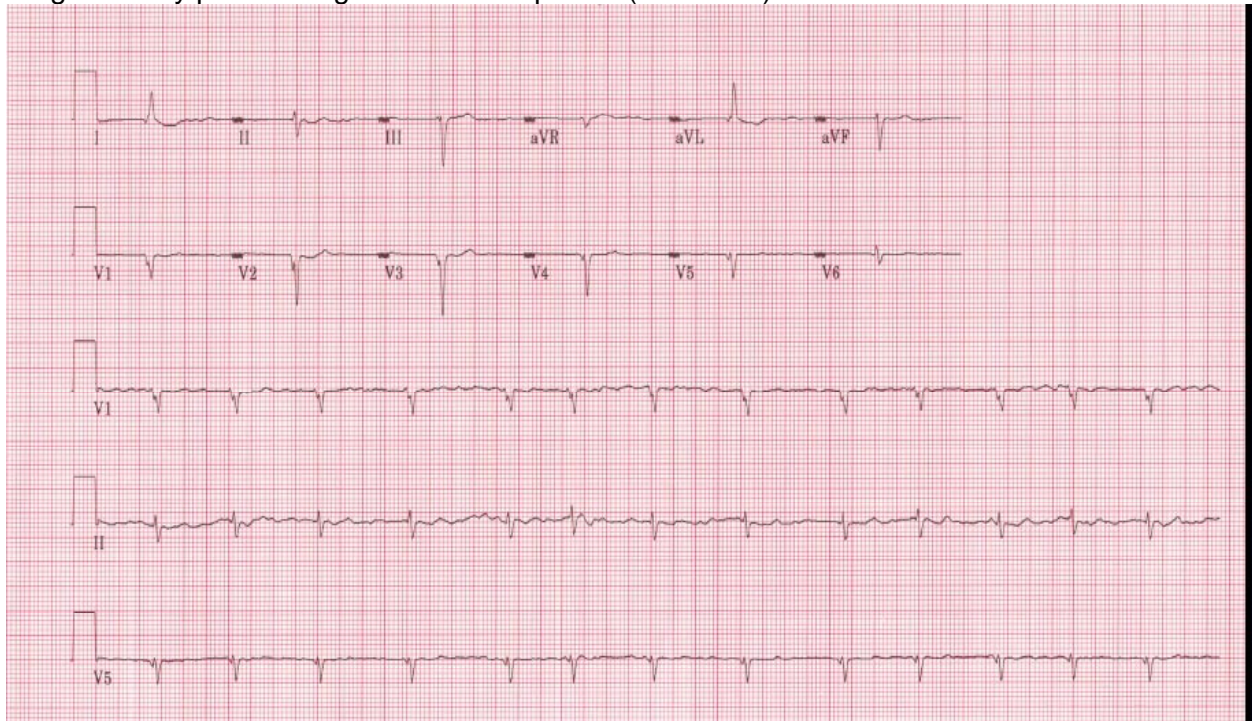


Figure 8. Atrial flutter

Diagnosis key points: multiple P waves; saw-teeth pattern (as in V1), mostly regular but could be irregular with a certain pattern (regular irregularity)

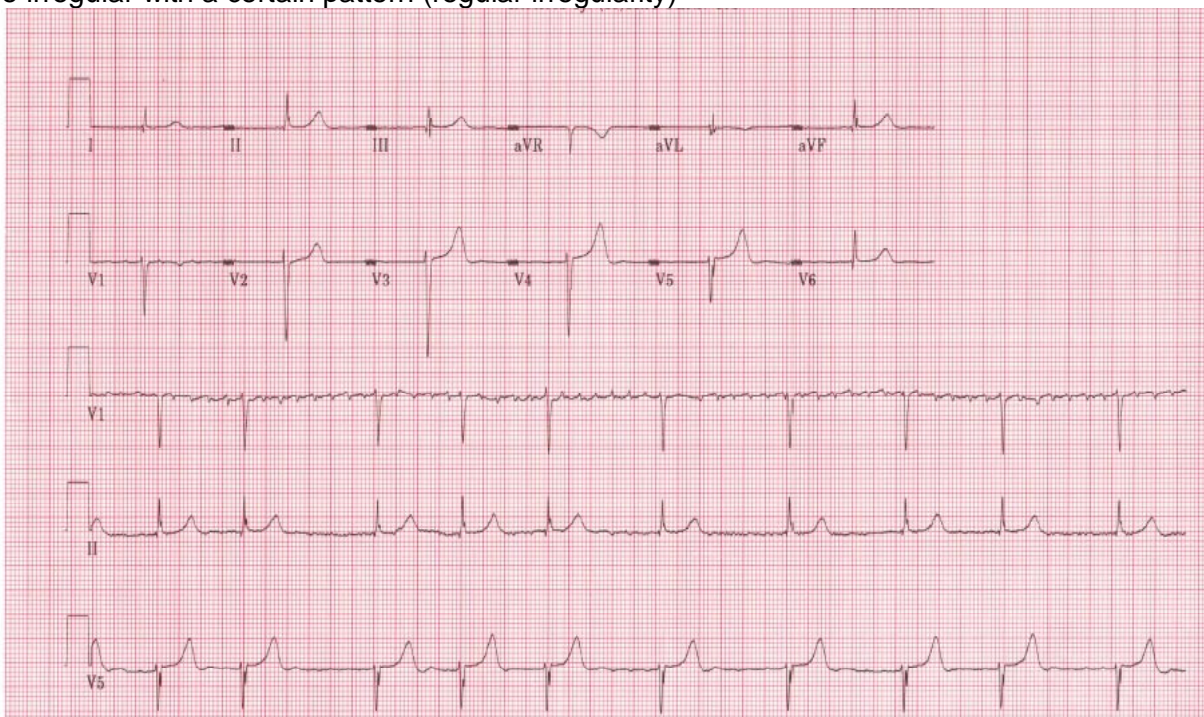


Figure.9 Ventricular tachycardia

Diagnosis key points: Wide complex tachycardia ($HR \geq 110$) with QRS not preceded by P wave. The participant will be mostly restless

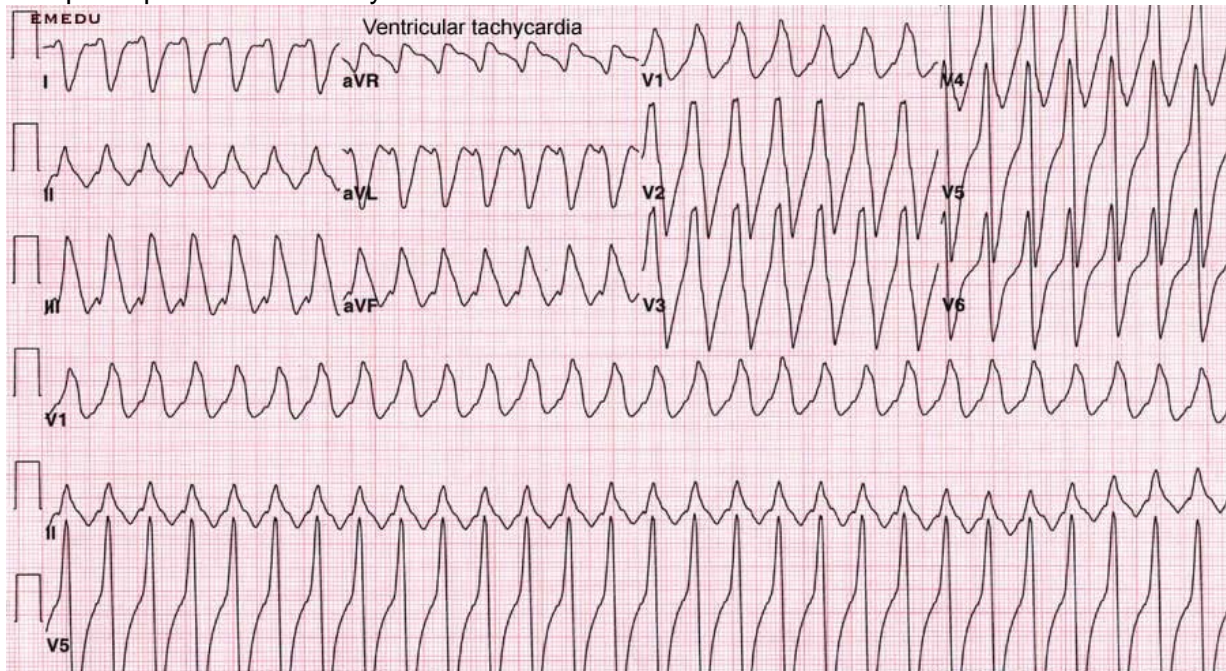


Figure 10. Acute inferior (upper panel) and acute anterior (lower panel) myocardial infarction

Diagnosis key points: Elevated ST segment in a group of adjacent leads with or without Q waves and with or without ST depression in other leads. Patients usually will have chest pain

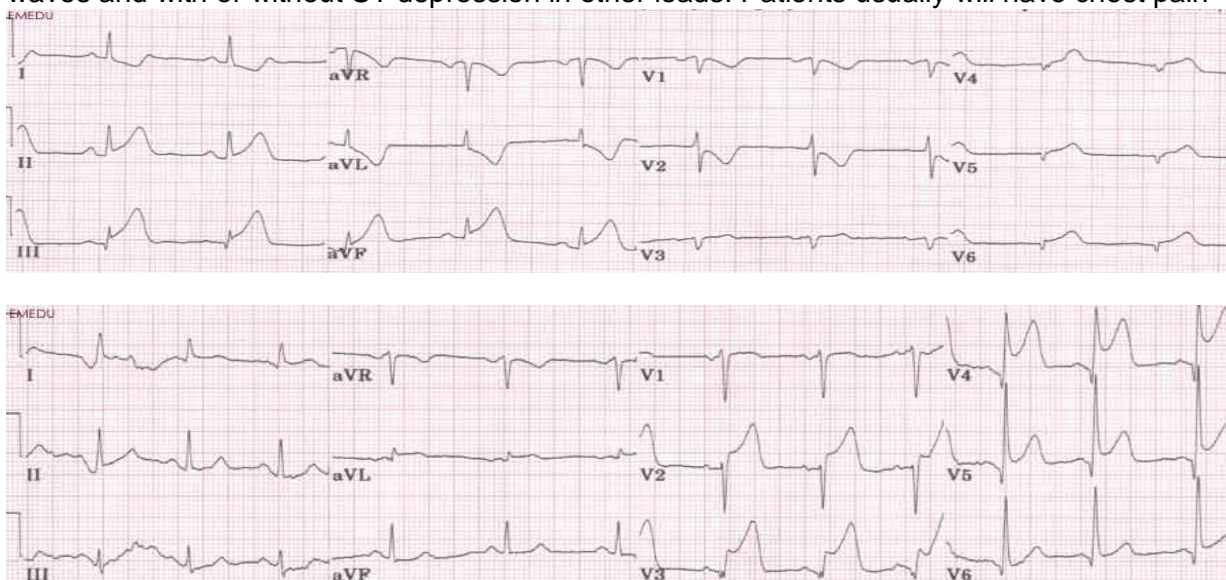


Figure 11. Wolf Parkinson White Syndrome

Diagnosis key points: Short PR interval (below 120 ms), slurred upstroke of the R wave (delta wave) with wide QRS complex (mostly above 110 ms)

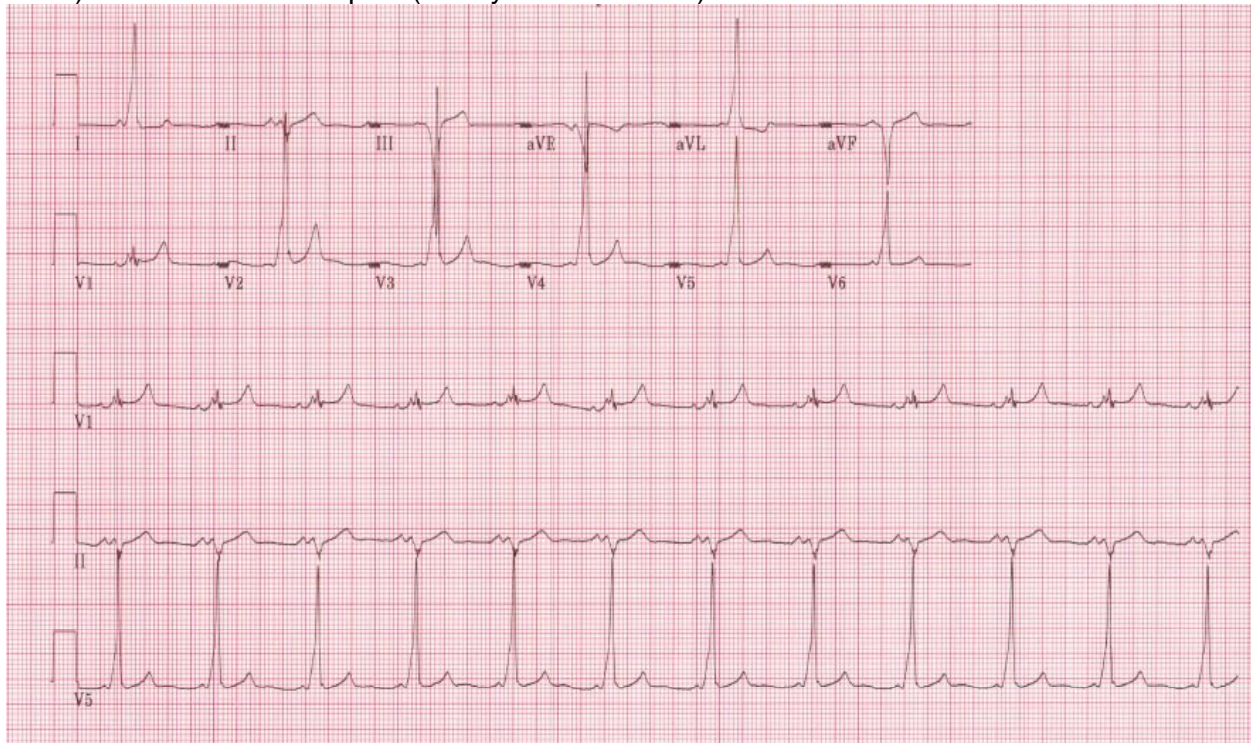


Figure 12 Third degree atrioventricular block.

Diagnosis key points: Slow heart rate (around 40 beats per minute) with no relation between the P wave and the QRS

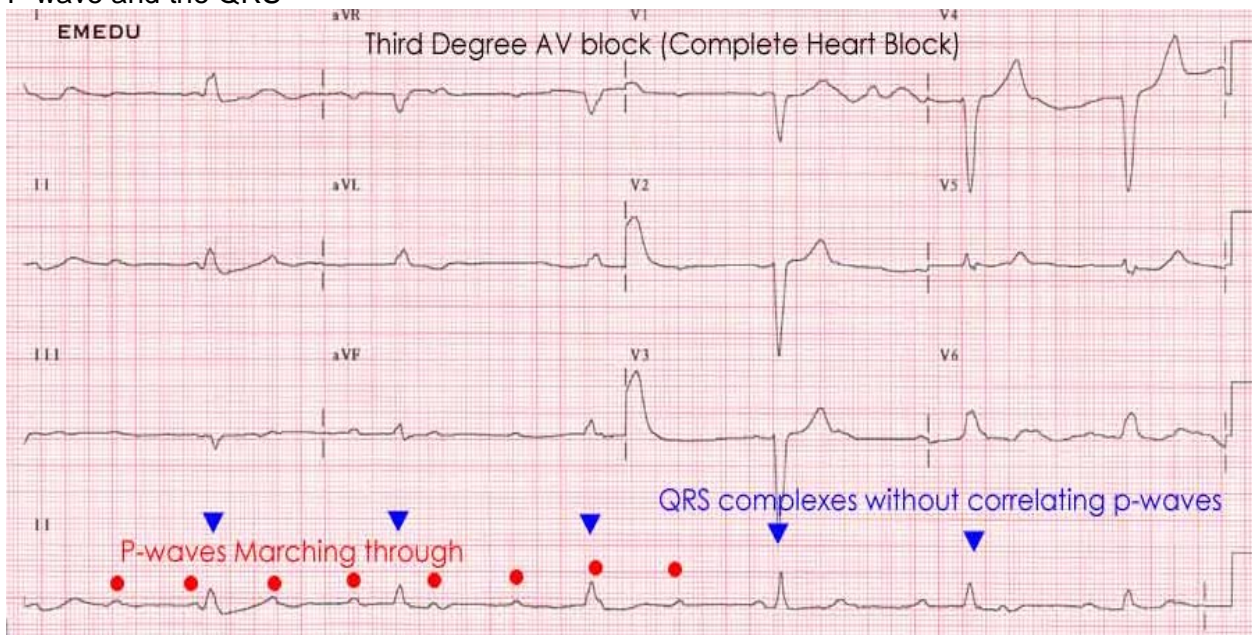


Figure 13. Complete left bundle branch block

Diagnosis key points: Wide QRS complexes (> 120 ms)

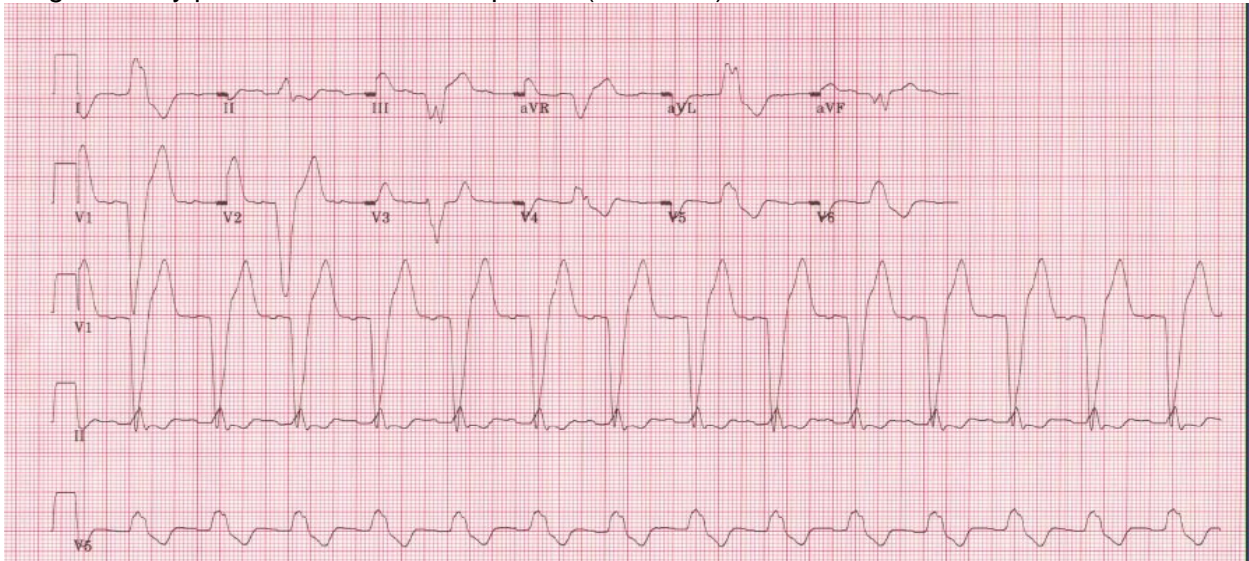
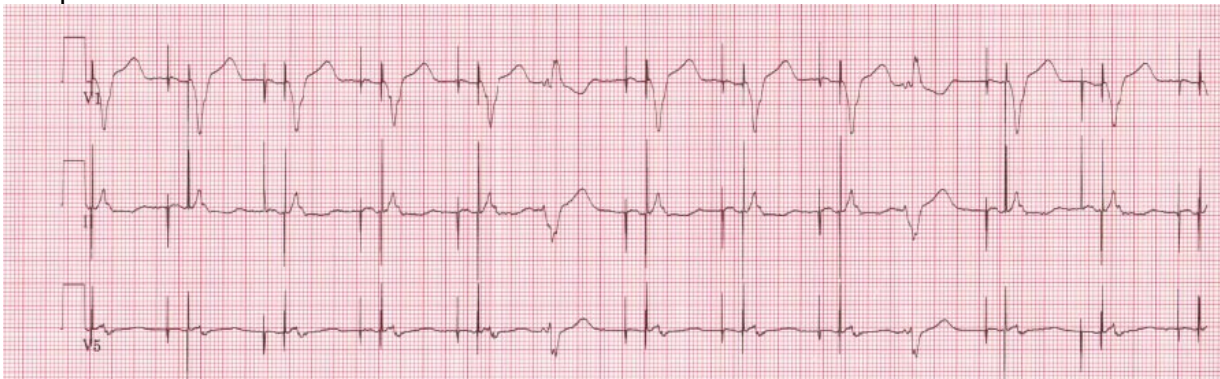


Figure 14. Cardiac pacemaker

Diagnosis key points: Presence of sharp signals (spikes) before either the P wave, QRS complex or both



III.3. Data management procedure

III.3.1 Communications setup for transmission

As previously mentioned, internal set up of the machines must be done according to the instructions established by CERC. Correct internal set up should enable the clinics to send the ECGs via a modem and a phone lines. Adding 9 (or other number) to get an outside line and/or adding an access code for long distance are taken into consideration. [NOTE: Contact the CERC any time with questions and/or comments]

III.3.2 Before transmitting ECGs to the CERC

- Ensure that all previously transmitted ECGs are deleted only after confirmation of receipt.
- Check to ensure that all IDs are valid. You can correct any variable from your participant data information by doing the following: While holding the “Shift” key down, press the Store/Retrieve key, move the cursor to the ID in question, highlight “Change” and then proceed to make corrections as needed

III.3.3 Transmitting ECGs to the CERC

- Secure the modem cable into the 9-pin connector found on the right side of the MAC1200 and the 25-pin connector found on the rear of the modem.
- Plug one end of the phone cable into the connector marked “LINE” on the rear of the modem and the other end into any “analog” (fax) phone line.
- Start at the 12-lead screen. While holding the “Shift” key down, press the “Store/Retrieve” key. Press the down arrow 3 times and then hold the shift key and the down arrow together to get to the desired ECG to be transmitted. The screen will show black squares on the right and left sides of the ECG selected for transmission.
- To skip an ECG press the down arrow without using the shift key.
- Repeat this procedure until all ECGs that are to be transmitted have been selected.
- Once selections are made, press the “Enter” key. This will return you to the top of the screen.
- Use the right arrow to highlight “Send” and press the “Enter” key.
- Another screen will appear which states “to start transmission, press enter”. Once transmission is complete, press the “start/Stop” key, located on the far bottom right of the keyboard, to return to the 12-lead screen.
- Confirmation of receipt of transmitted ECGs could be made by email or logging into the EPICARE website using a user name and password specific to each clinic. Allow 24 hours between transmission and confirmation of receipt through the website and deletion of ECGs from the ECG machine to allow system backup at EPICARE. **No ECGs are to be deleted from the electrocardiograph until receipt by EPICARE is confirmed.**

III.3.4 Directory management

Keep your directory correct and current by doing the following:

- BEFORE TRANSMISSION: Delete all unwanted ECGs like those with flat lines, poor quality or duplicates. Correct any errors in participant data entry like ID numbers, or HEARTSQUARE measurements

- AFTER TRANSMISSION: Delete transmitted ECGs ONLY after confirming that EPICARE has successfully received the ECGs.

III.4. Ancillary ECGs

Ancillary ECGs are obtained for participants having ECGs recorded outside the clinic. This includes ECGs recorded in-hospital and at local medical facilities.

III.4.1 Procedures for obtaining Ancillary ECGs

For each JHS participant with an in-hospital or clinic ECG, obtain up to 3 ECGs for each event. For example, a participant has a two-day hospital stay for chest pain. Ideally, the JHS clinic staff will obtain three ECGs; the first ECG upon participant's admission to the hospital/ER/clinic; the last ECG before the participant's discharge; and one in between. Label each ECG with the participant's JHS ID number, and either F (First), T (in between) or L (Last), indicating the order of the ECGs.

Original ECG tracings are best, otherwise a good photocopy should be taken. Obtain two copies, one to keep in the JHS participant's clinic file, and one to send to EPICARE.

III.4.2. Transmission of Ancillary ECGs

Monthly, the JHS will send Ancillary ECGs to the EPICARE. Two copies of a shipping form will accompany the shipment, listing the JHS participant IDs. Upon receipt, EPICARE authorized person will initial and date the shipping forms and send one back to the JHS. See Appendix D for an example of a shipping form.

ECGs should be shipped to: Lisa Keasler
EPICARE
2000 West First St.
Piedmont Plaza 2, Suite 505
Winston-Salem, NC 27104

IV. READING CENTER TECHNICAL DETAILS

Set-up of the machines is ONLY allowed to be done at EPICARE or with assistance of one of the EPICARE staff or an authorized study personnel if it has to be done at the clinic. It may be necessary to re-program the machine after the start of the study if a malfunction occurs, or the battery has been allowed to become dead. The machine set-up and programming instruction are listed in Appendix E. PROGRAMMING WITHOUT ASSISTANCE FROM THE CERC PERSONNEL IS NOT ALLOWED

V. QUALITY CONTROL ISSUES AND PROCEDURES

V.1 Quality grades

The ECG reading center evaluates and ranks the ECG quality through an automated system with visual confirmation of the results if needed. There are 5 grades from 1 to 5. The best grade is 1 and the worst is 5. Generally, grades 1 and 2 are difficult to separate visually and they are considered good. Grades 3 and 4 are given to ECGs that have correctable problems i.e. the

ECG problems could be adjusted for on reading them. Grade 5 ECG are given for the ECGs that there have major problems which make it impossible to read them

V.2 Certification/Recertification procedures

- All ECG technicians **must go through the certification** process before they are allowed to acquire study ECGs.
- Each technician must acquire and successfully transmit three (3) good quality ECGs.
- The 3 ECGs should be performed on 3 different volunteers or on 1 volunteer provided that there is at least 30 minutes between each ECG.
- Recertification process (required annually) is the same as the certification process.
- The participant data entry should be done according to the instructions in table 3 after pressing the “pat info” key on the MAC 1200 keyboard

Table 3 Entry into the MAC1200 for certification of technicians **ONLY**

Category	Entry
New Patient	YES
Last name	Enter technician's last name
First name	Enter technician's first name
Date of birth	Enter volunteer's birth date (MM/DD/YY)
Participant ID	Enter 99999999 (Press “Shift” key to enter numbers)
Secondary ID	Enter 99999999 (Press Shift key to enter numbers)
Pacemaker	YES or NO
Gender	M or F (Note: Do not choose)
Height	E Measurement of HeartSquare (e.g., if E=16.0, enter 160)
Weight	V6 Measurement of HeartSquare (e.g., if V6=12.0, enter 120)
Race	Choose “Other” and choose defined race codes
Referring physician	No action required. Pre-programmed data
Technician	Choose “Other” and select technician's last name
Location	No action required. Pre-programmed data

V.3. Examples of common ECG quality problems and possible solutions

- EXCESSIVE BASELINE DRIFT (Figure15): This occurs if the participant is moving around or there is tension on the lead wires. Ask the participant to lie still for a few seconds. Drift in excess of 1 mm between baseline points (QRS onset) of any two successive complexes is a sign of significant drift.
- EXCESSIVE MUSCLE NOISE (Figure 16): The participant is either tense due to lack of body support or may be cold. Use a wide bed and blanket to cover the participant.
- BASELINE DRIFT DUE TO TANGLED WIRES (Figure 17): Ensure that the wires are not pulling. Be sure to establish a good electrode connection. Lay a towel across the wires, if necessary. Adjusting the angle of the clip at the electrode often helps. You may need to tape down the chest leads; use only hypoallergenic medical tape to prevent allergic reactions. Use a U loop (not a cross loop) with the electrode wires, i.e., the wire should not cross but remain open like a U; never crossover wires
- LOOSE ELECTRODE CONNECTION (Figure 18): Loose electrode connection may cause a wavy baseline in some ECG leads. Check each electrode to ensure that it is secure.
- SIXTY HZ NOISE (Figure 19): Periodic 60 HZ noise is sometimes visible in the record. This may be caused by AC interference from a nearby machine. Make a visual check of

this before recording the ECG. Unplug any unnecessary surrounding electric equipment
Note: Jewelry does not cause 60 HZ noise.

- **MISSING LEADS AND LEAD REVERSAL** (Figures 20, 21, and 22): To minimize the chances of having lead reversal and missing leads, always make sure that there are no flat lines in the ECG recording and/or mainly positive QRS in aVR lead. Also, always have a second look at the connections before recording

V.4. Other issues

Each clinic has to keep list of phone numbers of the ECG reading center contact persons, participant data entry quick reference guide, GE operation manual for the MAC 1200 and GE contact numbers to order supplies

Figure (15) Excessive baseline drift due to sudden movement of the participant

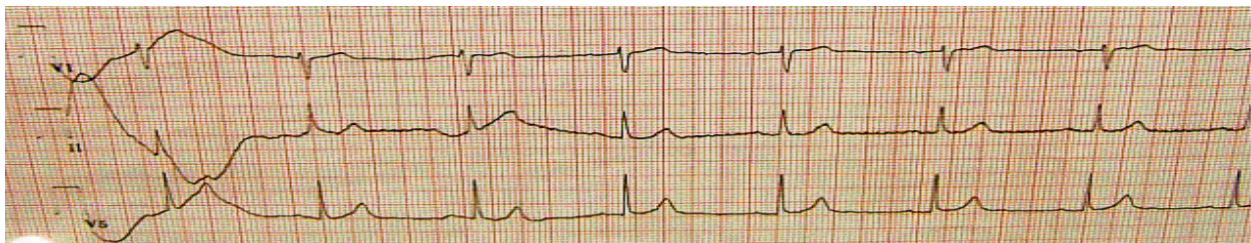


Figure (16) Excessive muscle noise

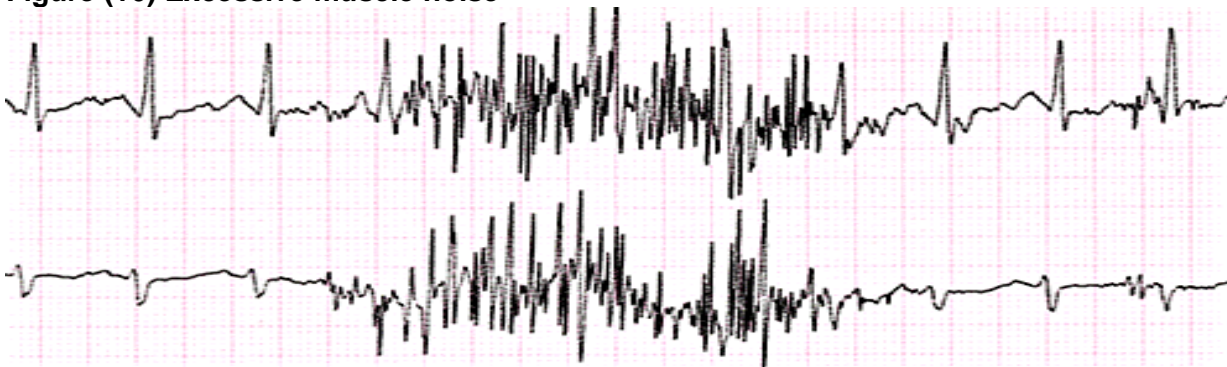


Figure (17) Baseline drift due to tangled wires



Figure (18) Wavy V1 baseline due to loose electrode

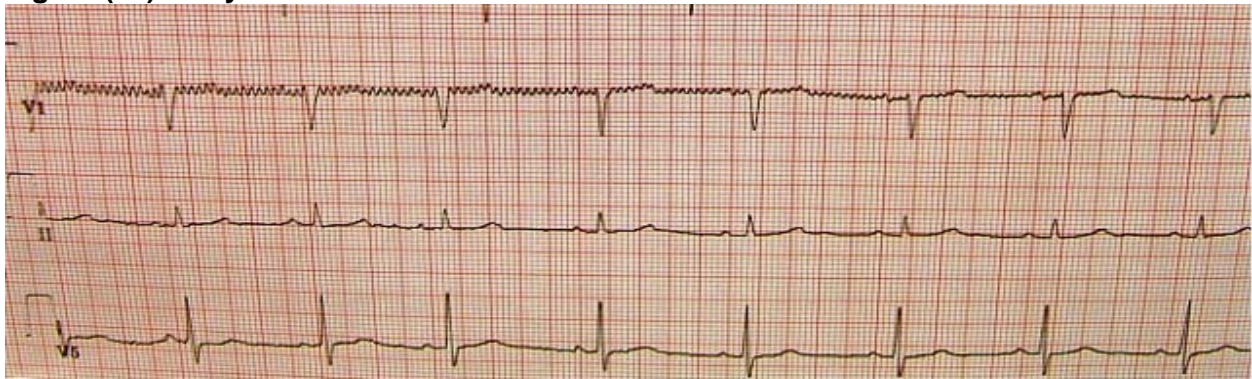


Figure (19) Sixty Hz electrical interference



Figure (20) Flat line due to missing V1 lead

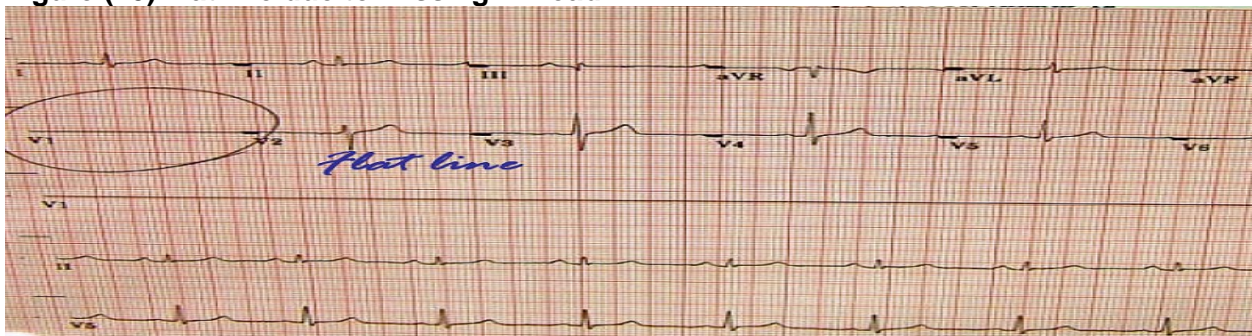


Figure (21) Lead reversal denoted by positive aVR (upper panel) compared to the normal (lower panel)

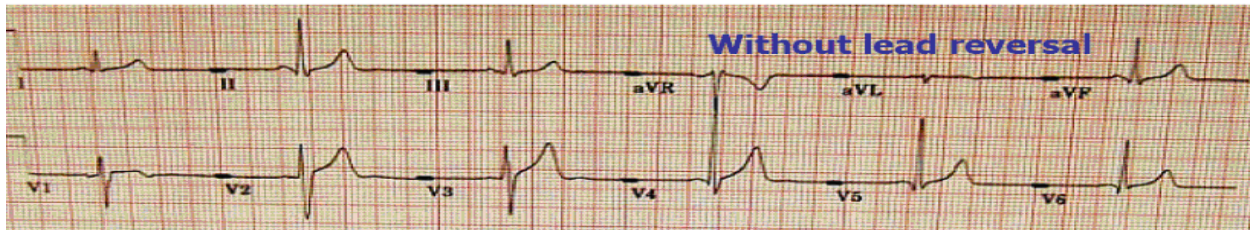
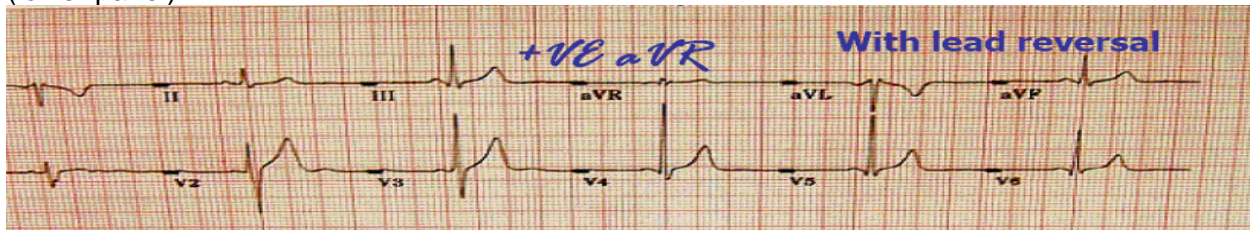
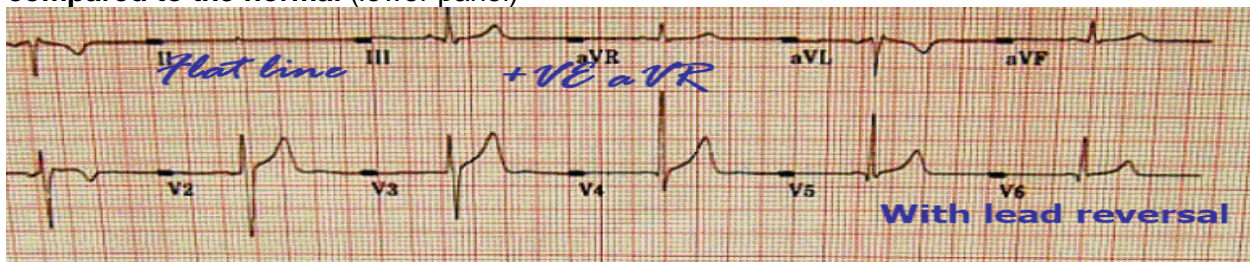


Figure (22) Lead reversal denoted by flat line in one of the limb leads (upper panel) compared to the normal (lower panel)



VI. APPENDICES

Appendix A

Contact list of the JHS Central ECG Reading Center (CERC), EPICARE

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EPICARE Fax: (336) 716-0834

Appendix B

JHS Quick Reference Guide for Entry of New Participant Data Prior Recording

New Patient	Select Yes
Subject Last Name	Enter the first 4 letters of the last name
Subject First Name	Enter the visit number [For this third visit, enter 003
Date of Birth	Enter participant's date of birth
Participant ID	Enter participant's study identification number decided by the CC.
Secondary ID	Enter the Participant's identification number (as above)
Pacemaker	Select Yes or No
Gender	Enter Male or Female
Height	Enter E measurement of HeartSquare (e.g., if E=16.0, enter 160). Do not enter participant's actual height
Weight	Enter V6 measurement of HeartSquare (e.g., if V6= 12.0, enter 120). Do not enter participant's actual weight.
Race	Use Race codes defined in MAC1200
Referred by	No action required. Pre-programmed into machine
Technician ID	Choose "Other" and highlight technician's name
Location	No action required. Pre-programmed into machine

Appendix C

Transmission of JHS study ECGs to the CERC

Before transmitting ECGs to the CERC

1. Ensure that all previously transmitted ECGs are deleted only after confirmation of receipt by the CERC.
2. Check to ensure that all IDs are valid.
3. You can correct any variable from your participant data information by doing the following:
 - a. While holding the “Shift” key down, press the Store/Retrieve key,
 - b. Move the cursor to the ID in question,
 - c. Highlight “Change”
 - d. Proceed to correct information

Transmitting ECGs to the CERC

1. Plug one end of the phone cable into the connector marked “LINE” on the rear of the modem and the other end into any “analog” (fax) phone line.
2. Start at the 12-lead screen.
3. While holding the “Shift” key down, press the “Store/Retrieve” key.
4. Use the arrow keys to get cursor to the send option below the ECG to be transmitted, then press the “Enter” key. To skip an ECG press the down arrow without using the shift key. Repeat this procedure until all ECGs that are to be transmitted have been selected
5. Press the enter key to start the transmission
6. Once transmission is complete, press the “Start/Stop” key, located on the far bottom right of the keyboard, to return to the 12-lead screen.
7. Confirmation of receipt of transmitted ECGs is made by logging into the EPICARE website using a user name and password specific to each clinic.

Appendix D

JACKSON HEART STUDY SHIPPING FORM for ANCILLARY ECGs

Date shipped: _____ Prepared by: _____

Total number of ECGs in shipment: _____ Telephone: _____

Instructions:

Please complete this shipping form and include it with your ECG shipment to the Minnesota ECG Coding Center. Enter each participant ID, the date shipped, total number of ECGs in the shipment, the name and phone number of the person preparing the shipment. Only accurate shipping forms will be accepted, others will be returned for correction.

Once the ECGs are received and verified, ECG Coding Center staff will initial and date the form and return a copy to the JHS to verify receipt.

#	Patient ID
1	00J123456 – F
2	00J123456 – T
3	00J123456 – L
4	00J567890 – F
5	00J567890 – L
6	00J135792 - F
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	

#	Patient ID
26	
27	
28	
29	
30	
31	
32	
33	
34	
35	
36	
37	
38	
39	
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41	
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46	
47	
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49	
50	

Shipment received by: _____ Date: _____

Appendix E
MAC 1200 PROGRAMMING AND SETUP

IF THIS EVER BECOMES NECESSARY, CALL EPICARE BEFORE DOING SO!
Minor changes in the set up below occur during the course of the study- ALWAYS CALL!

In order to setup a MAC1200 for the JHS study turn the ECG machine ON. After the self-test completes, the ECG machine will be at the 12-lead screen (3 flat lines). Press the "Setup" key. Press "Enter" to select either 12-lead setup, system setup, communication setup, participant data setup, or code setup. To make a selection, use the four arrow keys to highlight any selection and press "Enter".

12-Lead Setup

CATEGORY	SELECTION
REPORT SEQUENCE	[STANDARD]
RHYTHM LEADS	[II]
GAIN	[10]
REPORT FORMAT	[4x2.5R1]
DETAILED RESULTS	[NO]
MUSCLE FILTER	[NO]
MUSCLE FILTER FREQUENCY	[40 Hz]
AC FILTER	[YES]
MANUAL COPY TO	[HOST]
NO. OF COPIES	[1]
DELETE ECG AFTER TRANSMISSION	[NO]
AUTOSAVE ECG	[YES]
USE SCREENING CRITERIA	[NO]
SUPPRESS NORMAL STATEMENTS	[NO]
SUPPRESS ABNORMAL STATEMENTS	[NO]
INTERPRETATION	[YES]
PRINT INTERPRETATION	[YES]
OVERRIDE FUNCTION	[YES]

When finished, press the STOP key

Press the Down Arrow key to highlight System Setup, and press ENTER.

System Setup

CATEGORY	SELECTION
ORDERING PHYSICIAN	Name of the local clinic coordinator
REFERRING PHYSICIAN	Highlight OTHERS press ENTER. Press ENTER until the cursor is under the LAST NAME; type JHS. Press ENTER until the cursor is under the FIRST NAME; type Jackson. Press ENTER; then press the Stop key.
TECHNICIAN	Choose OTHERS, press ENTER. Press ENTER until the cursor is under the LAST NAME; type the technician's LAST NAME then press ENTER. Type the technician's FIRST NAME then press ENTER. Press the Stop key.
INSTITUTION NAME	Type JHS
CART NUMBER	Individual numbers will be assigned to each machine
SITE NUMBER	ENTER 170 This is EPICARE's Study Number for JHS
LOCATION NUMBER	ENTER (01)
DATE (mm/dd/yyyy)	ENTER the correct date using the mm/dd/yyyy format.
TIME (hh:mm)	ENTER the correct time in the hh:mm format.
LEAD FAIL BEEP	[NO]
HIGH HR BEEP	[NO]
LEAD LABELS	[AAMI]
PACE ENHANCEMENT	[NO]
BASELINE ROLL FILTER	[0.08]
DATE	[MM/DD/YYYY]
TIME	[24]
UNITS	[Cm, Kg]
MAINS	[60 Hz]
LCD LIGHT OFF AFTER	[5 MINS]
LOW BATTERY BEEP	[0 sec]
DEFAULT MODE	[12 LEAD]
LANGUAGE	[ENGLISH]
ENABLE PASSWORD	[NO]
TEST DATA	[NO]
RESTORE DEFAULTS	[NO]
PRINT SETUP LISTS	[NO]

When finished, press the STOP key

Press the Down Arrow key to highlight Communication, and press ENTER.

Communication Setup

CATEGORY	SELECTION
BAUD RATE (PC)	[9600]
PROTOCOL	[CSI]
MODEM	MultiTech 56k
DIAL MODE	TONE
PHONE NO.	13367131105 If an Access code is required to dial a long distance number, enter the access code and the transmission telephone number at EPICARE, the same way you would dial a long distance number from your institution (using your Access code), e.g.: <ul style="list-style-type: none">• If the Access Code is needed AFTER entering the transmission number, enter: 13367131105,,,123456789 where 123456789 is the Access Code• If the Access Code is needed BEFORE entering the transmission number, enter 123456789,,, 13367131105 where 123456789 is the Access Code Note: Access codes are separated from the EPICARE transmission telephone number by three commas. This allows the MAC1200 to pause before another telephone number is entered.
OUTSIDE LINE	If you need an outside line to obtain dial tone, please enter that digit here, e.g. 9

When finished, press the STOP key

Press the Down Arrow key to highlight Patient Data Setup, and press ENTER.

Participant Data Setup

CATEGORY	SELECTION
NEW PATIENT	[YES]
PACEMAKER	[YES]
GENDER	[YES]
HEIGHT	[YES]
WEIGHT	[YES]
RACE	[YES]
SYSTOLIC BP	[NO]
DIASTOLIC BP	[NO]
ORDERING PHYSICIAN	[NO]
REFERRING PHYSICIAN	[YES]
TECHNICIAN	[YES]
PHONE NO.	[NO]
MEDICATION	[NO]
COMMENTS	[NO]
ID REQUIRED	[YES]
PATIENT ID LENGTH	9
SECONDARY ID	[YES]
SECONDARY ID REQUIRED	[YES]
LAST NAME (Required)	[YES]
FIRST NAME (Required)	[YES]
LOCATION #	[NO]
ROOM #	[NO]
ORDER NUMBER	[NO]
EXTRA QUESTIONS	[Leave Blank]

When finished, press the STOP key. Press the STOP key once again to exit the Setup menu. The Option Code Setup requires NO action.