

Basic 12 Lead EKG Class

The basics of 12 Lead
EKG interpretation and
practice.

4. Complete the "hands-on" lead placement skill station.

Skills Assessment 12-Lead ECG Acquisition

Objective: The participant will obtain an "on-scene" 12-lead ECG on a simulated "stable" patient while directing basic cardiac care and assessment.

Equipment: Live volunteer, 12-lead ECG monitor, electronic ECG simulator and false cable or pre-printed ECG tracing.

1. Locate patient. Power up monitor (indicates patient contact).
2. Recognize need for a 12-lead ECG.
3. Remove patients clothing above the waist. Use a gown or sheet to preserve patient's modesty.
4. Apply SpO₂ monitor and O₂ as indicated.
5. Direct assistant to obtain and report vital signs.
6. Select, shave and abrade limb lead sites.
7. Apply limb leads.
8. Print rhythm strip.
9. Select, shave and abrade precordial limb lead sites.
10. Apply precordial leads.
11. Place patient in position of comfort (supine preferred).
12. Verify that all electrodes are securely attached.
13. Remove any obvious and proximal sources of EMI.
14. Place cables so that they are neither swaying nor tugging at electrodes (use clip if available).
15. Instruct patient to keep arms supported, and to avoid even subtle movement.
16. Coach patient to relax and take a deep breath.
17. Acquire 12-lead ECG.

ECG MONITORING -12 LEAD

12/13/2013

[EMT-I, PARAMEDIC]

Single Monitoring leads help establish the rate and regularity of the heartbeat. They also help identify if there is an arrhythmia.

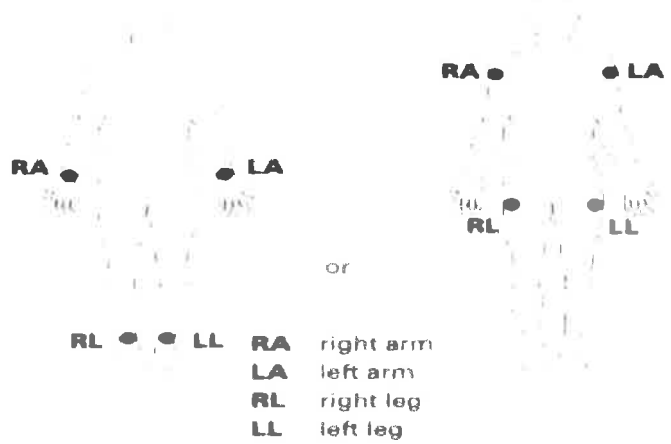
The 12-Lead ECG is used to evaluate patients for the possibility of acute myocardial infarction (AMI) and improve the evaluation of arrhythmias.

INDICATION	<ol style="list-style-type: none"> 1. Evaluate patient for the possibility of acute myocardial infarction (AMI), with or without chest pain. 2. Evaluation of arrhythmias (including trauma, electrical electrolyte abnormalities (e.g. hyperkalemia), and many other conditions.)
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PROCEDURE Limb Leads
 The Limb Leads record activity from a vertical plane of reference.

Lead	Placement
RA/White	Right mid-clavicular line (MCL), below clavicle; or above anterior wrist
LA/Black	Left (MCL), below clavicle; or above anterior wrist.
LL/Red	Between 6th and 7th intercostal space, left MCL line; or ankle or thigh.
RL/Green	Between 6th and 7th intercostal space, right MCL line; or ankle or thigh.

Limb Leads



ECG MONITORING -12 LEAD

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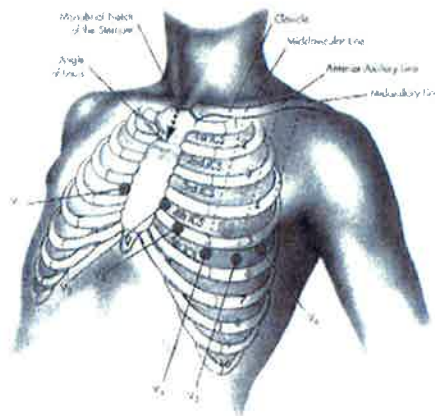
[EMT-I, PARAMEDIC]

Precordial Leads

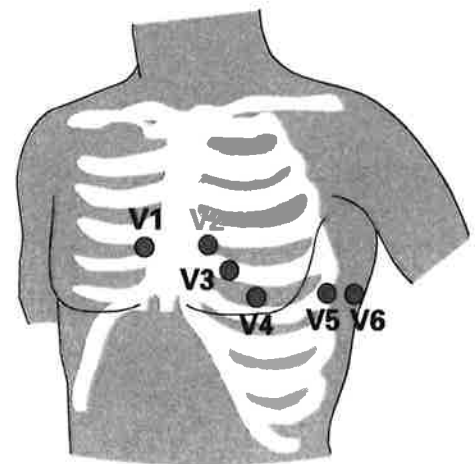
Certain landmarks help with the location of electrode placement

- **Angle of Louis** - this structure is a ridge on the sternum directly below the manubrial notch at the top of the sternum. Directly below and to the sides of the Angle of Louis is the second intercostal space. Use this to count down two more spaces for placement of V1 & V2.
- **Mid-Clavicular Line** - from MCL runs down to 5th intercostal space for V4.
- **Axilla** - left armpit, point where axilla meet the chest determines the Anterior Axillary line. V5 is positioned in horizontal alignment with V4 on the left Anterior Axillary line. Midway down the axilla is the Mid-Axillary Line. V6 is placed in horizontal alignment with V5 on the Mid-Axillary Line.

	Placement
V1	4 th Intercostal space to the right of the sternum.
V2	4 th Intercostal space to the left of the sternum
V3	Midway between V2 and V4
V4	On the mid-clavicular line, at the 5 th intercostal level.
V5	On the anterior axillary line, at the 5 th intercostal level.
V6	On the mid-axillary line, at the 5 th intercostal level.



Wall affected	Leads	Artery(s) involved	Reciprocal changes
Anterior	V ₂ – V ₄	Left coronary artery, Left anterior descending (LAD)	II, III, AVF
Anterolateral	I, AVL, V ₃ – V ₆	Left anterior descending (LAD) and diagonal branches, circumflex and marginal branches	II, III, AVF
Anteroseptal	V ₁ – V ₄	Left anterior descending (LAD)	
Inferior	II, III, AVF	Right coronary artery (RCA)	I, AVL
Lateral	I, AVL, V ₅ , V ₆	Circumflex branch or left coronary artery	II, III, AVF
Posterior	V ₈ , V ₉	Right coronary artery (RCA) or circumflex artery	V ₁ – V ₄ ST segment depression (R > S in V ₁ and V ₂).
Right ventricular	V _{4R}	Right coronary artery (RCA)	-----



ECG MONITORING -12 LEAD

12/13/2013

[EMT-I, PARAMEDIC]

AMI Recognition

1. Common abnormal findings:

- ST Elevation (presumptive evidence of AMI)
- ST Elevation with Q Waves
- ST Depression (ischemia)
- T wave inversion (Subendocardial infarct or ischemia)
- Peaked T wave (Hyperacute Infarction)
- The presence of Q waves with ST elevation usually indicates an old infarction.

2. Basic Lead Groups

Leads	Areas of the Heart Muscle Seen
II, III, aVF	Inferior leads - lower portion of the heart.
V1 & V2	Septal leads - muscle between right & left ventricles.
V2, V3, V4	Anterior leads - front of the heart.
V4, V5, V6	Lateral pre-cordial leads - lateral aspects of the heart.
I & aVL	High lateral leads - lateral aspect from above

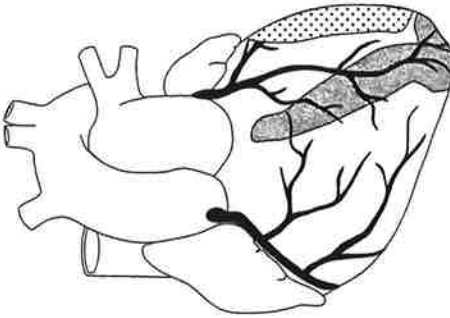
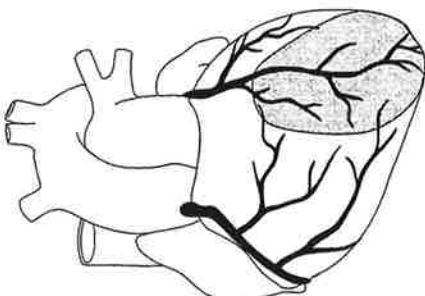
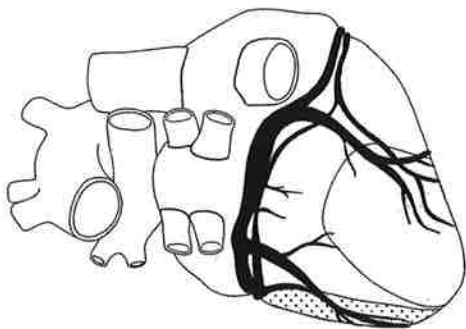
3. Location:

AMI Recognition

Limb Leads		Chest Leads	
I Lateral	aVR	V1 Septal	V4 Anterior
II Inferior	aVL Lateral	V2 Septal	V5 Lateral
III Inferior	aVF Inferior	V3 Anterior	V6 Lateral

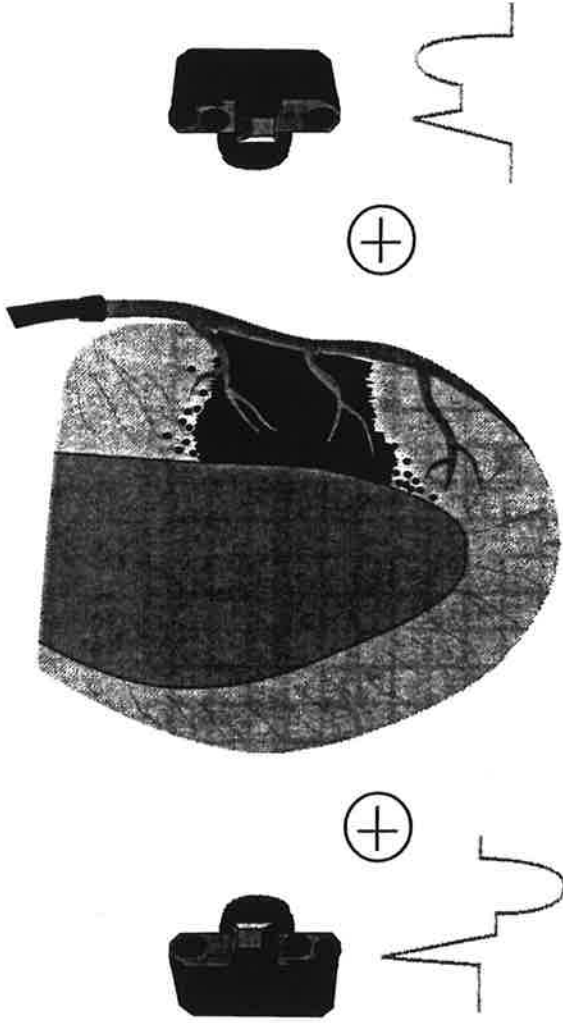
CARDIAC CHEST PAIN	
12/03/2013	
Follow Assessment, General Procedures Protocol	
EMR	<ul style="list-style-type: none"> • Assess and support ABC's • Administer oxygen, high flow – See Oxygen Therapy Protocol • Position of comfort
EMT	<ul style="list-style-type: none"> • Obtain 12 lead ECG - See ECG/12-Lead • Aspirin • Nitroglycerin (Assist patient with their own prescription)
A-EMT	<ul style="list-style-type: none"> • IV – NS with standard tubing or saline lock TKO • Nitroglycerin
EMT-I/ PARAMEDIC	<ul style="list-style-type: none"> • Cardiac monitoring - See ECG/12-Lead • IO as indicated for shock and no IV access -See EZ-IO/IO Infusion • Pain management – See Acute Pain Management Protocol

CATH ALERT CRITERIA
<ul style="list-style-type: none"> • Chest pain or suspected cardiac discomfort; • (and) No LBBB; • (and) 1 mm ST elevation in 2 anatomically adjacent leads • (or) ECG printout consistent with acute STEMI
ACTIVATION
<ul style="list-style-type: none"> • Call receiving hospital and provide following information: • Patient Name, DOB, weight, expected ETA • Deliver 12 lead to ED staff • Consider a 2nd IV • Transport with defib pads anterior/posterior position • RiverBend (541) 222-1581 • McKenzie Willamette (541) 726-4470



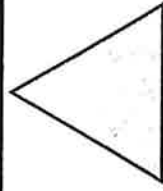
I Lateral	aVR	V1 Septal	V4 Anterior
II Inferior	aVL Lateral	V2 Septal	V5 Lateral
III Inferior	aVF Inferior	V3 Anterior	V6 Lateral

Reciprocal Changes

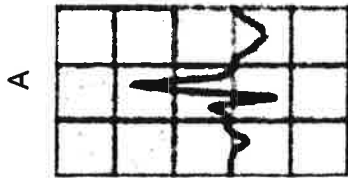


II, III, aVF

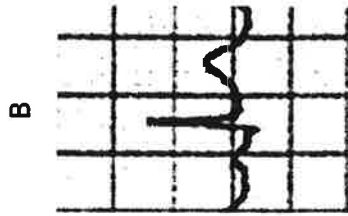
I, aVL, V-Leads



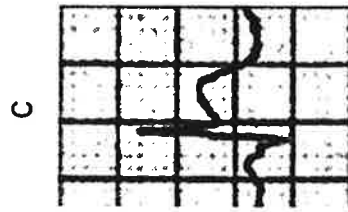
3. Identify which of the following complexes have Q waves. When Q waves are present, measure their width and categorize them as physiologic or pathologic.



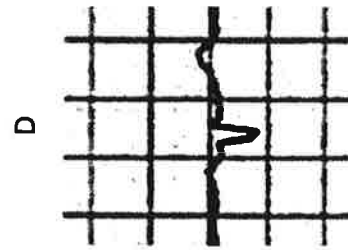
- No Q
- Pathologic
- Physiologic



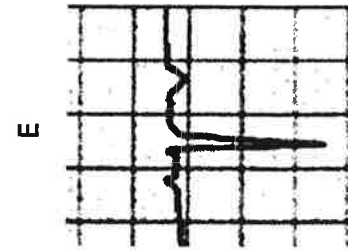
- No Q
- Pathologic
- Physiologic



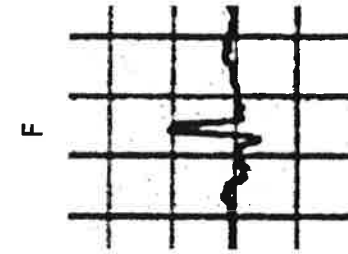
- No Q
- Pathologic
- Physiologic



- No Q
- Pathologic
- Physiologic

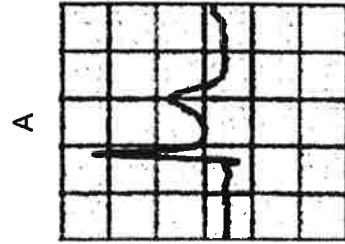


- No Q
- Pathologic
- Physiologic

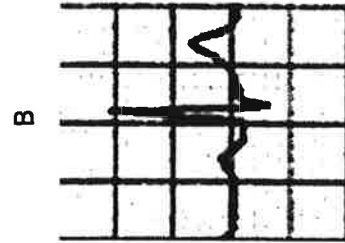


- No Q
- Pathologic
- Physiologic

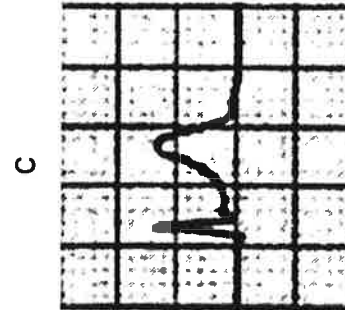
4. Measure the millimeters of ST segment deviation present at the J-point.



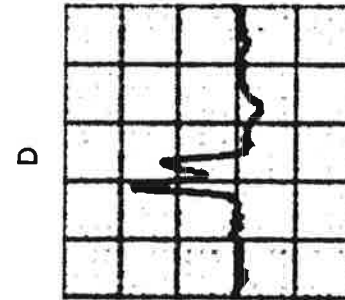
+ _____ mm
- _____ mm



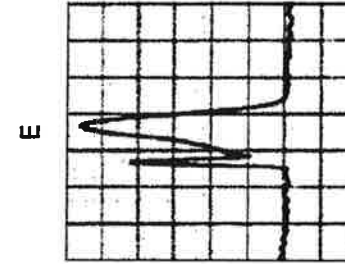
+ _____ mm
- _____ mm



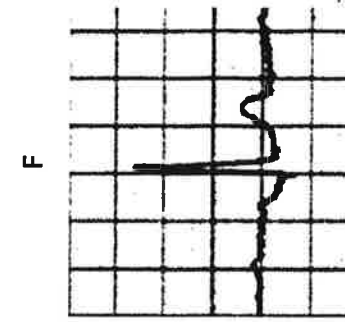
+ _____ mm
- _____ mm



+ _____ mm
- _____ mm



+ _____ mm
- _____ mm

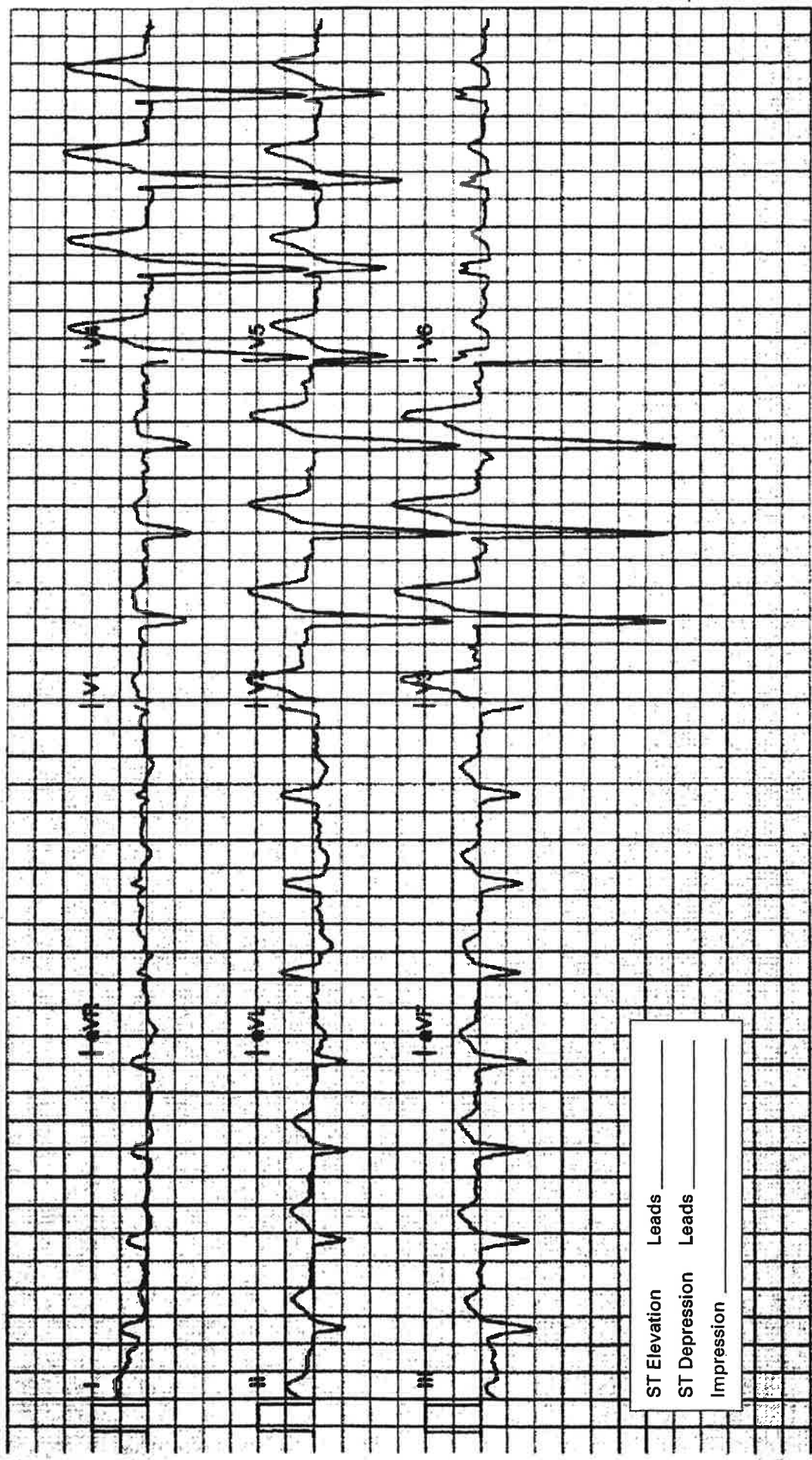


+ _____ mm
- _____ mm

HR: 94 P-QRS-T Axis: -10 -66 76

PR Int: 160 QRS Dur: 140

QT/QTc: 384/436



ST Elevation	Leads _____
ST Depression	Leads _____
Impression	_____

1111 2.2 LPK1100002663

x1.0 0.05-150Hz 25mm/sec

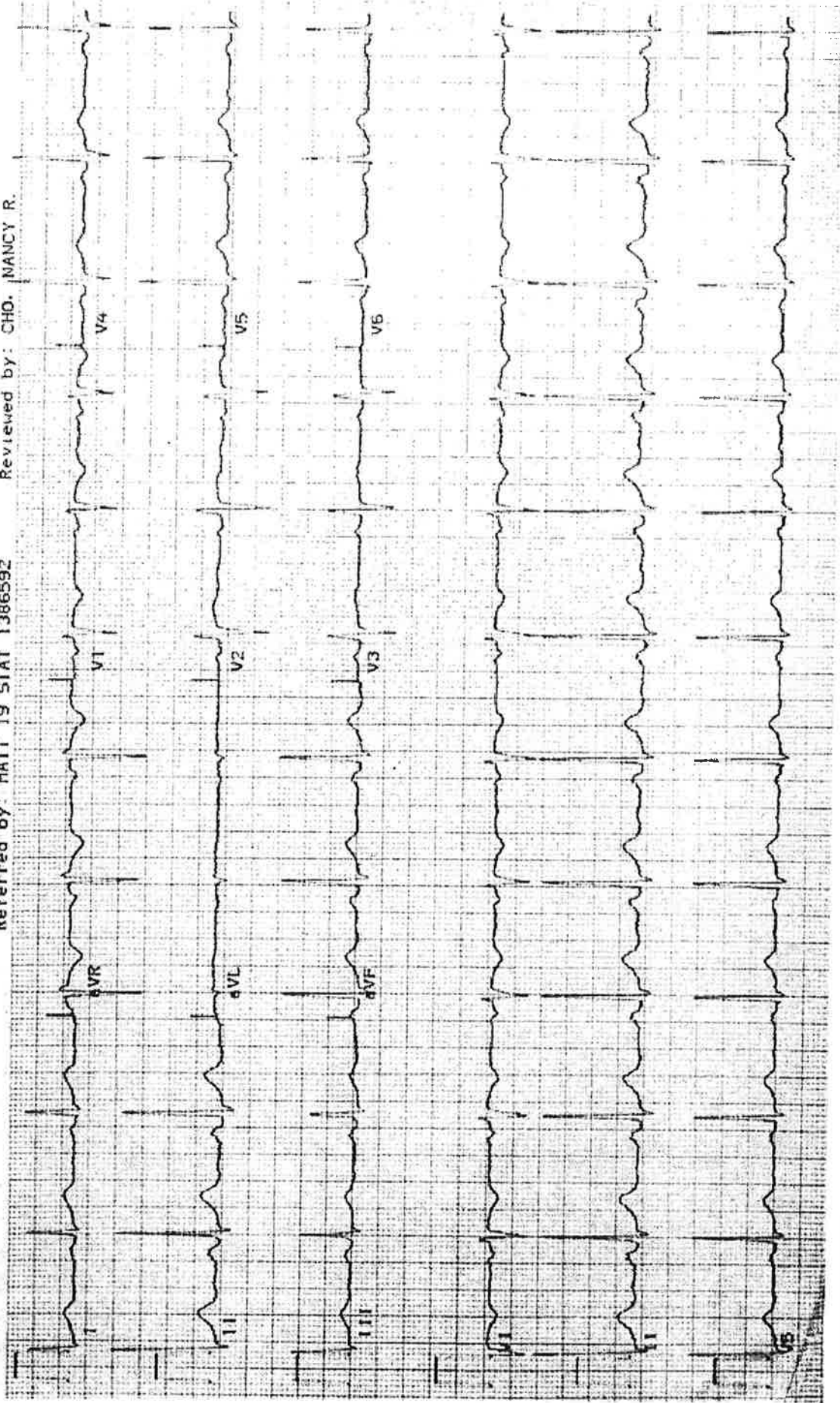
25mm/s
10mm/mV
100Hz
Pgm 004C
12SL v78

Med: Unknown
O4-MAR-30 Ht:
Sex: F Race: BIX
Loc: 1 Room: ER 3
Option: 1
Vent. rate 66 BPM
PR interval 172 ms
QRS duration 96 ms
QT/QTc 416/429 ms
P-R-T axes 78 61 53

NORMAL SINUS RHYTHM
NORMAL ECG

Referred by: MATT 19 STAT 1386592

Reviewed by: CHO. NANCY R.



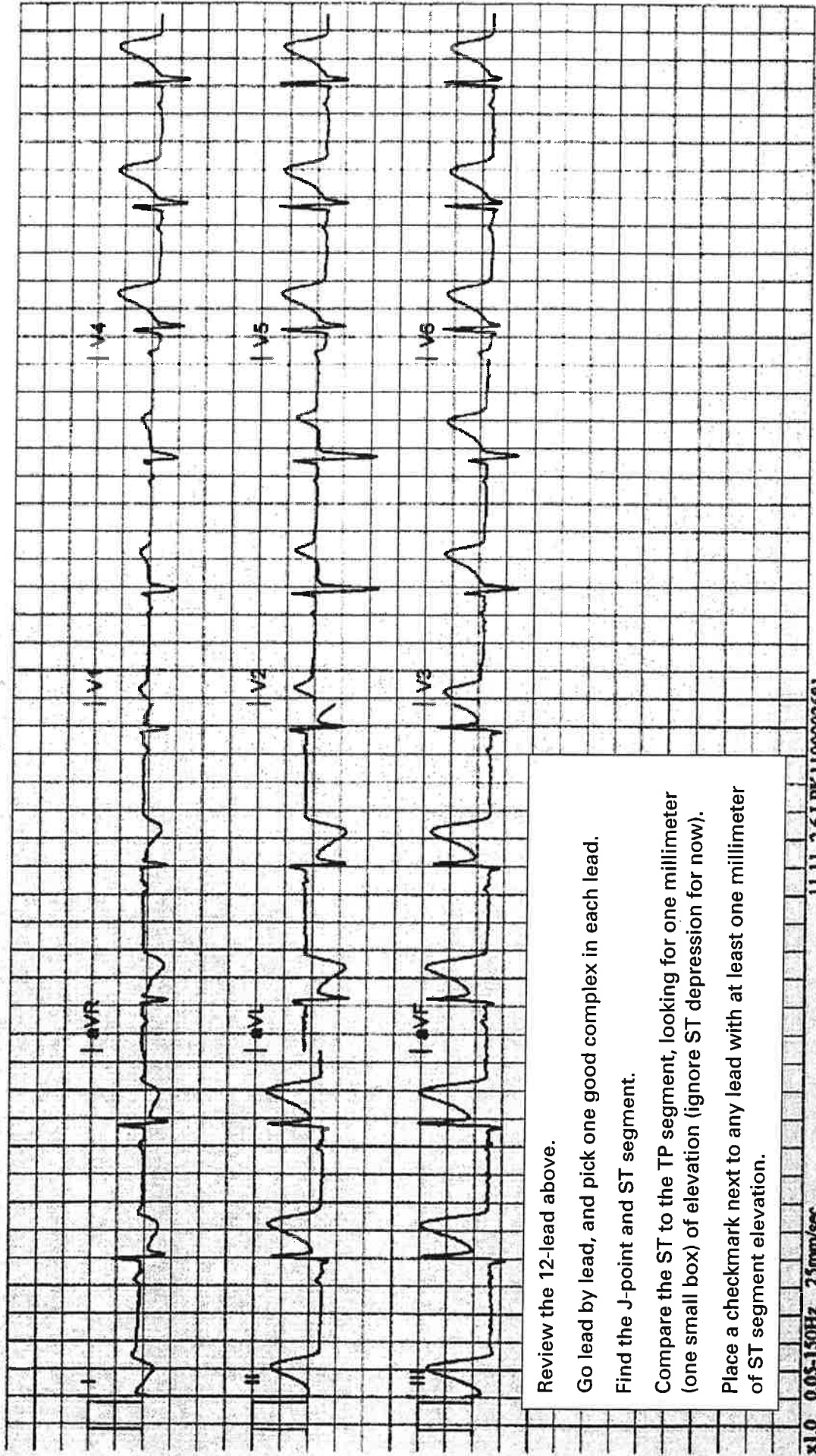
Practice

12-Lead #1

9:15:18 AM 5/5/99

HR: 65 P-QRS-T Axes: 26 90 101

PR Int: 164 QRS Dur: 100 QT/QTc: 408/419



Review the 12-lead above.

Go lead by lead, and pick one good complex in each lead.

Find the J-point and ST segment.

Compare the ST to the TP segment, looking for one millimeter (one small box) of elevation (ignore ST depression for now).

Place a checkmark next to any lead with at least one millimeter of ST segment elevation.

x1.0 0.05-150Hz 25mm/sec 1111 2.6 LPK1100002681

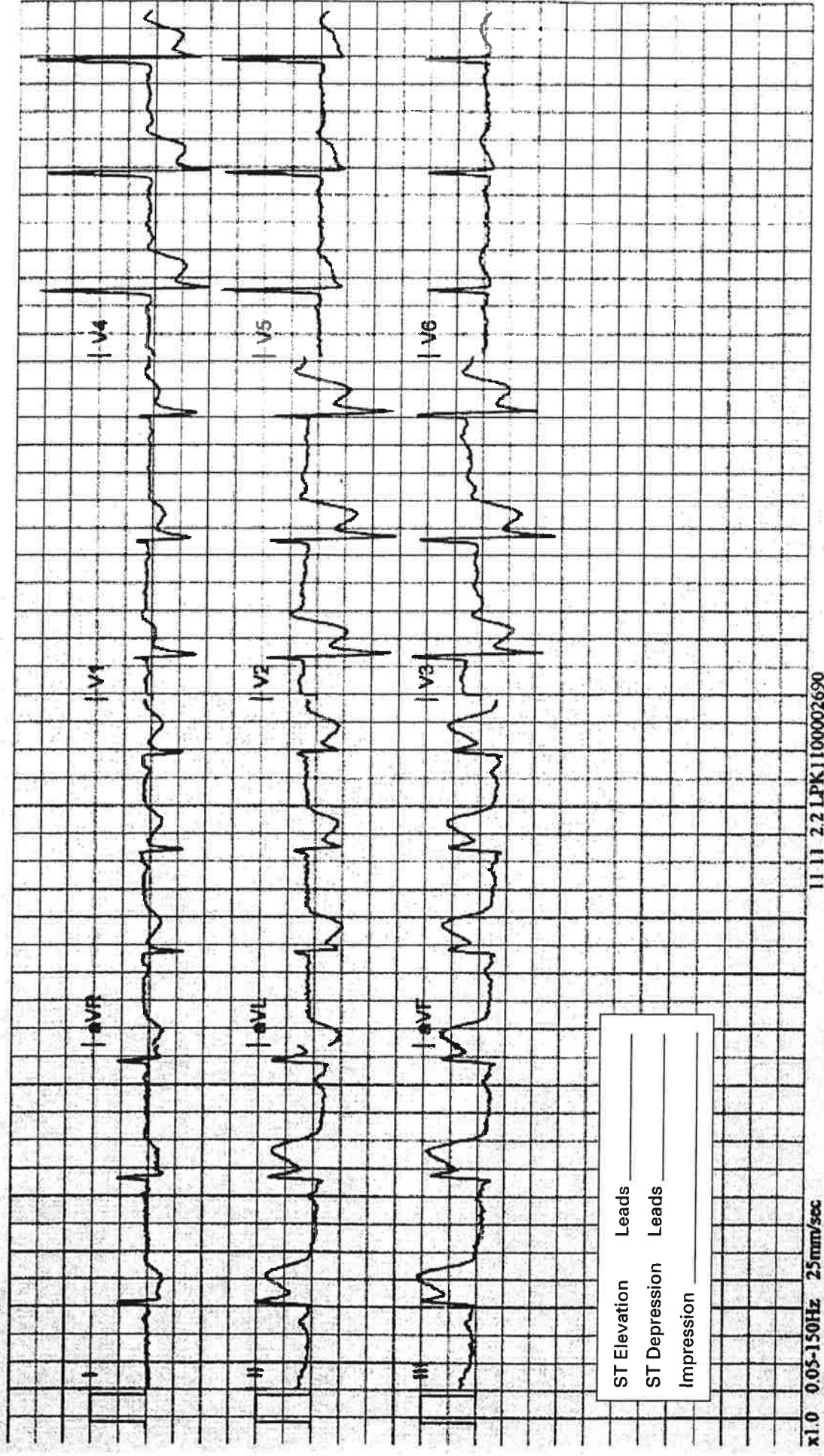
12-Lead #1

4:41:26 PM 2/23/97

HR: 73 P-QRS-T Axes: 70 79 92

PR Int: 172 QRS Dur: 104

QT/QTc: 380/406



ST Elevation	Leads _____
ST Depression	Leads _____
Impression	_____

x1.0 0.05-150Hz 25mm/sec 1111 2.2 LPK1100002690

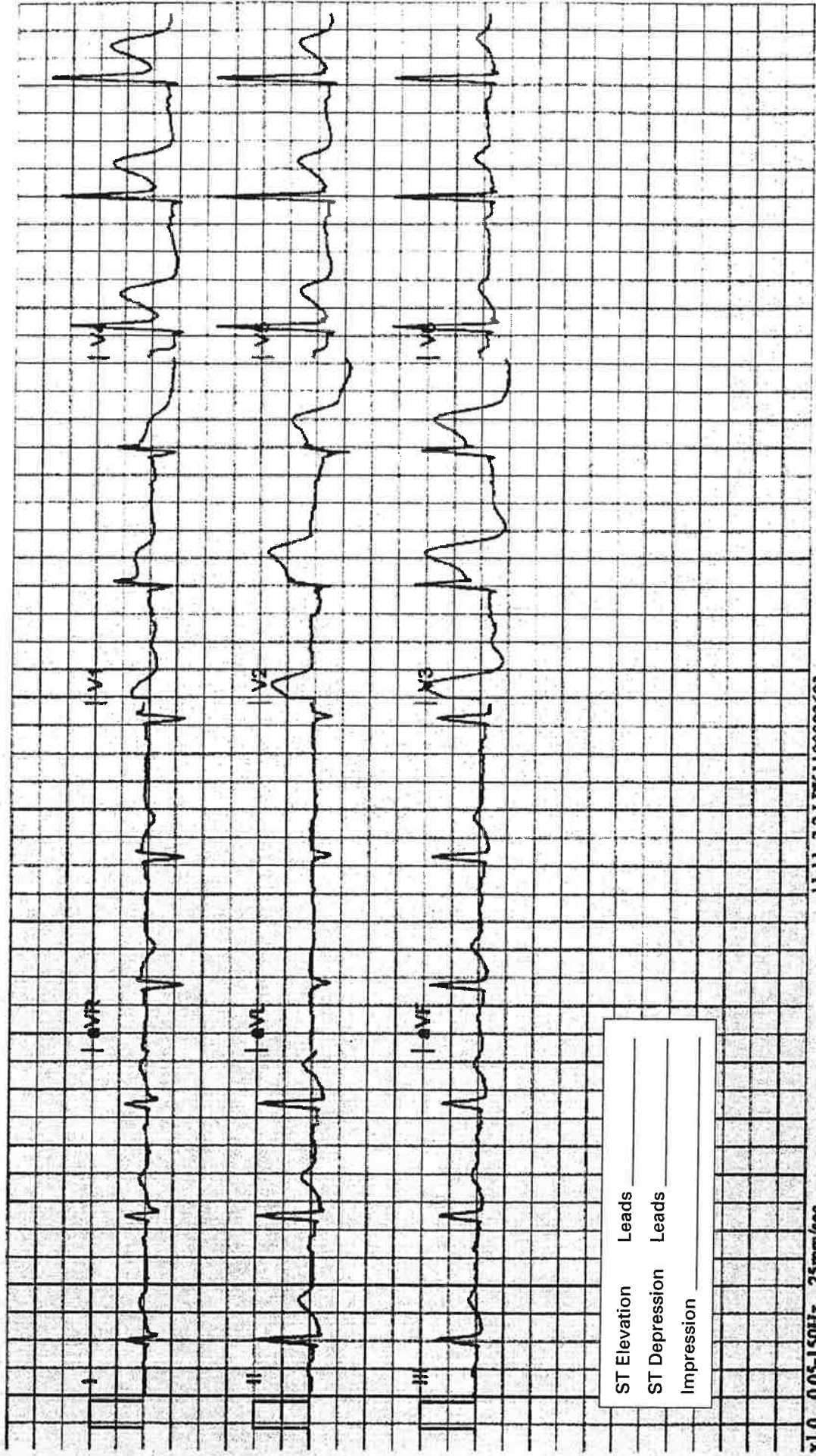
14

12-Lead #1

9:43:57 AM 1/28/97

HR: 66 P-QRS-T Axes: 73 78 65

PR Int: 232 QRS Dur: 104 QT/QTc: 428/441



ST Elevation	Leads _____
ST Depression	Leads _____
Impression	_____

x1.0 0.05-150Hz 25mm/sec 1111 2.2 LPK1100002693

15 Lab Page 7

12-Lead #1

9:41:32 PM 11/7/98

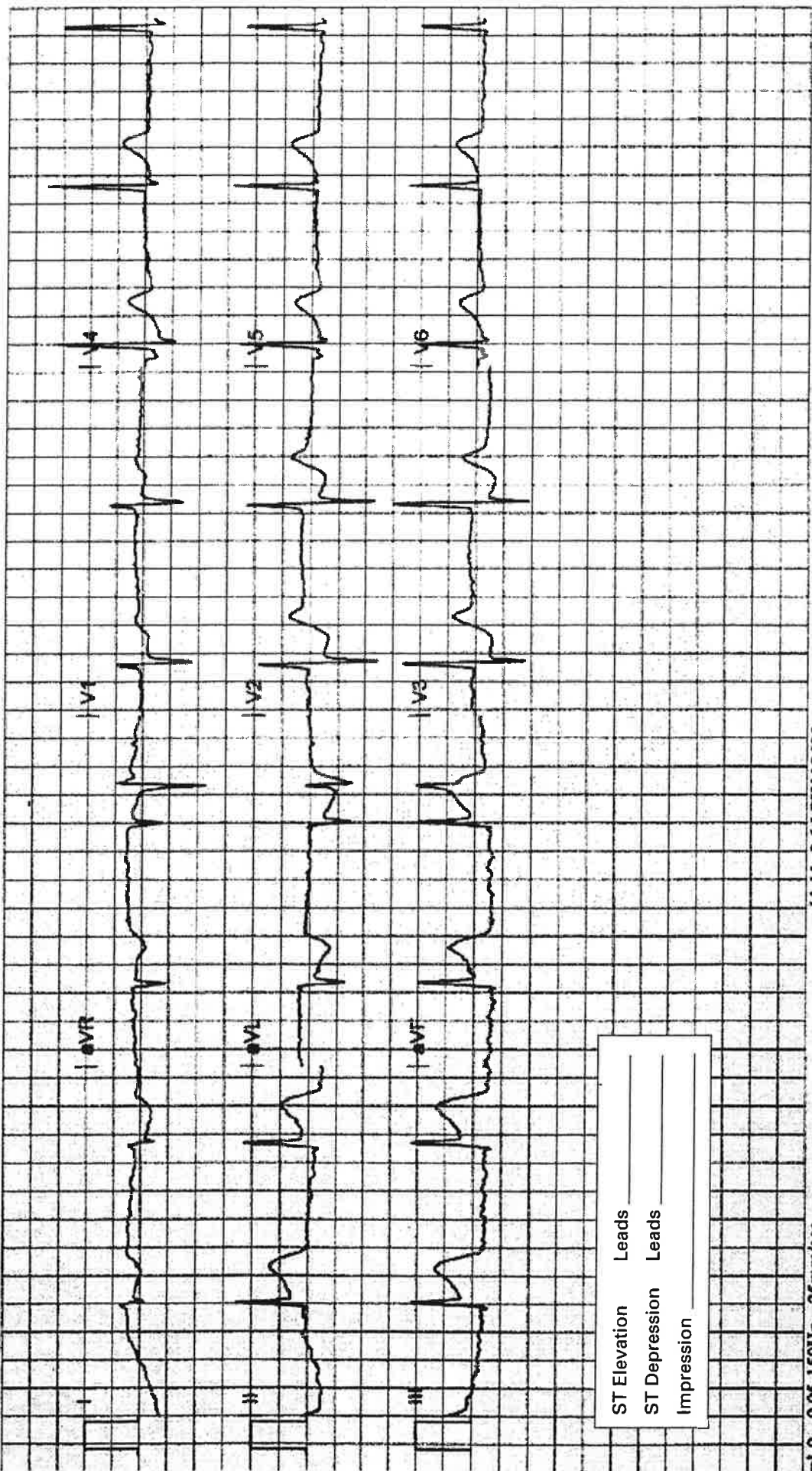
P-QRS-T Axes: 999 97 102

QRS Dur: 92

QT/QTc: 452/434

HR: 53

PR Int: 0



ST Elevation	Leads _____
ST Depression	Leads _____
Impression	_____

1111 2.6 LPK112680

x1.0 0.05-150Hz 25mm/sec

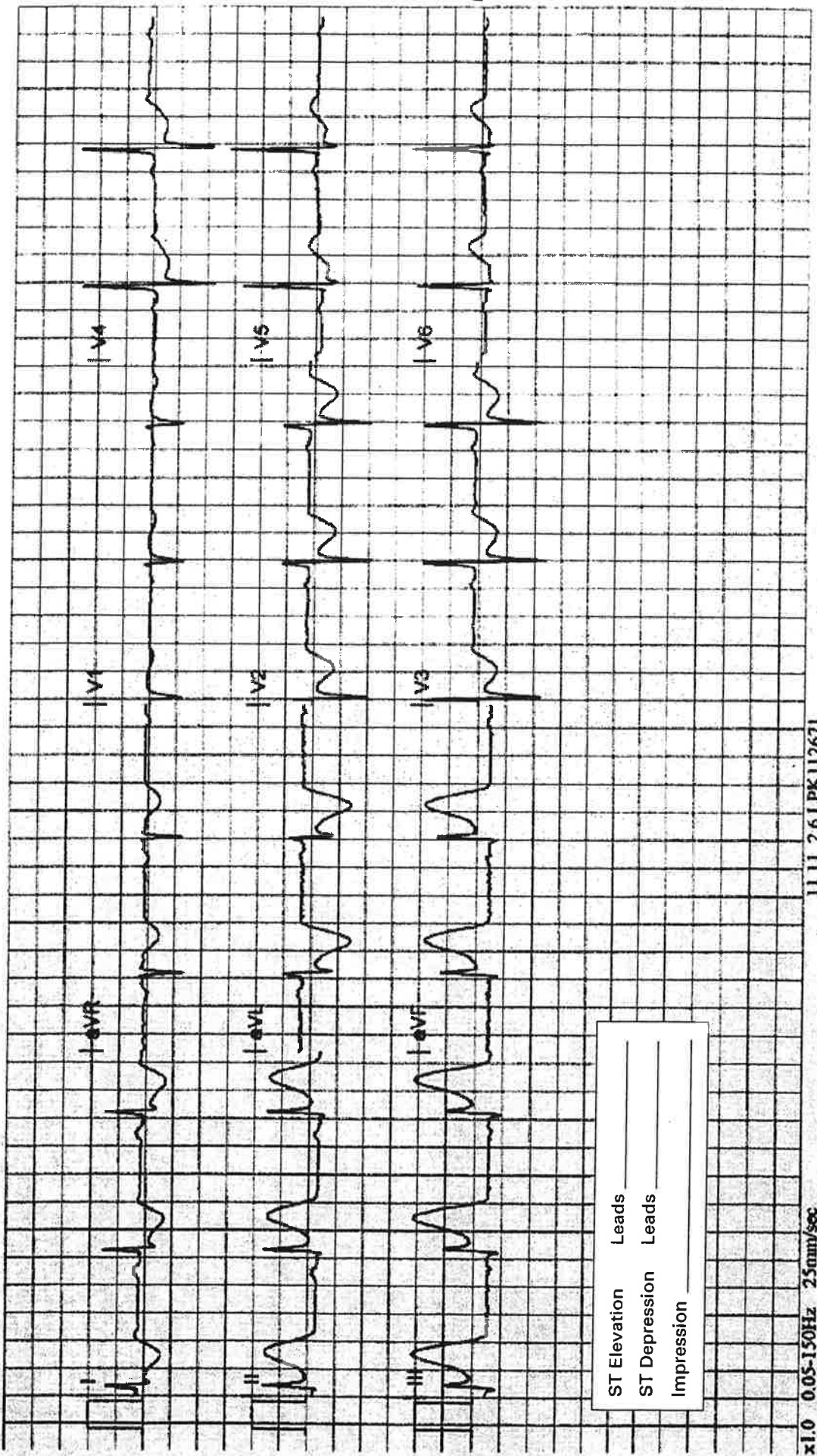
Practice

12-Lead #1

2:51:54 AM 8/8/98

HR: 60 P-QRS-T Axes: 12.66 106

PR Int: 160 QRS Dur: 96 QT/QTc: 440/441

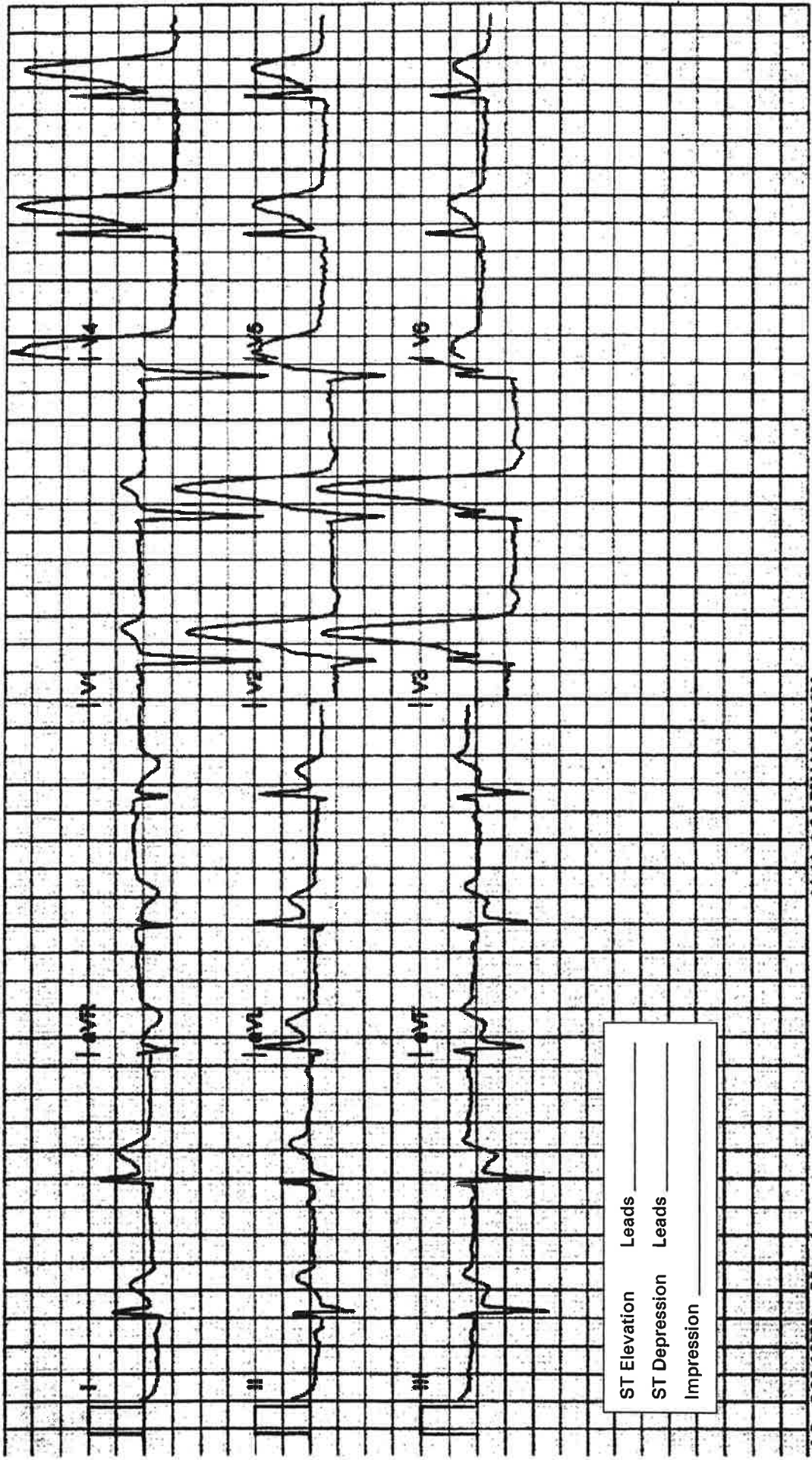


ST Elevation	Leads _____
ST Depression	Leads _____
Impression	_____

x1.0 0.05-150Hz 25mm/sec IIII 2.6 LPK112671

11:04:47 AM 3/17/97 12-Lead #1

HR: 62 P-QRS-T Axis: 55 -29 35
PR Int: 168 QRS Dur: 100 QT/QTc: 380/393



ST Elevation	Leads
ST Depression	Leads
Impression	

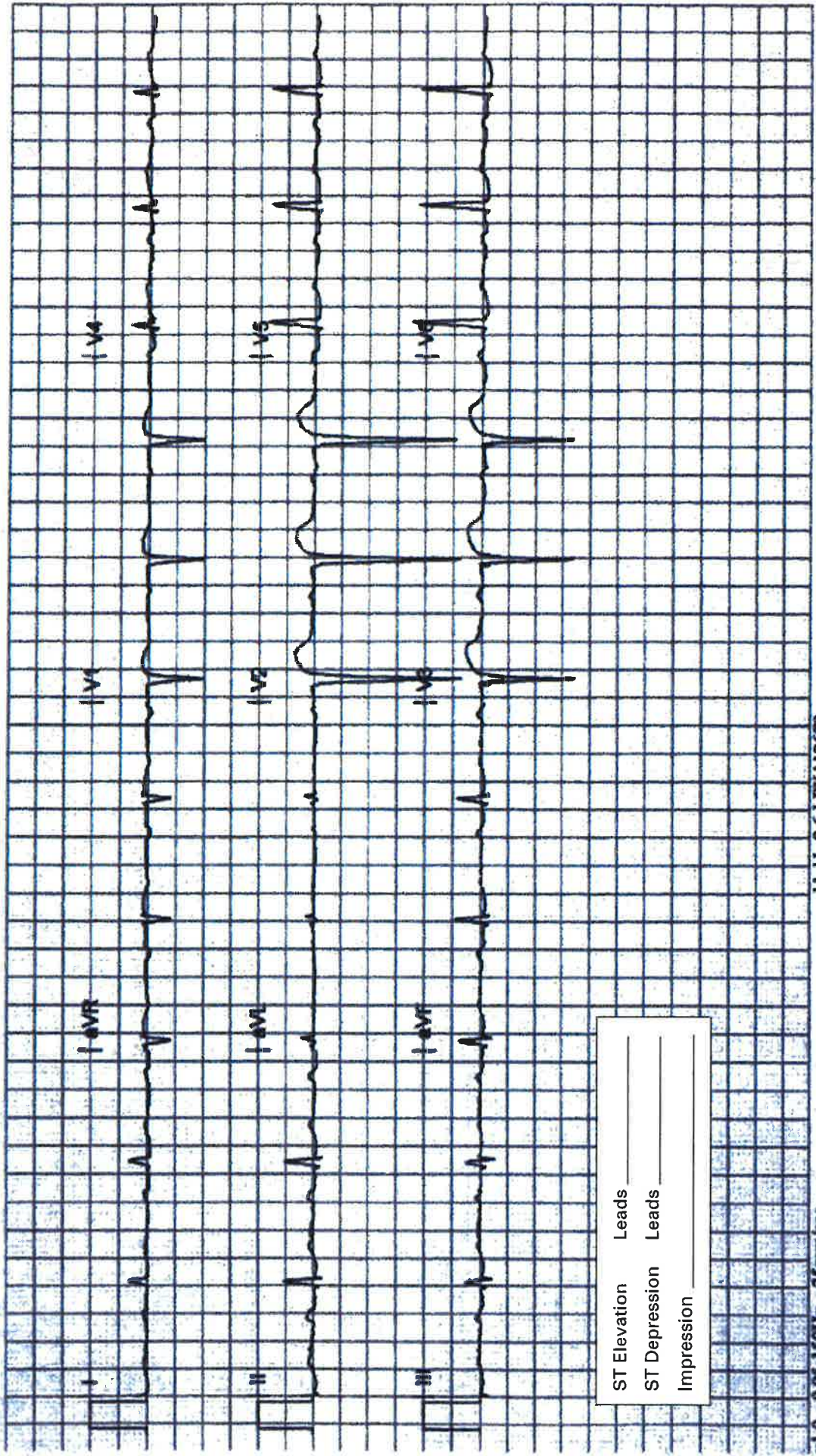
x1.0 0.05-150Hz 25mm/sec 1111 2.2 LPK1100002690

12-Lead #1

7:41:23 AM 5/16/98

P-QRS-T Axis: 60 41 68
QRS Dur: 108 QT/QTc: 372/392

HR: 70
PR Int: 240



ST Elevation	Leads _____
ST Depression	Leads _____
Impression	_____

1111 2.6 LPK112673

xl.0 0.05-150Hz 25mm/sec