Temporary Pacemakers

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Objectives

- Temporary pacemaker indications
- Identify different types of temporary pacemakers
- Basic temporary pacemaker concepts

What Is a Pacemaker?

- An artificial device that delivers a timed electrical stimulus which results in cardiac depolarization.
- Keeps the heart from beating too slow.
- Cannot restrict heart from going too fast.

Indications for Temporary Pacing

- Heart block
- Symptomatic Sinus bradycardia
- Sinus arrest
- Atrial and/or ventricular ectopic arrhythmia suppression
- During pacemaker generator replacement of CHB pt with slow/no ventricular escape

Other Temporary Pacing Indications

Cardiovascular Surgery

- Coverage for anesthesia and surgery in patients with positive cardiac history
- Treatment for CHB development during surgery
- Augment cardiac output post operatively

NBG Codes

1st Letter

Chamber(s) Paced

A = atrium

V = ventricle

D = dual (both atrium and ventricle)

2nd Letter

Chamber(s) Sensed

A = atrium

V = ventricle

D = dual

O = none

3rd Letter

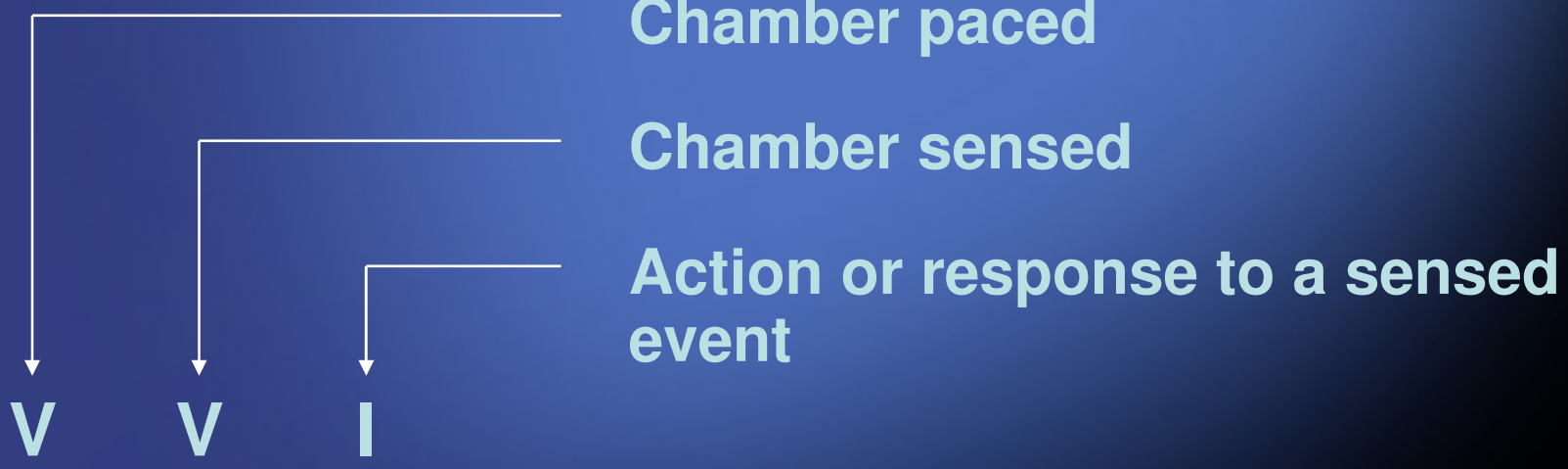
Response to Sensing

I = inhibit (Demand mode)

T = triggered

D = dual

O = none (Asynch)



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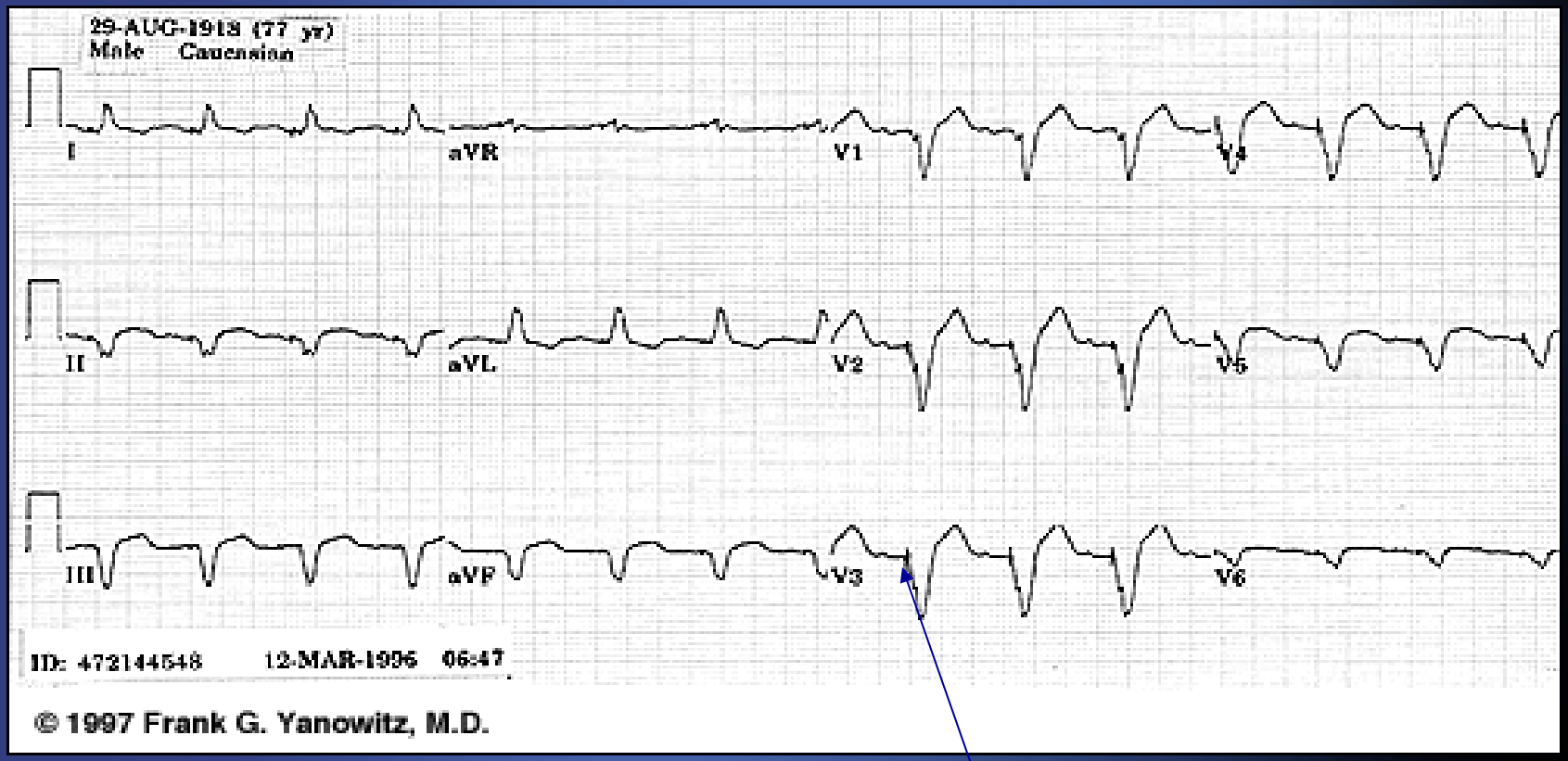
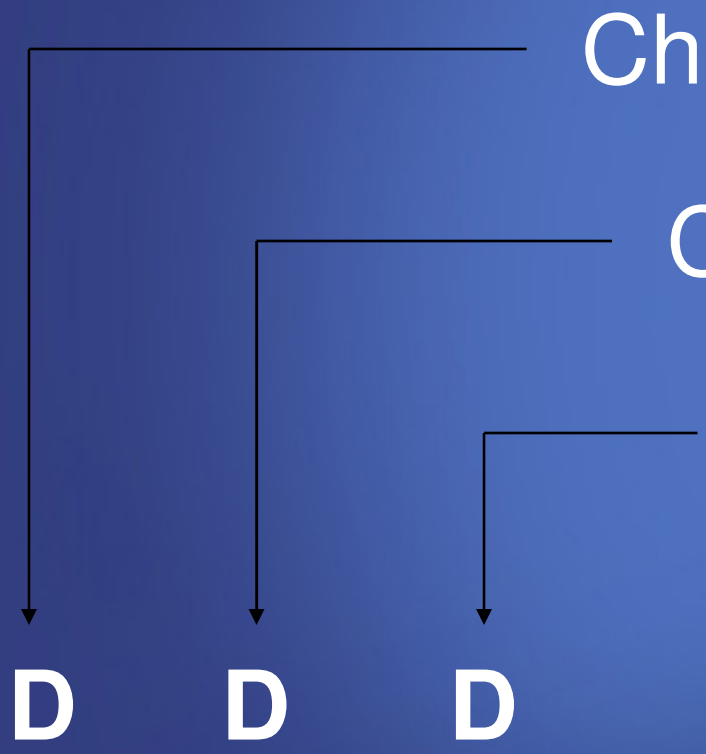
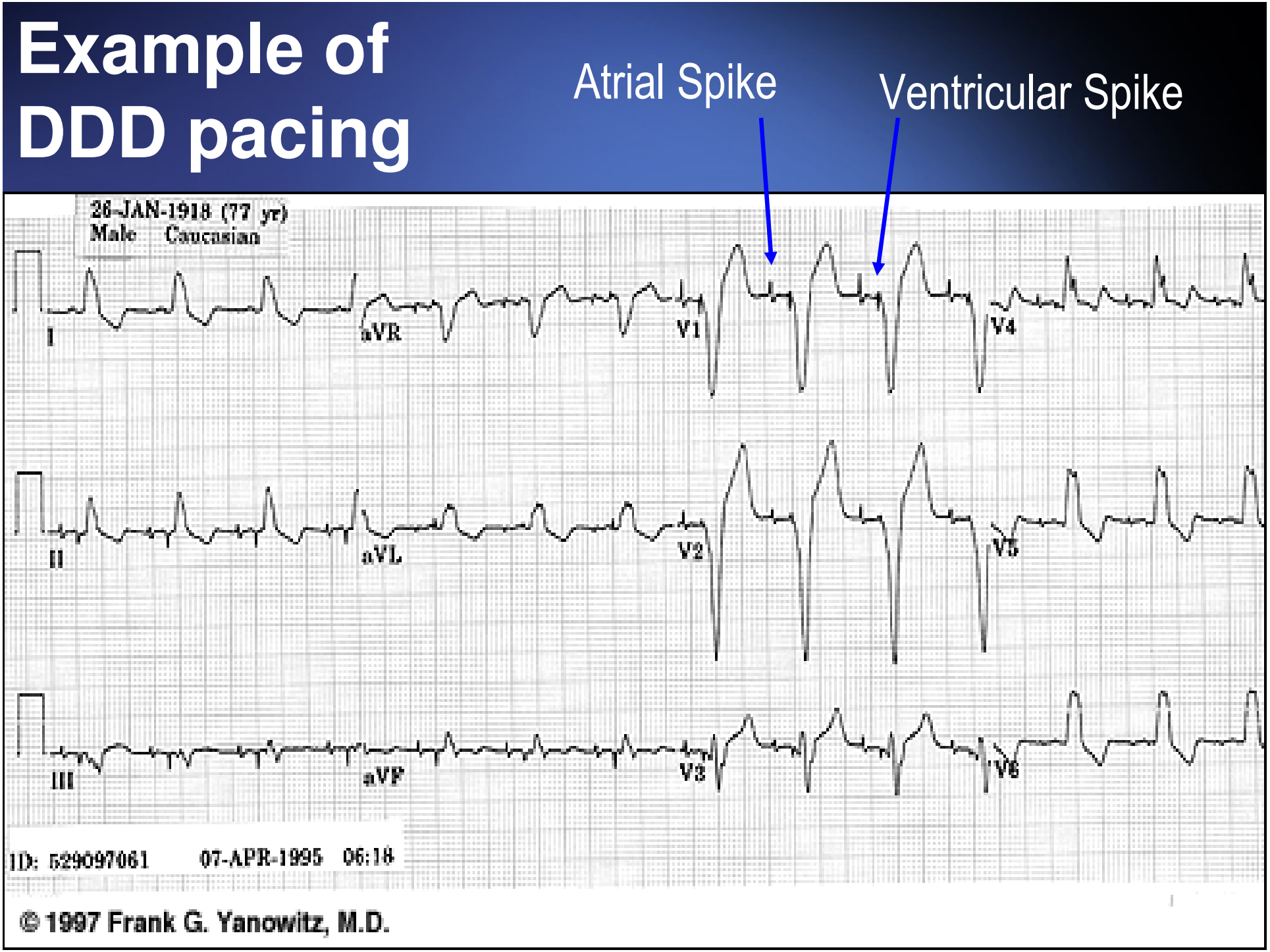
Example of VVI pacing



DDD Pacing


Chamber Paced
Chamber Sensed
Action or Response to a Sensed Event
D
D
D

Example of DDD pacing



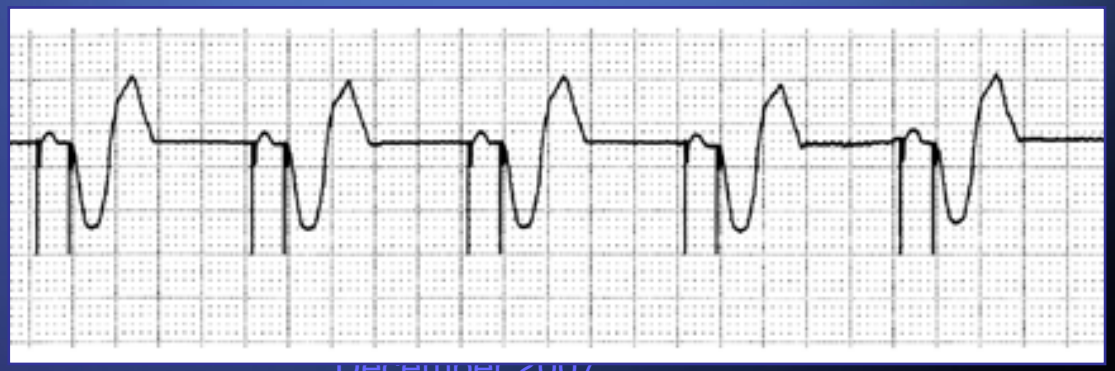
Asynchronous Modes

PACEMAKER WILL NOT SENSE WITH MAGNET APPLICATION

AOO

VOO

DOO



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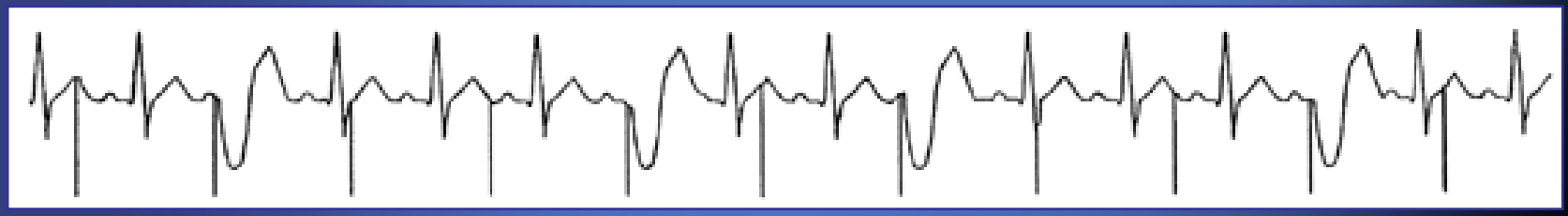
VOO Asynchronous (Fixed)

Pacemaker will emit an output at a fixed rate
regardless of intrinsic activity



Magnet application recommended only for patients that are pacing or having a history of dependency or complete heart block.

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Temporary Pacemaker Procedure

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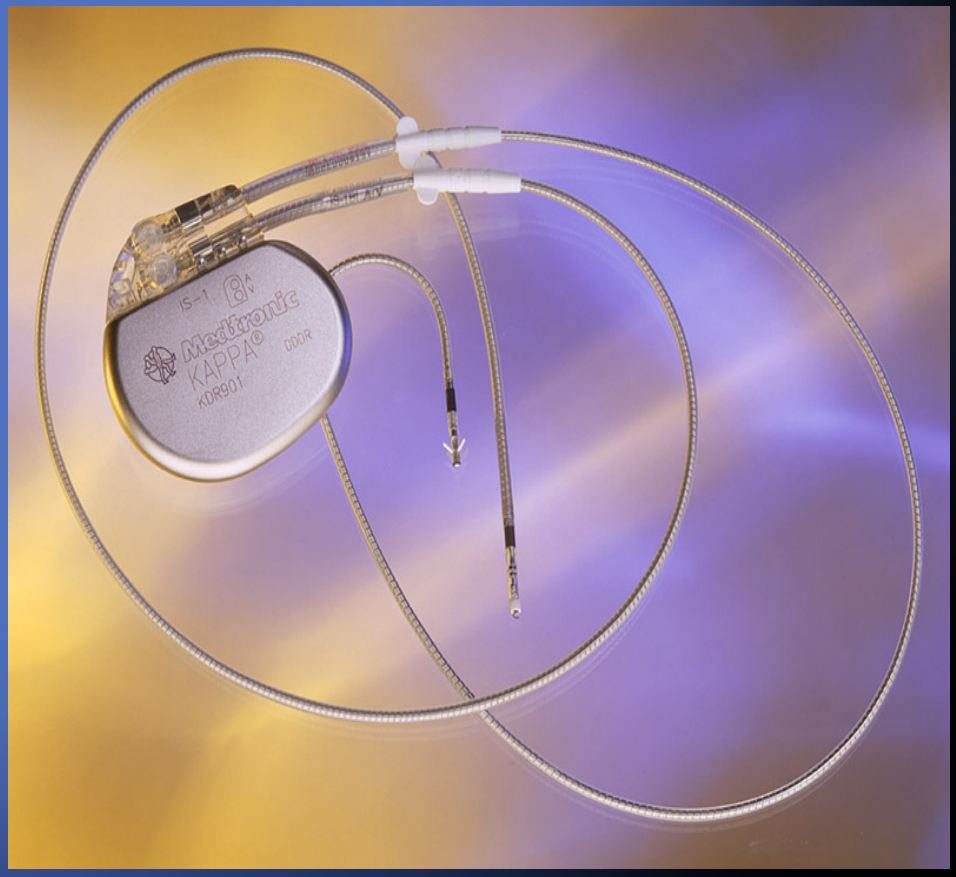
Temporary Pacemakers

Temporary Permanents



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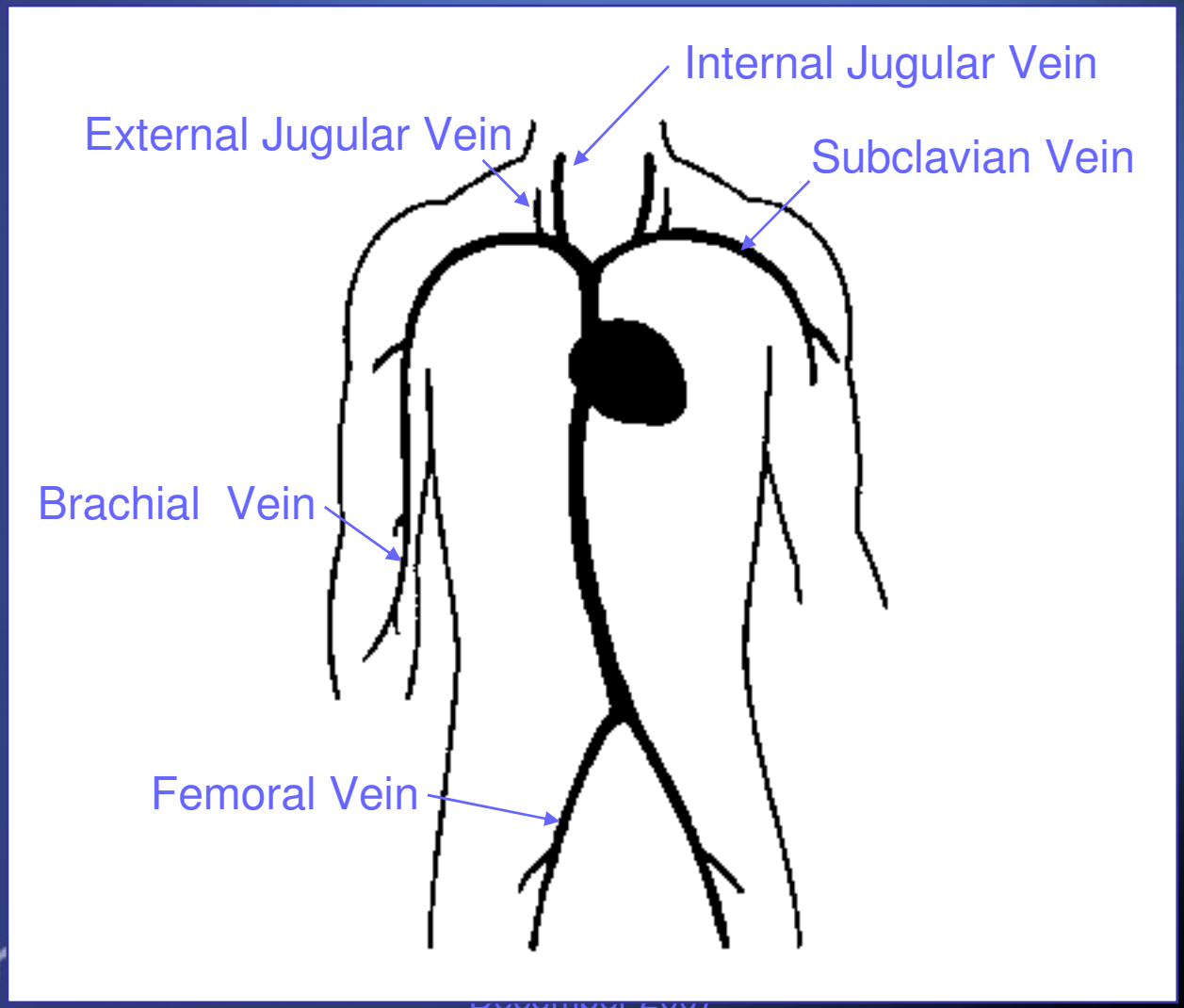
Insertion Sites

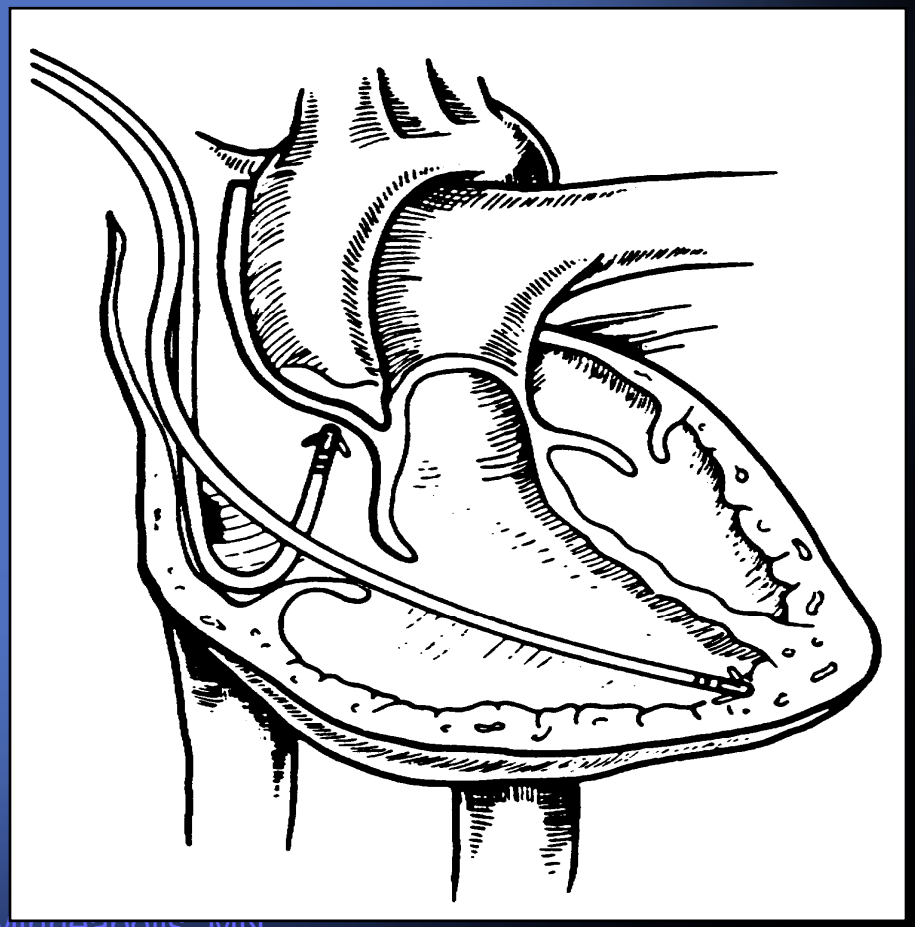


Lead Types

- Endocardial/Transvenous lead
  - Transvenous lead is introduced into a vein and advanced into the heart
- Epicardial/Myocardial lead
  - An epicardial lead attached to the outside of the heart is introduced through the chest wall

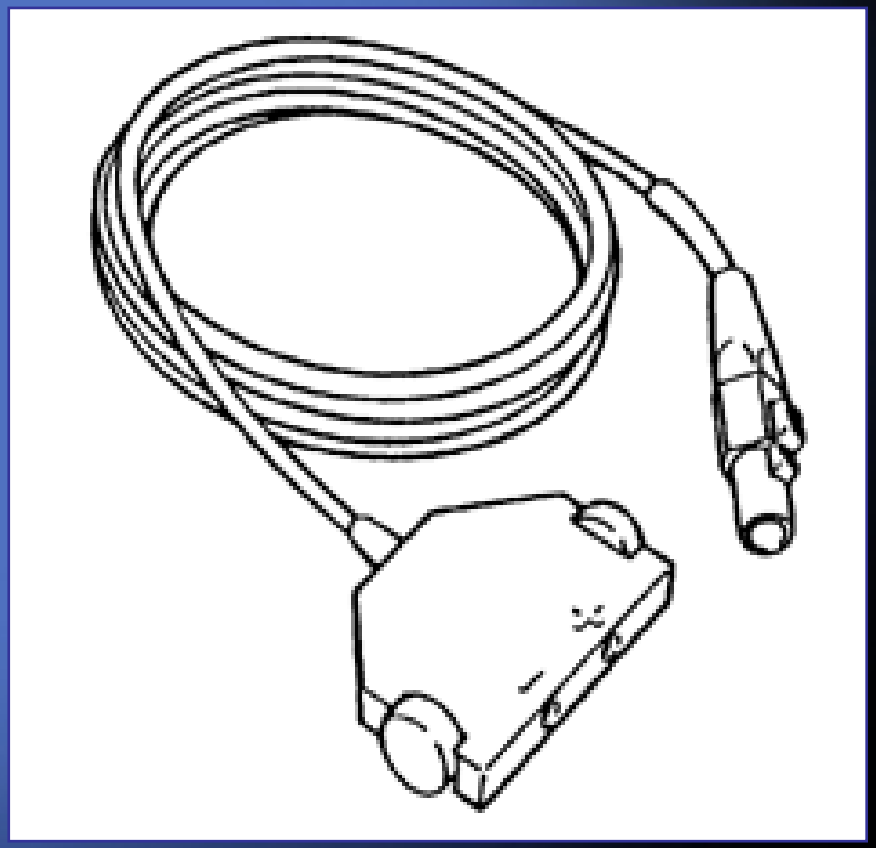
Pacing Systems

- One lead implanted in the right atrium
- One lead implanted in the right ventricle
- Or both

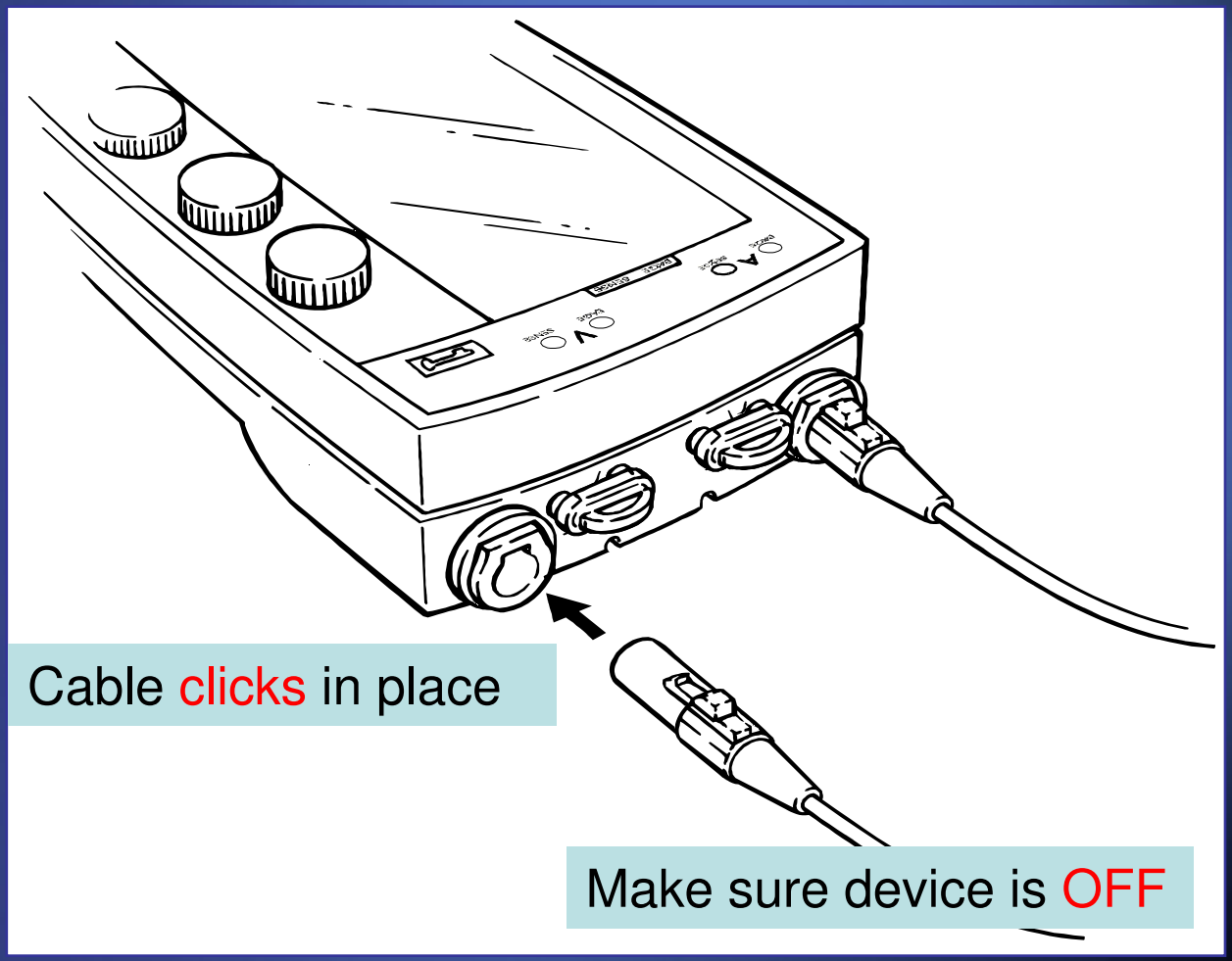


Cable Connectors

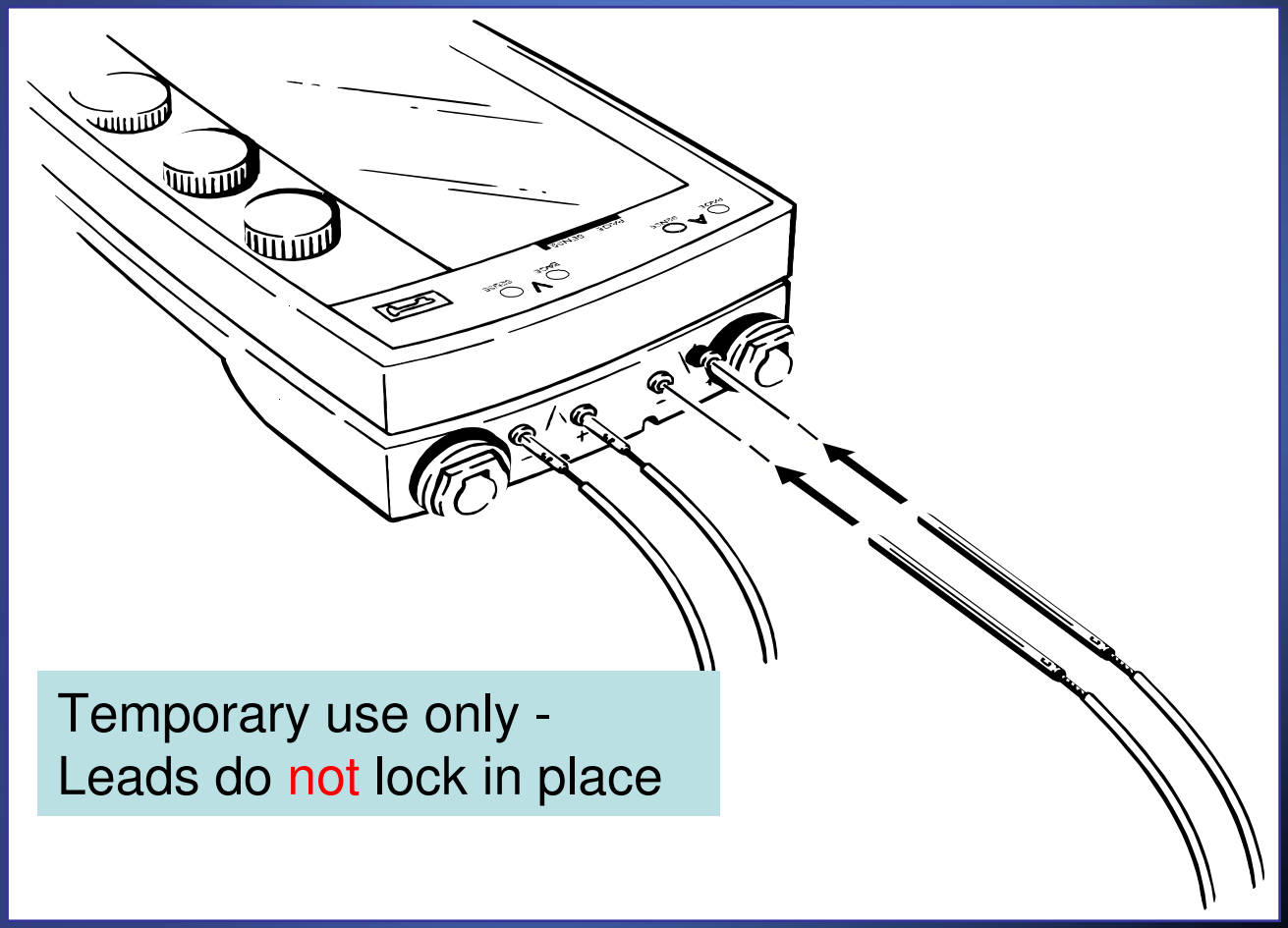
- Connector pins on the lead(s) must be fully inserted in the patient connector block
- Observe polarity
- Finger tighten only



Cable to Device Connections



Emergency Connections



Temporary use only -
Leads do not lock in place

Cable Connectors

- New Federal regulations made cable changes necessary

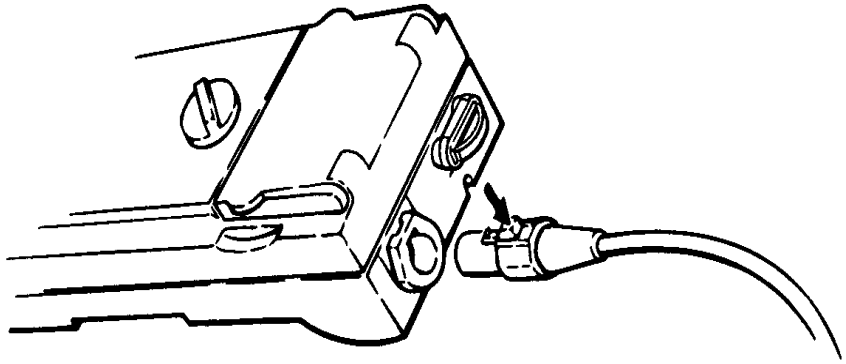


Figure 8. Connecting the Model 5433A or 5433V patient cable to the Model 5348 pacemaker.

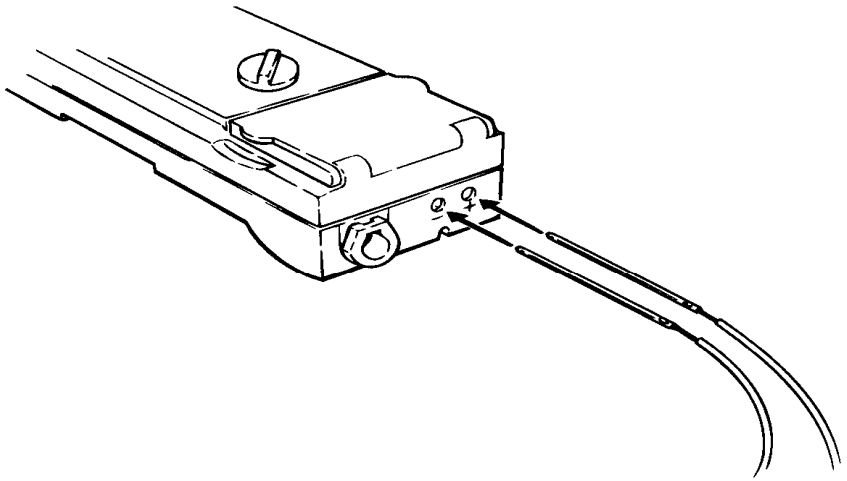
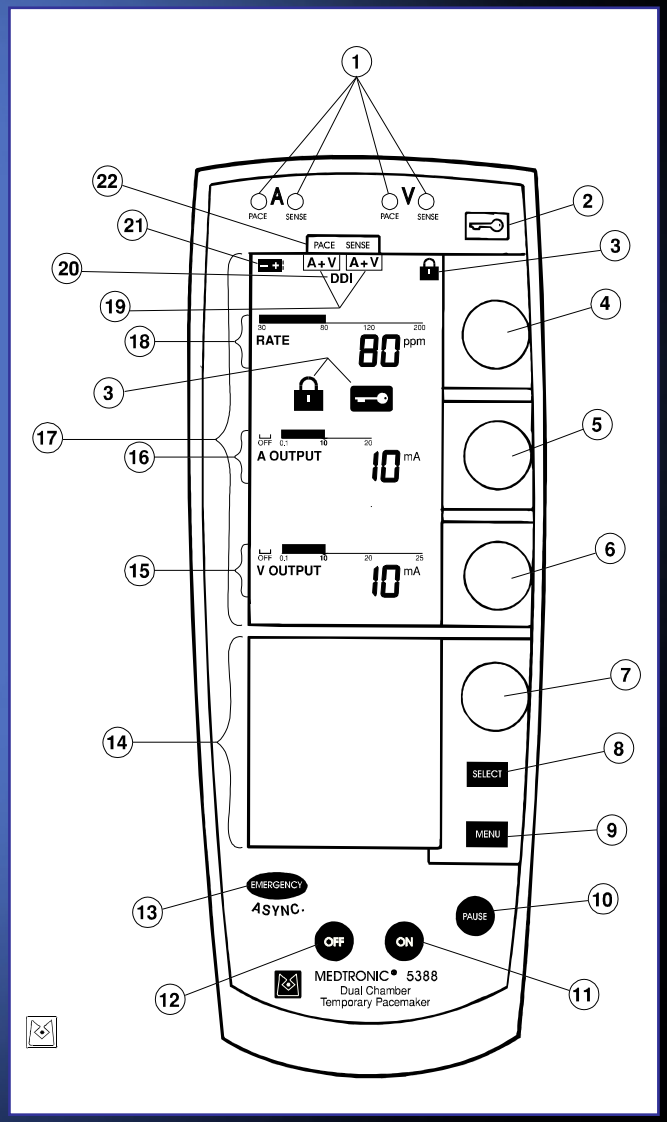


Figure 10. Connecting heartwires directly to the Model 5348.

Model 5388 Dual Chamber Temporary Pacemaker

1. Pace/Sense LEDs
2. Lock/Unlock Key
3. Lock Indicators
4. Rate Dial
5. Atrial Output Dial
6. Ventricular Output Dial
7. Menu Parameter Dial
8. Parameter Selection Key
9. Menu Selection Key
10. Pause Key
11. Power On Key
12. Power Off Key
13. Emergency/Asynchronous Pacing Key
14. Lower Screen
15. Ventricular Output Graphics
16. Atrial Output Graphics
17. Upper Screen
18. Rate Graphics
19. Setup Indicators
20. DDI Indicator
21. Low Battery Indicator
22. Setup Labels



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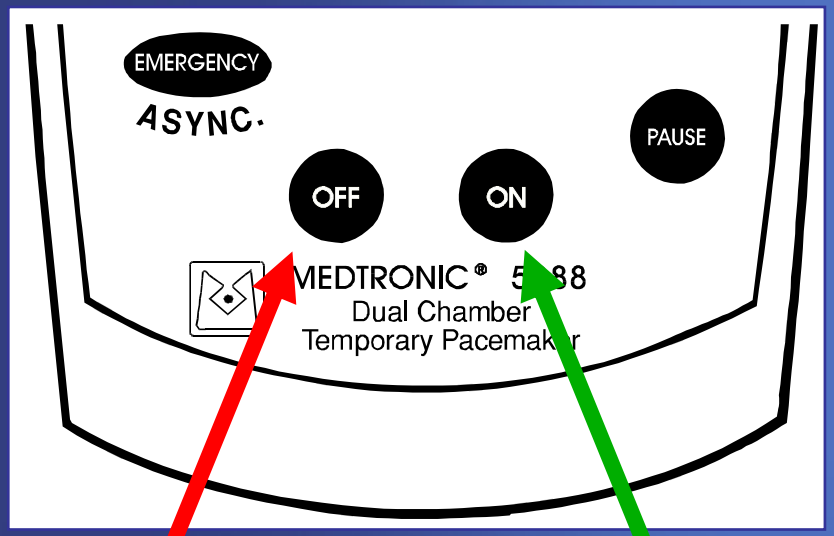
Off / On Keys

Values at Power-On

Dual Chamber Pace/Sense

- **RATE** **80 ppm**
- UPPER RATE 110 ppm



OFF Push twice

ON Push once

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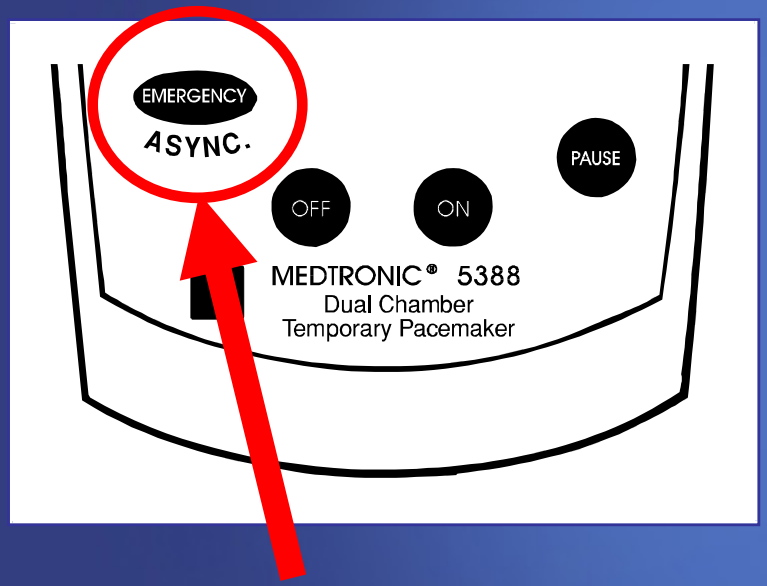
Emergency Key



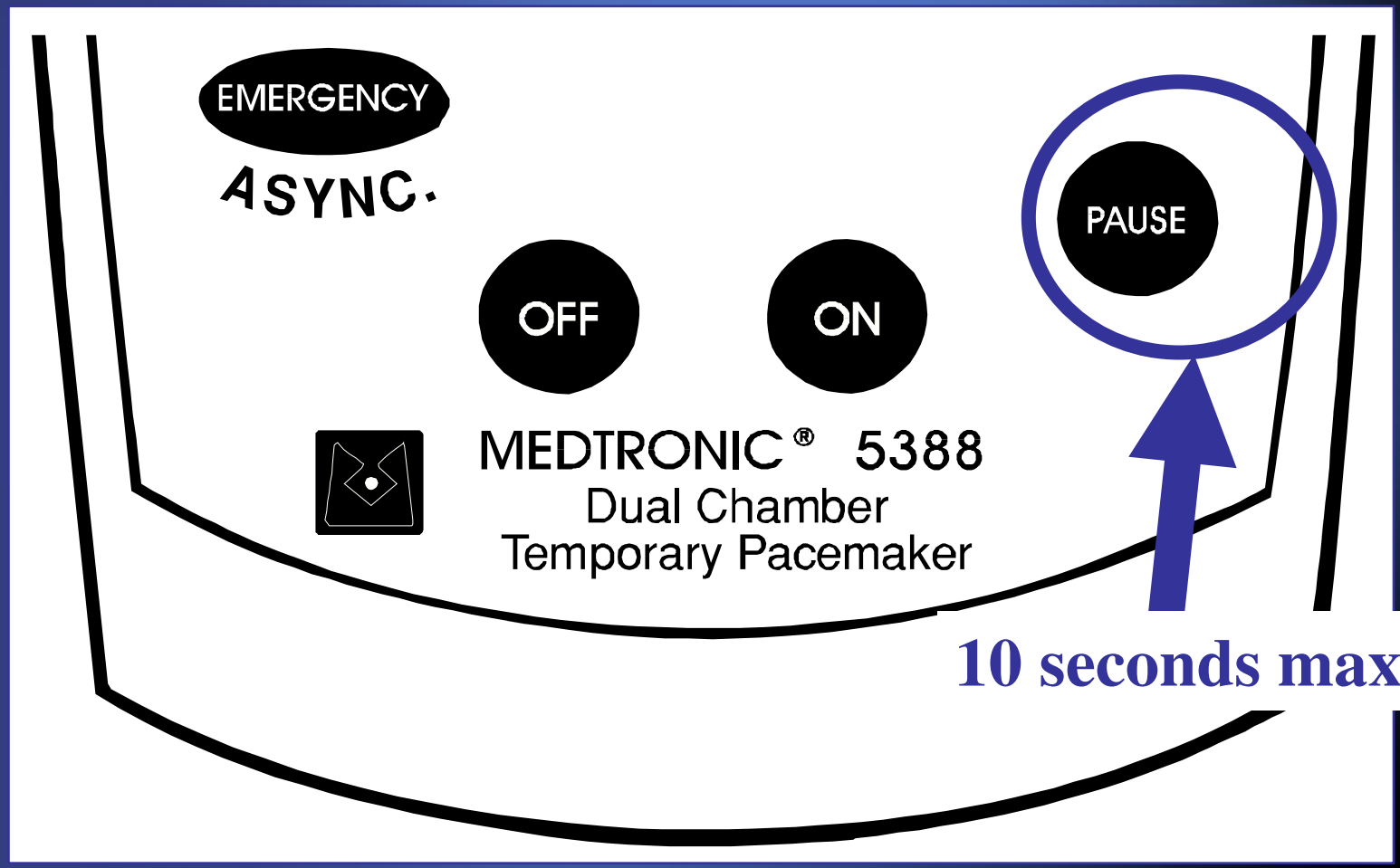
Always available – Single key press enters Emergency mode

Emergency Pacing Values

• RATE	Current Rate
• A OUTPUT	MAX
• V OUTPUT	MAX
• PACING	ASYNC
• NO SENSING!	

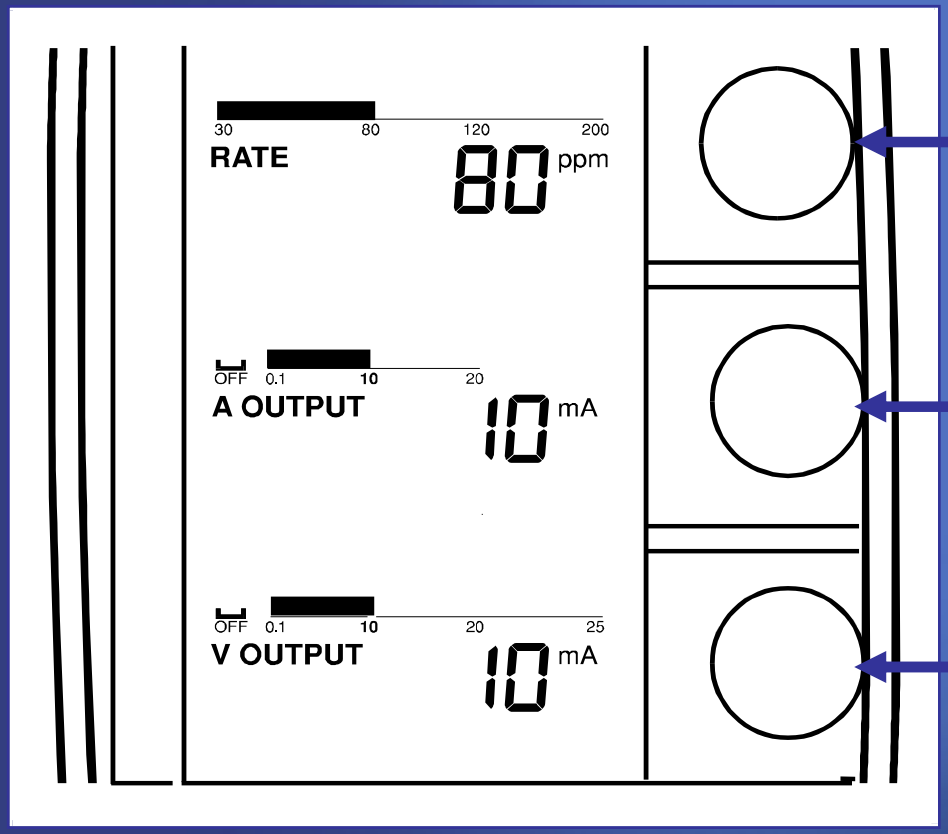
Use caution when setting the device to asynchronous modes.

Pause Key – Check Patient's Intrinsic Rhythm



Rate and Output Adjustments

Single or Dual Chamber Pacing With Only 3 Dials!



Rate Dial

Max rate of **200bpm** for pediatrics

Atrial Output Dial

For Single Chamber pacing, turn OFF Atrial output

Ventricular Output Dial

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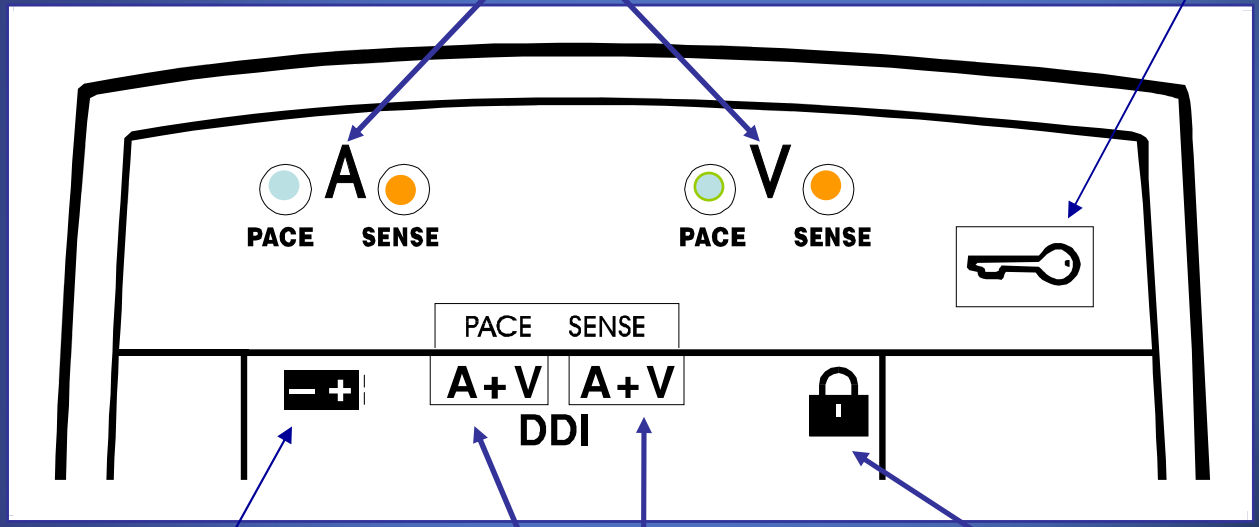
Indicators

Pace/Sense Indicators
(Flashing Lights)

Lock/Unlock Key



Low Battery
Light Indicator

Pace/Sense
Setup Indicators
("how is the device setup?")

Padlock
Indicator
("is the device
locked?")

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5348 Temporary Pacer Controls

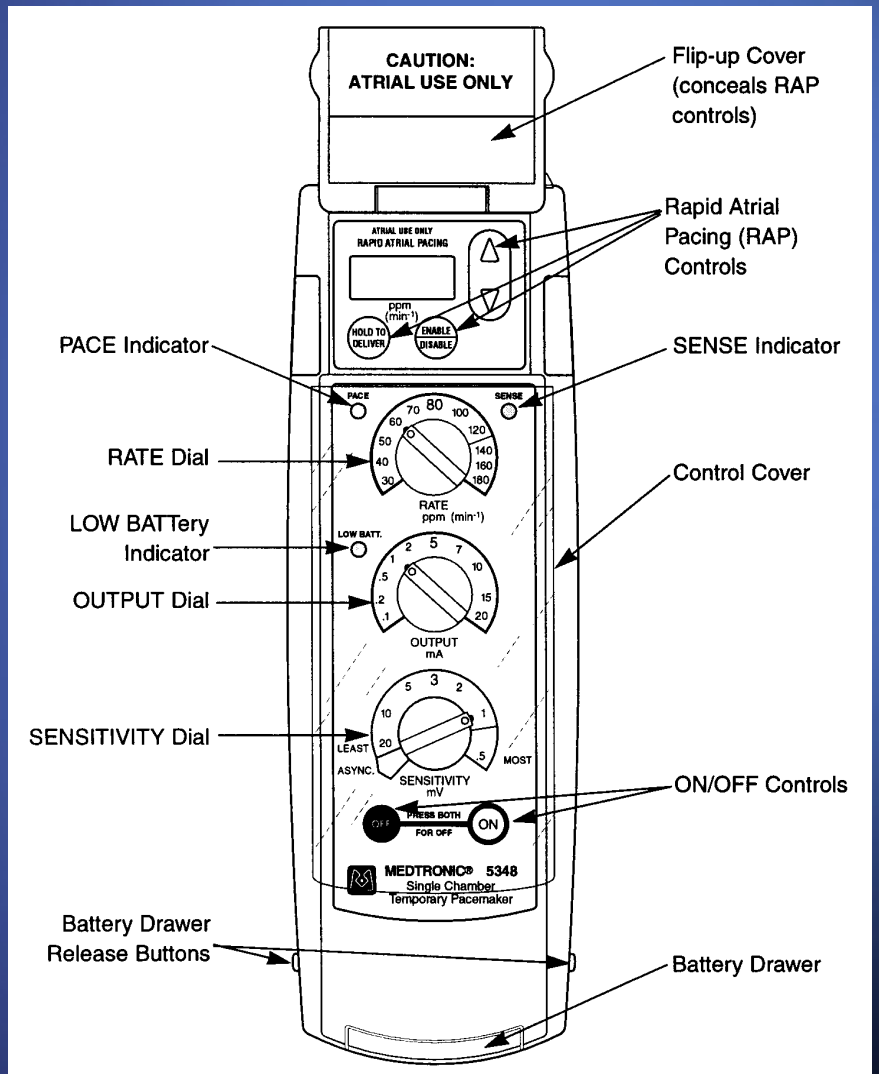

Figure 2. Controls, indicators, and features of the Model 5348.

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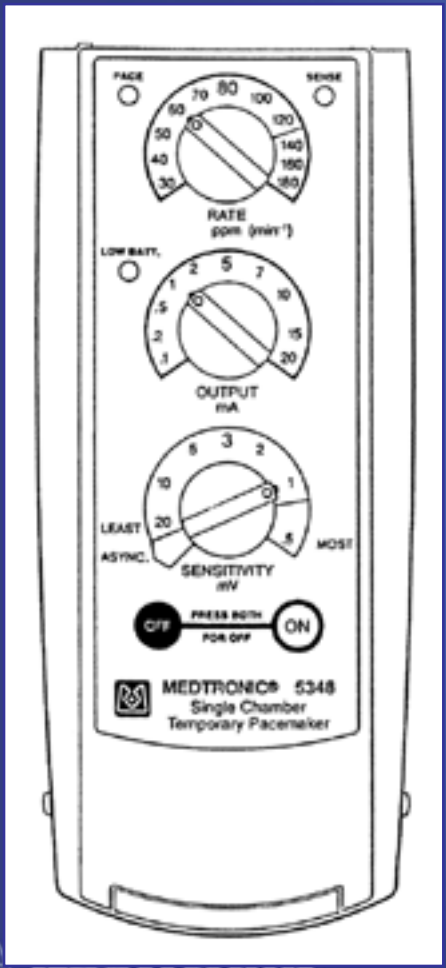
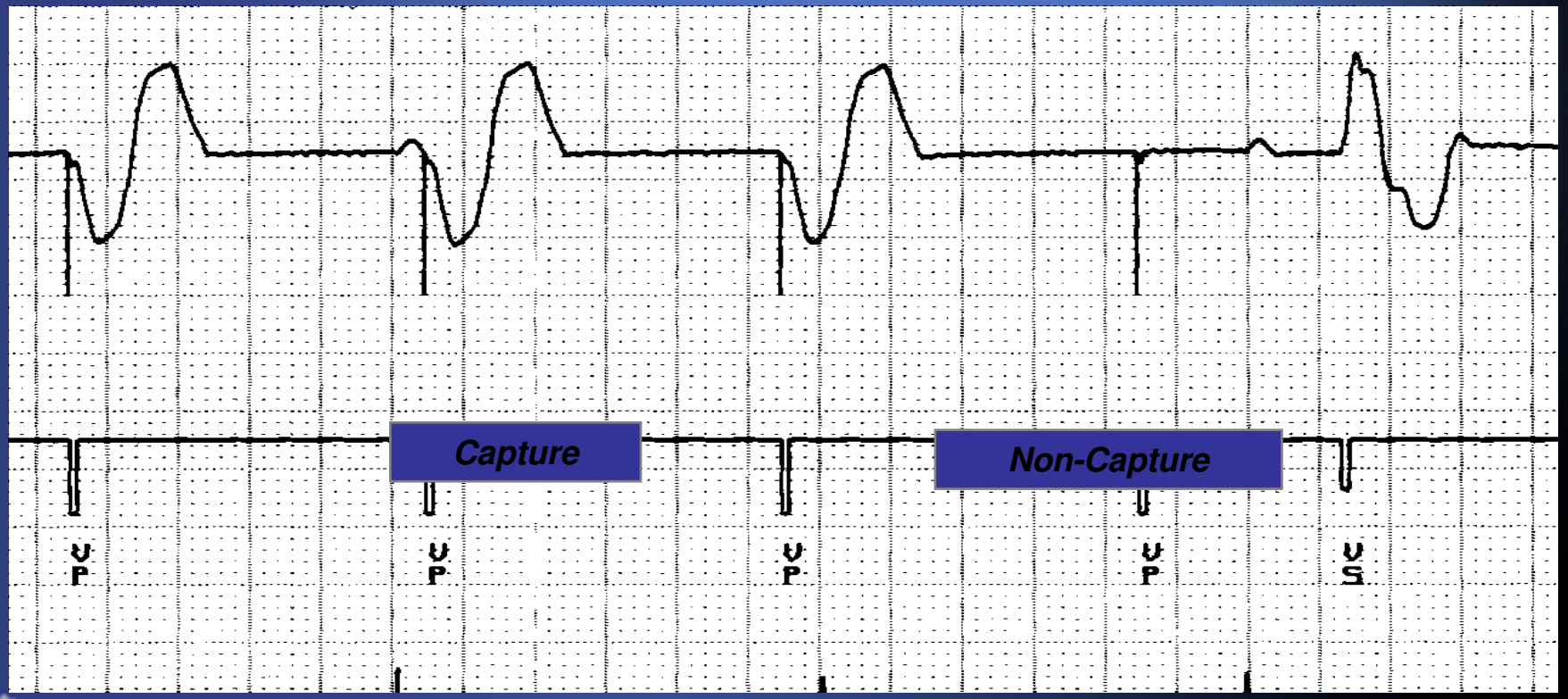
Temporary Pacing Parameters



- Pacing rate (heart rate)
- Output/stimulation threshold
- Sensitivity

Stimulation Threshold

- The minimum electrical stimulus needed to consistently capture the heart



Stimulation Threshold Procedure

1. Set RATE at least 10 ppm *above* patient's intrinsic rate.
2. Decrease OUTPUT: Slowly turn **OUTPUT** dial counterclockwise until ECG shows loss of capture.
3. Increase OUTPUT: Slowly turn **OUTPUT** dial clockwise until ECG shows consistent capture.
   This value is the stimulation threshold.
4. Set OUTPUT to a value 2 to 3 *times greater* than the stimulation threshold value.
   This provides at least a 2:1 safety margin.
5. Restore RATE to previous value.

Capture vs Non-Capture

Capture

Non-Capture

Atrial/Ventricular Stimulation Thresholds

Capture

Loss of Ventricular Capture

What kind of capture?

Fusion/Pseudofusion/Confusion

Identify:

- ✓ Capture Beats
- ✓ Fusion Beats
- ✓ Pseudofusion Beats

Fusion/Pseudofusion/Confusion

Identify:

- ✓ Capture Beats (A)
- ✓ Fusion Beats (B)
- ✓ Pseudofusion Beats (C)

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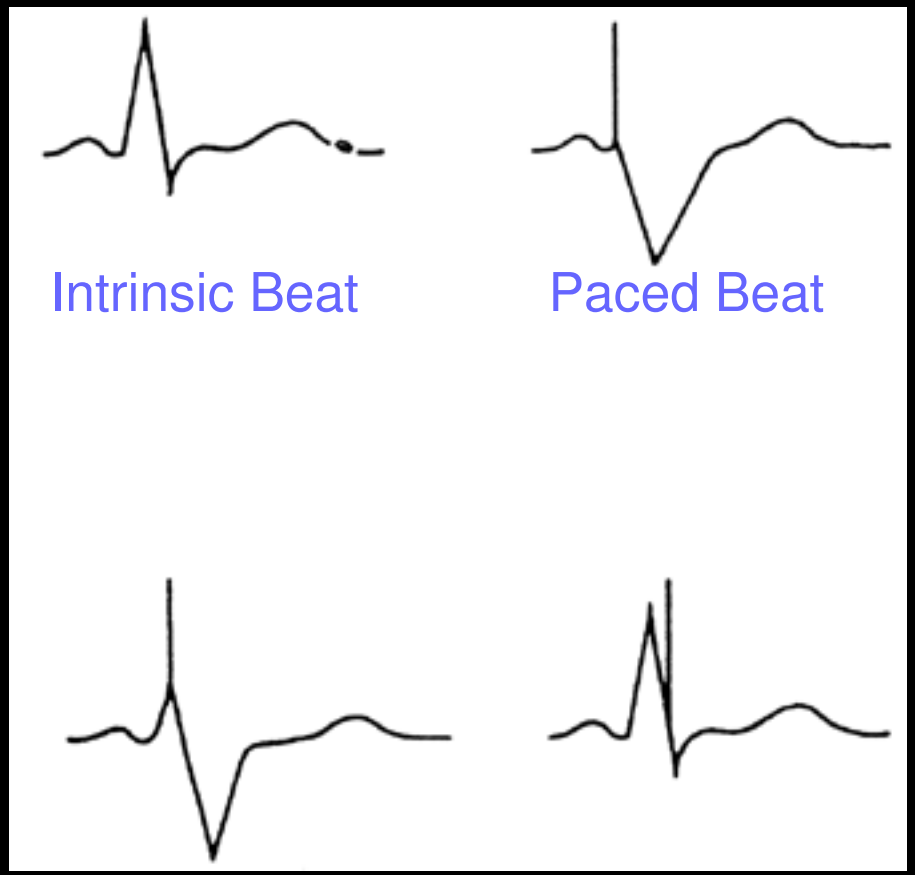
Fusion/Psuedofusion Beats



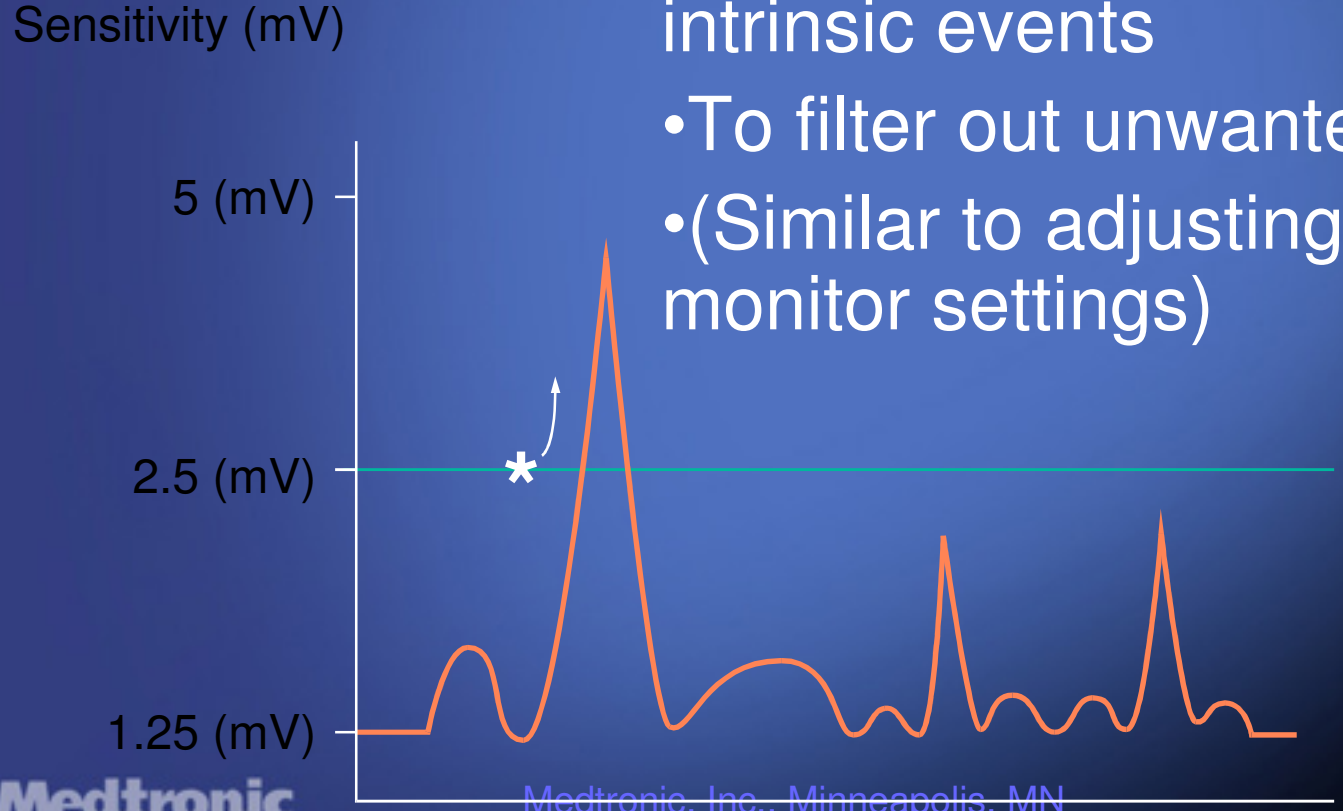
Sensing

- Sensing is the ability of the pacemaker to “see” when a natural (intrinsic) depolarization is occurring
  - Pacemakers sense cardiac depolarization by measuring changes in electrical potential of myocardial cells between the anode and cathode
  - Expressed in Millivolts (mV)

Sensing Threshold Procedure

1. Set rate at least 10 ppm *below* patient's intrinsic rate.
2. Adjust output: Set OUTPUT to 0.1 mA (A OUTPUT for atrial threshold; V OUTPUT for ventricular threshold).
3. Highlight SENSITIVITY (atrial or ventricular) (Menu 1).
4. Decrease SENSITIVITY: Slowly turn **MENU PARAMETER** dial counterclockwise until pace indicator flashes continuously.
5. Increase SENSITIVITY: Slowly turn **MENU PARAMETER** dial clockwise until sense indicator flashes and pace indicator stops flashing. *This value is the sensing threshold.*
6. Set SENSITIVITY to half (or less) the threshold value. *This provides at least a 2:1 safety margin.*
7. Restore RATE and OUTPUT to previous values.

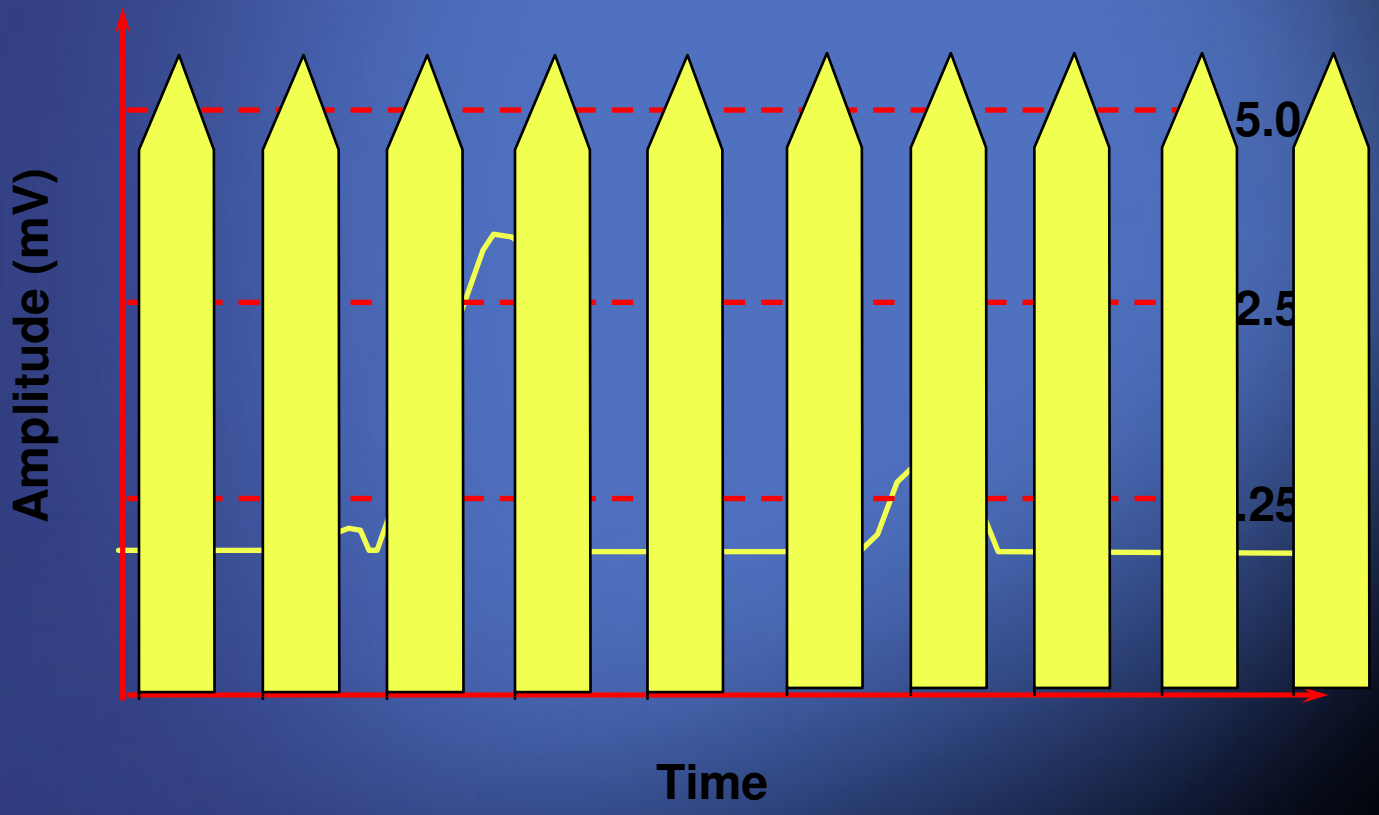
Sensitivity - Objectives



- To “see” or detect appropriate intrinsic events
- To filter out unwanted signals
- (Similar to adjusting bedside monitor settings)

Sensitivity

- The greater the number, the less sensitive the device to intracardiac events



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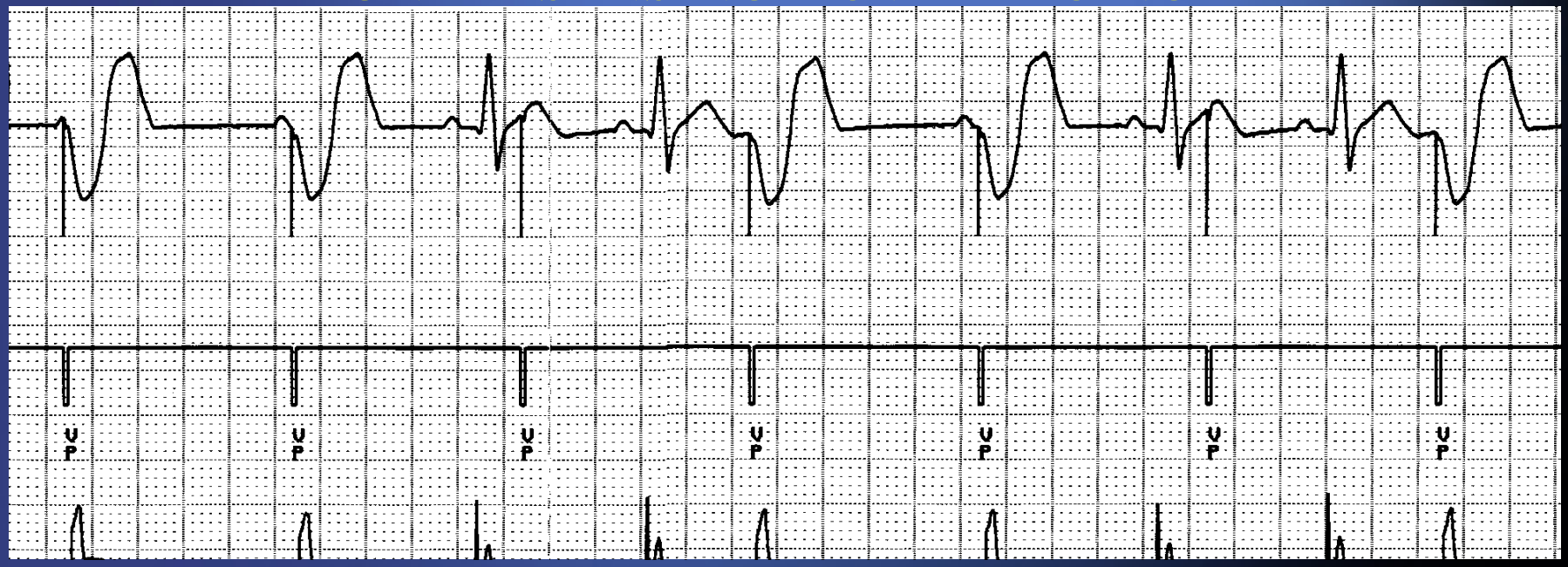
Undersensing

- Pacemaker does not “see” the intrinsic beat, and therefore does not respond appropriately

UNDERSENSING = OVERPACING



VVI/

Oversensing

An electrical signal other than the intended P or R wave is detected

OVERSENSING = UNDERPACING

Quick Step Up –Temporary Pacing

- Turn on temporary pacemaker
- Ensure battery is fresh
- Engage cable/cables
- Choose mode/rate
- Define capture threshold – apply safety margin
- Define sensing threshold – apply safety margin
- Lock

Managing Temporary Permanents in the OR Setting

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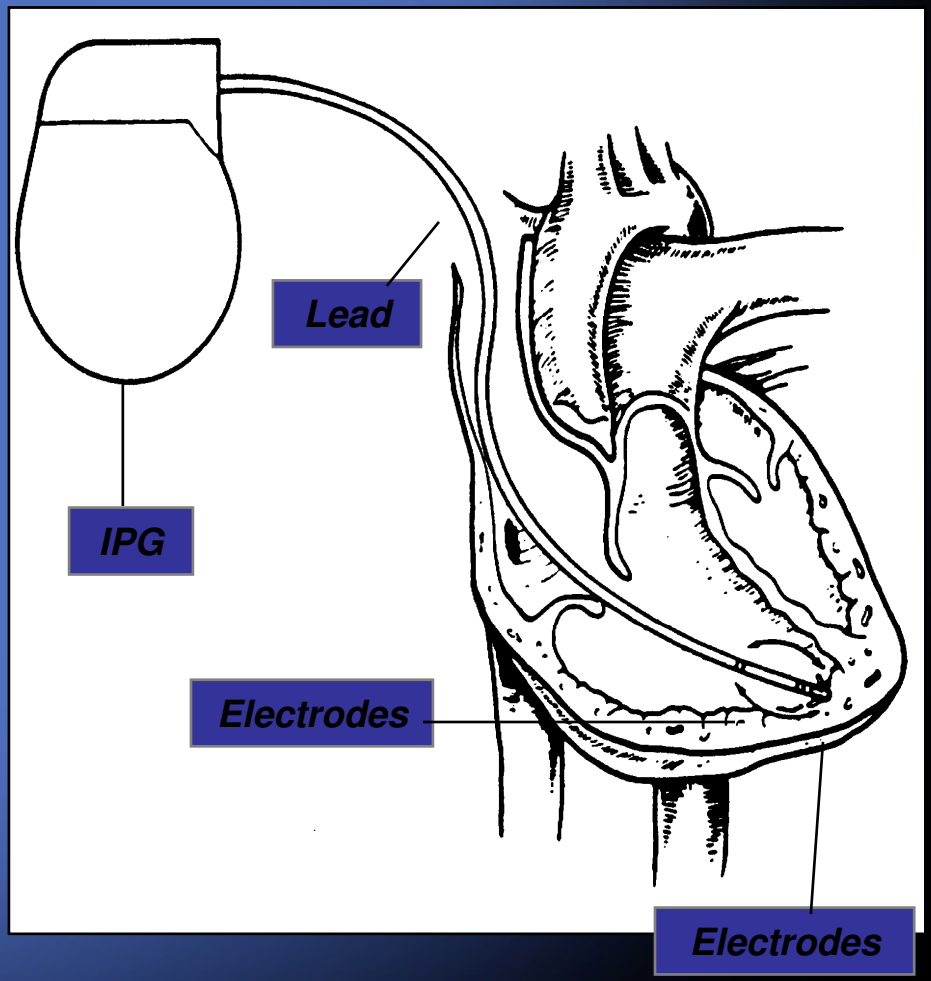
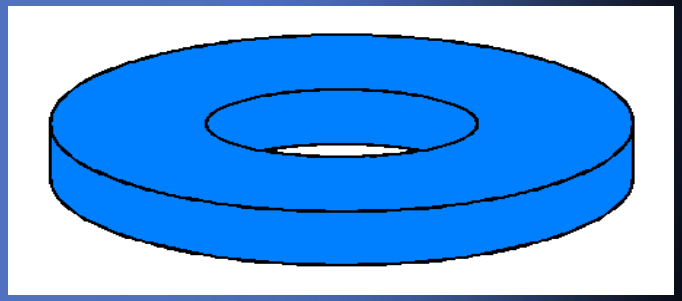
Temporary Permanent Components

- Pulse generator: power source or battery
- Leads or wires
- Electrode
- Body tissue



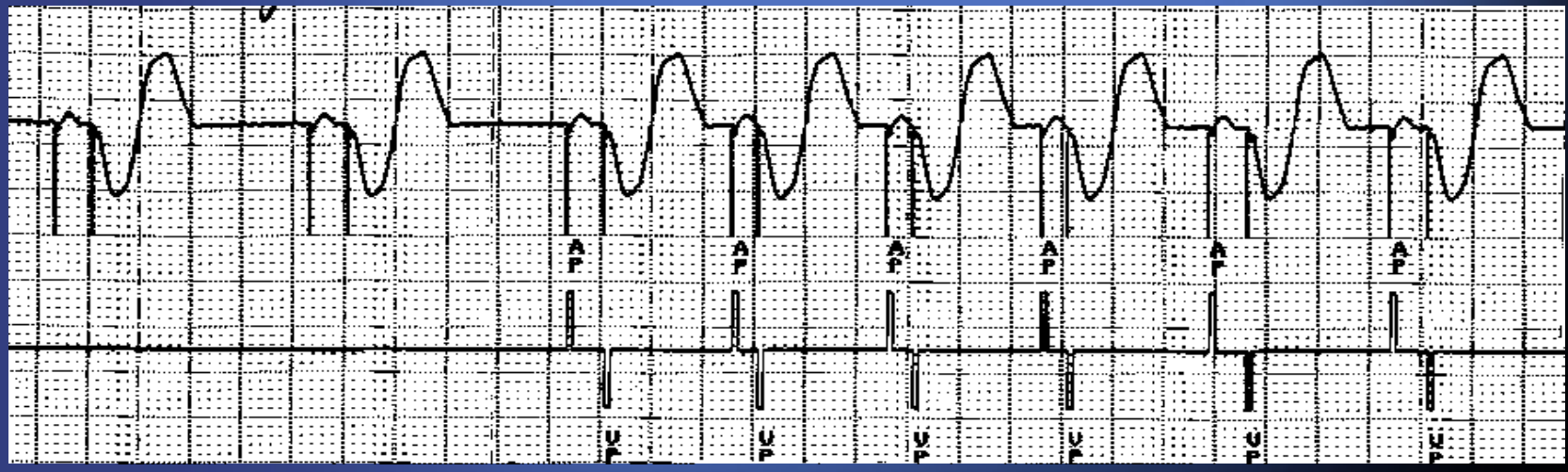
Use of Magnets with Pacemakers

- Locate patient's pacemaker.
- Place the round magnet directly over the pacemaker.
- Once the magnet is removed, the pacemaker will revert to normal function.
- Pacemaker interrogation is not routinely required before or after surgery.

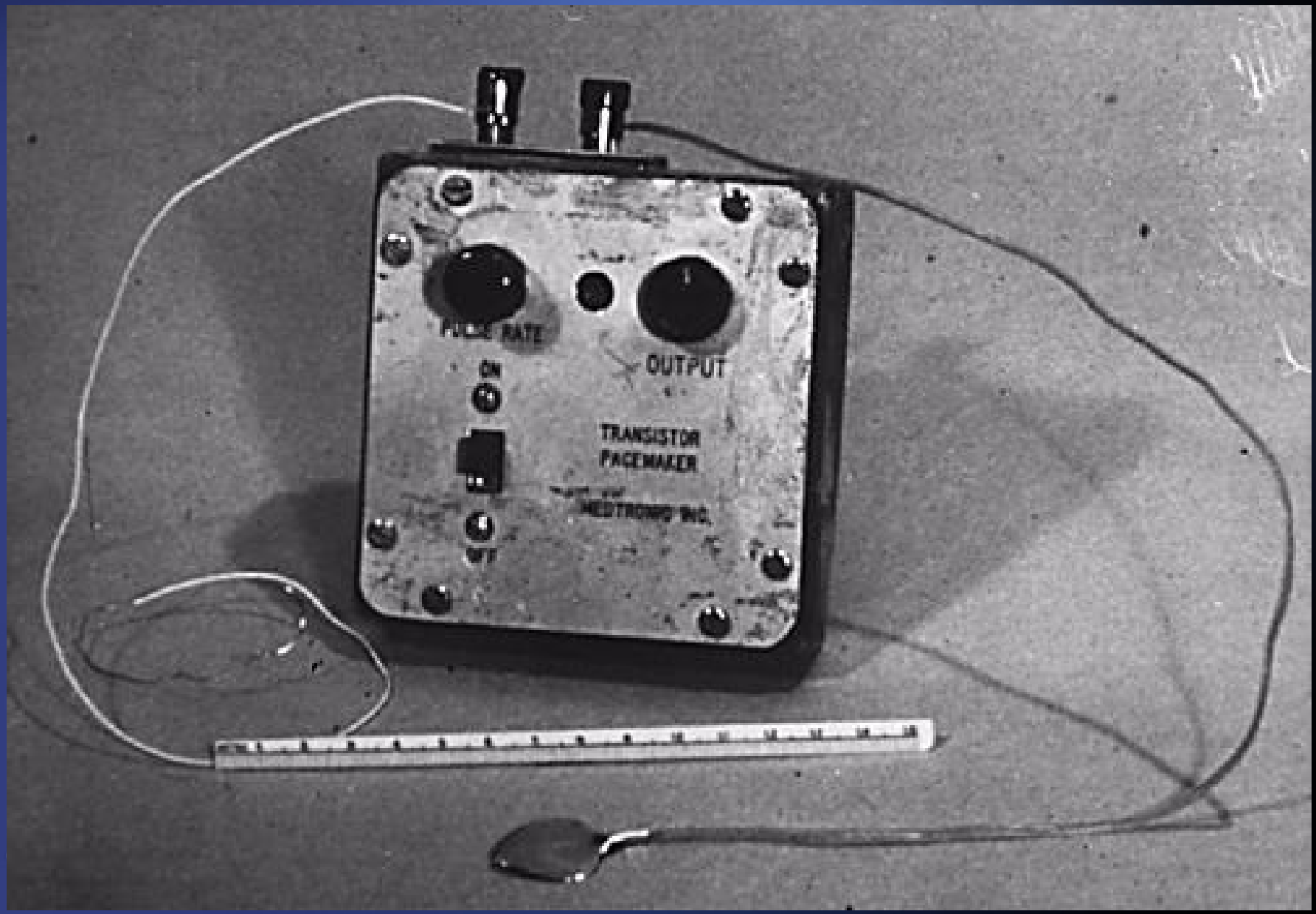


Magnet Application and Pacemakers

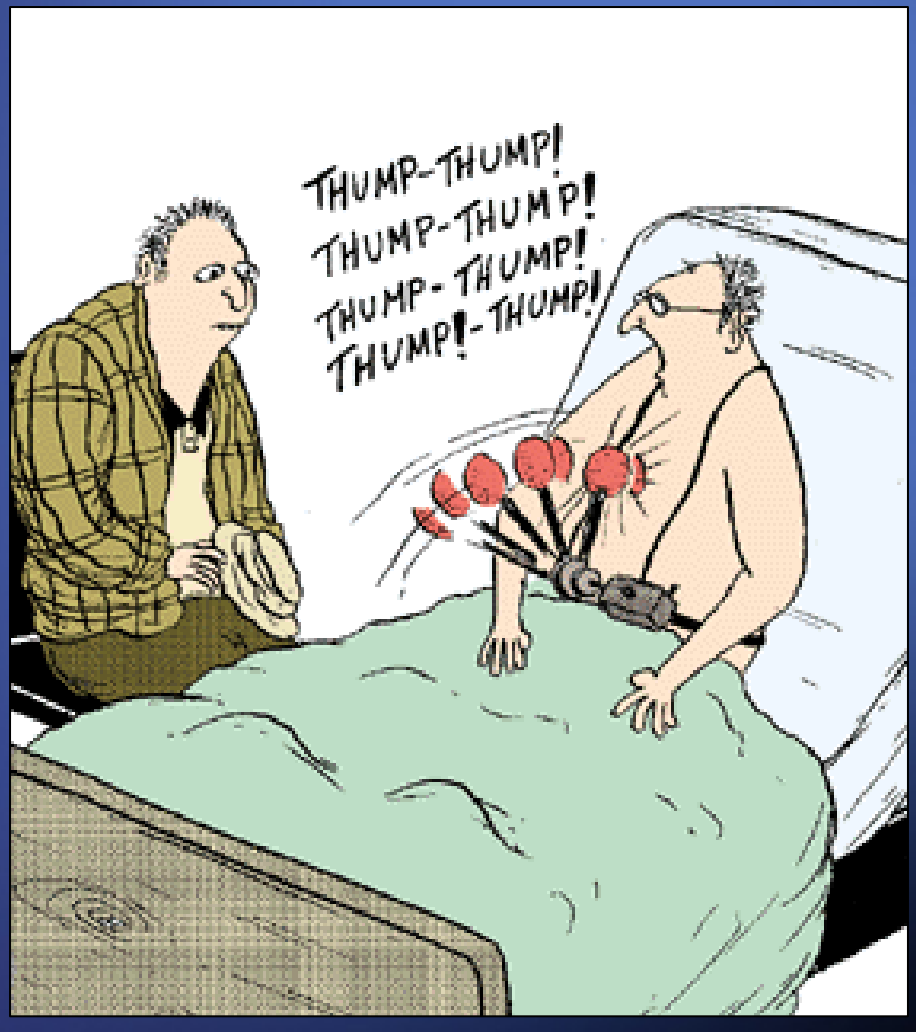
- Magnet application causes asynchronous pacing at a designated "magnet" rate



Temporary Pacemaker



“They tell me it’s the latest breakthrough – the nonsurgical pacemaker.”



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Magnets and Devices

Identify device with patient's ID Card. Call company or page your local representative with questions.

- **Medtronic**
  800.723.4636
- **Boston Scientific (Guidant)**
  800.227.3422
- **St. Jude (Ventritex)**
  800.733.3455

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