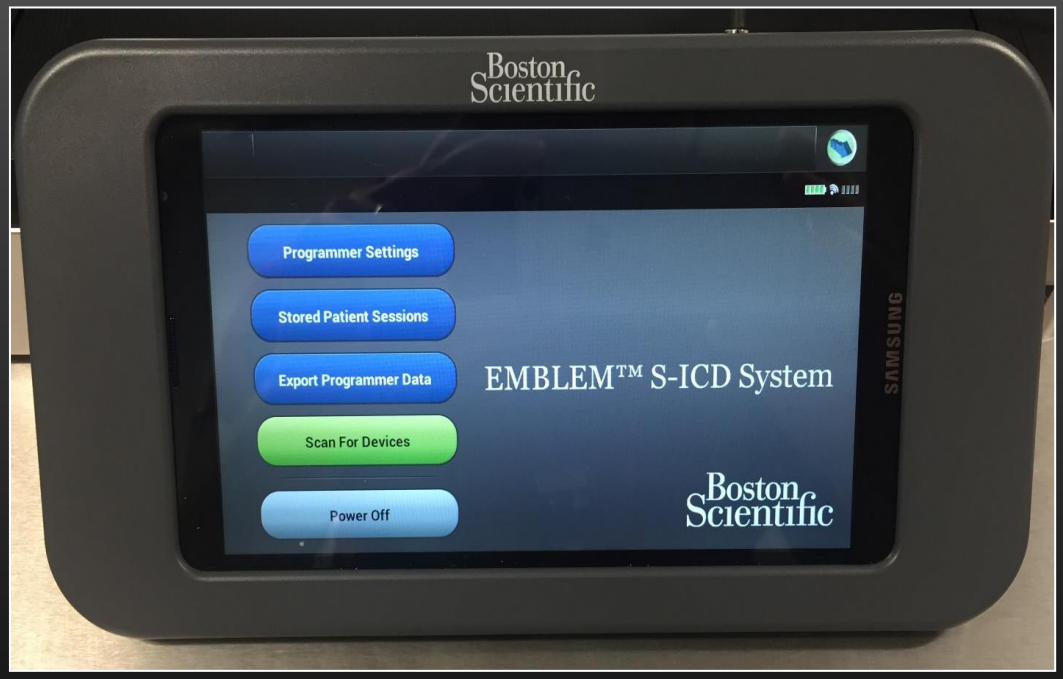
ESSEX CTC
S-ICD LIVE CASE DAY



THE PHYSIOLOGISTS PERSPECTIVE

Jason Collinson - Chief Cardiac Physiologist
Essex CTC, Basildon and Thurrock University Hospital

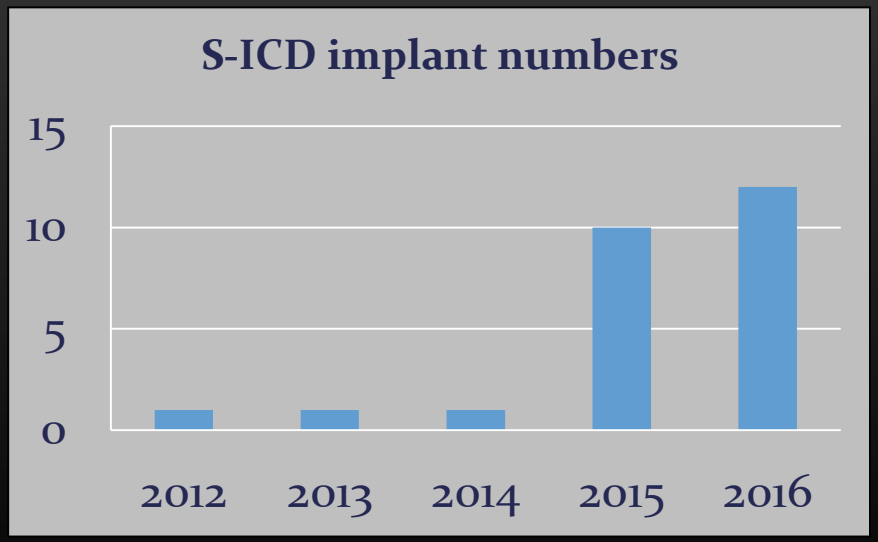
22/9/2016

Presentation Objectives

- Summarise the Basildon S-ICD service and the physiology team approach
- Review the role of the physiologist during implants and follow up
- Discuss our management of appropriate and inappropriate shocks
- Things to know and advice if an S-ICD patient turns up at your hospital

The S-ICD service

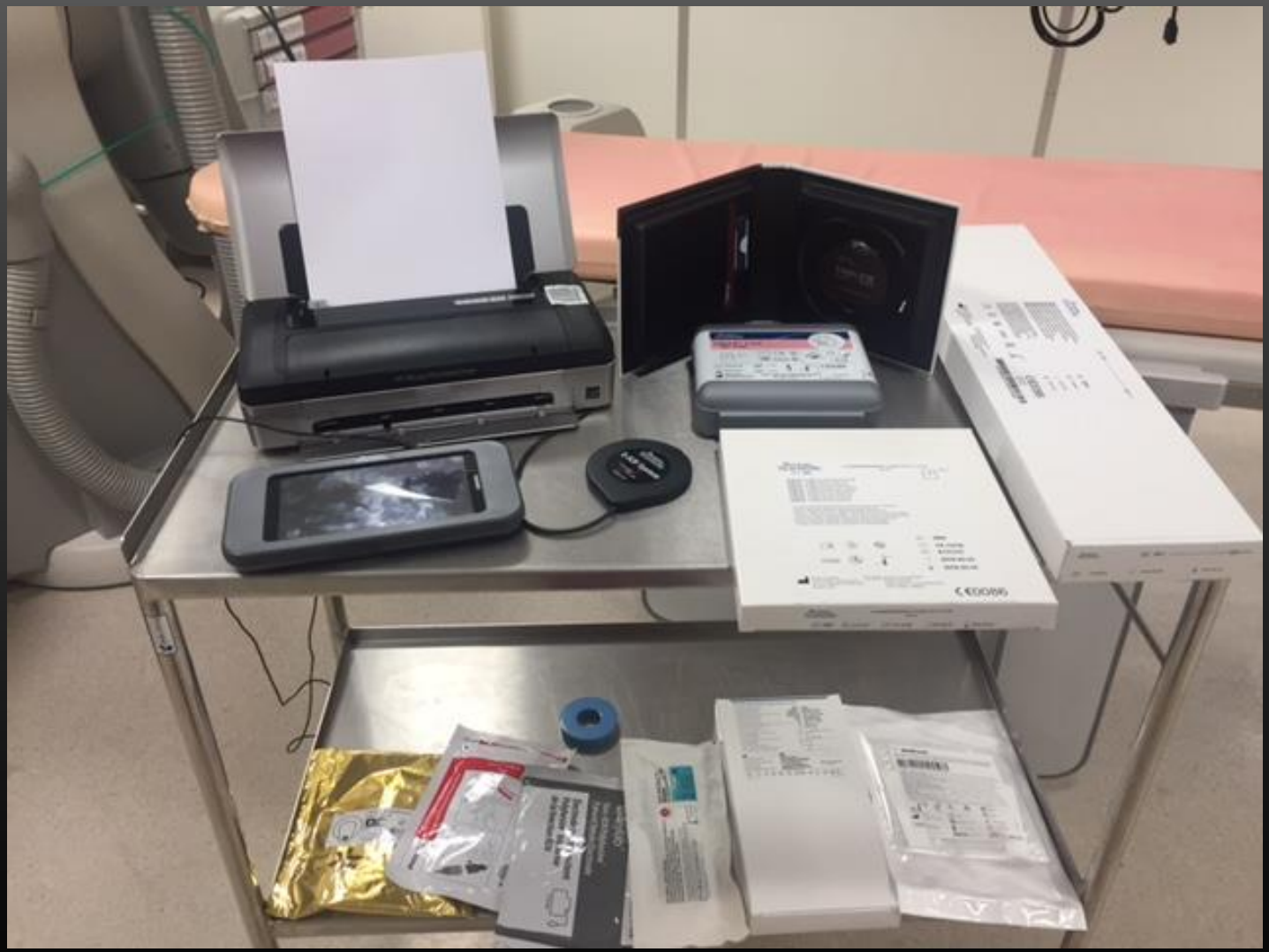
- 23 patients implanted with S-ICDs across Essex
  - 4 with the 1st generation Cameron health system
  - 17 with the 2nd generation Boston Scientific Emblem system
  - 2 with 3rd generation Boston Scientific Emblem MRI system



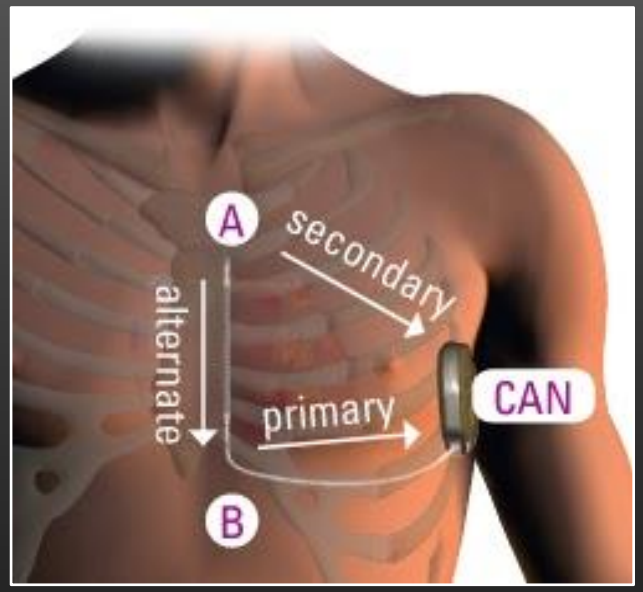
The Team and our Approach

- 2 lead physiologists, 11 involved in follow up in clinic and HM
- Leads attended S-ICD user course
- Company support (Screening, Implants, Troubleshooting)
- Internal educational meetings and training sessions
- Good record keeping
- Changes and updates to team via emails and one to one training (Recent update, Hand out of HM Hubs)
- Learning from experience

The Physiologist Role at Implant



Importance of Screening Document

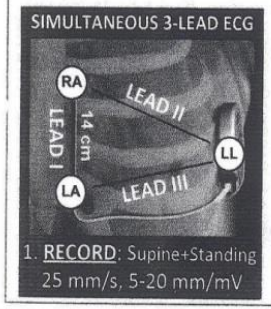


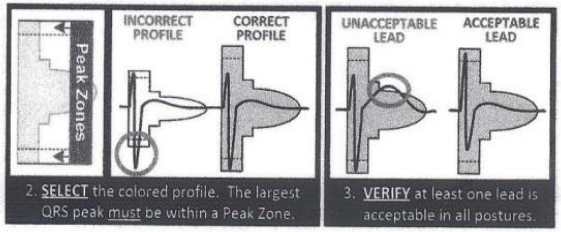
- Lead I Alternate
- Lead II Secondary
- Lead III Primary

SCREENED POSITION (RELATIVE TO STERNUM)	POSTURE	HEART RATE	Lead I	Lead II	Lead III
☑ LEFT STERNUM	☑ SUPINE ☐ STANDING	☑ RESTING ☐ EXERCISE	☑ PASS A+B ☐ FAIL	☐ PASS ☑ FAIL	☑ PASS E ☐ FAIL F
	☑ SUPINE ☐ STANDING	☑ RESTING ☐ EXERCISE	☑ PASS ☐ FAIL A+B	☐ PASS ☑ FAIL	☑ PASS ☐ FAIL E
☐ RIGHT STERNUM	☐ Other posture or heart rate tested (DESCRIBE): ☑ N/A		☐ PASS ☐ FAIL	☐ PASS ☐ FAIL	☐ PASS ☐ FAIL
☐ MID-STERNUM	☐ Other posture or heart rate tested (DESCRIBE): ☑ N/A		☐ PASS ☐ FAIL	☐ PASS ☐ FAIL	☐ PASS ☐ FAIL
	Mark all acceptable ECG leads: A surface ECG lead is acceptable if all evaluated postures and heart rates are marked as PASS for that lead.		☑	☐	☑

For an individual surface ECG lead (e.g., Lead I, II or III) to pass, all QRS complexes and morphologies must pass the evaluation

S-ECG screening Lead positions:





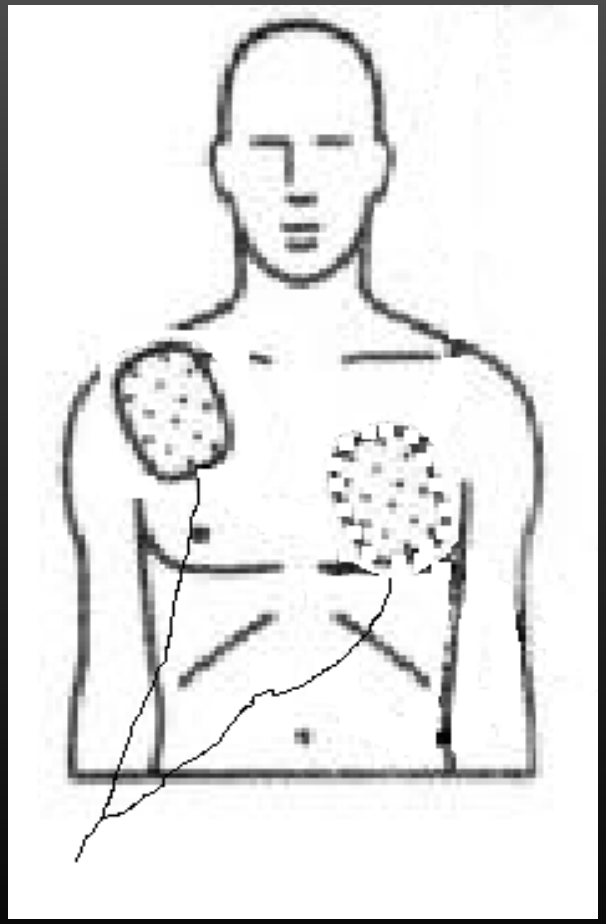
Physician's Signature: (BSC)

Physician's Printed Name: K. VERNAZZA

This document contains confidential information. Please safeguard the information and only use it for its intended purposes.

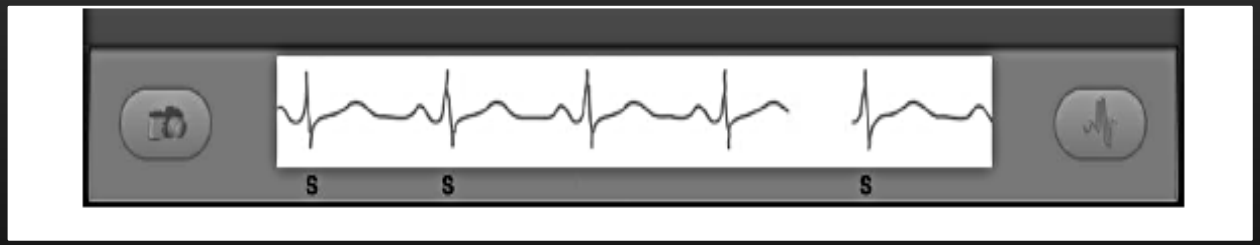
Patient preparation

- Defib patches on pre GA
- ECG needs to be clear of operation site
- Diathermy patch
- BP and Sats monitored through the anaesthetic machine



Device set up

- Check battery and enter patient and lead details
- Run the auto setup following the on screen instructions
- Assess the live ECG during the auto setup



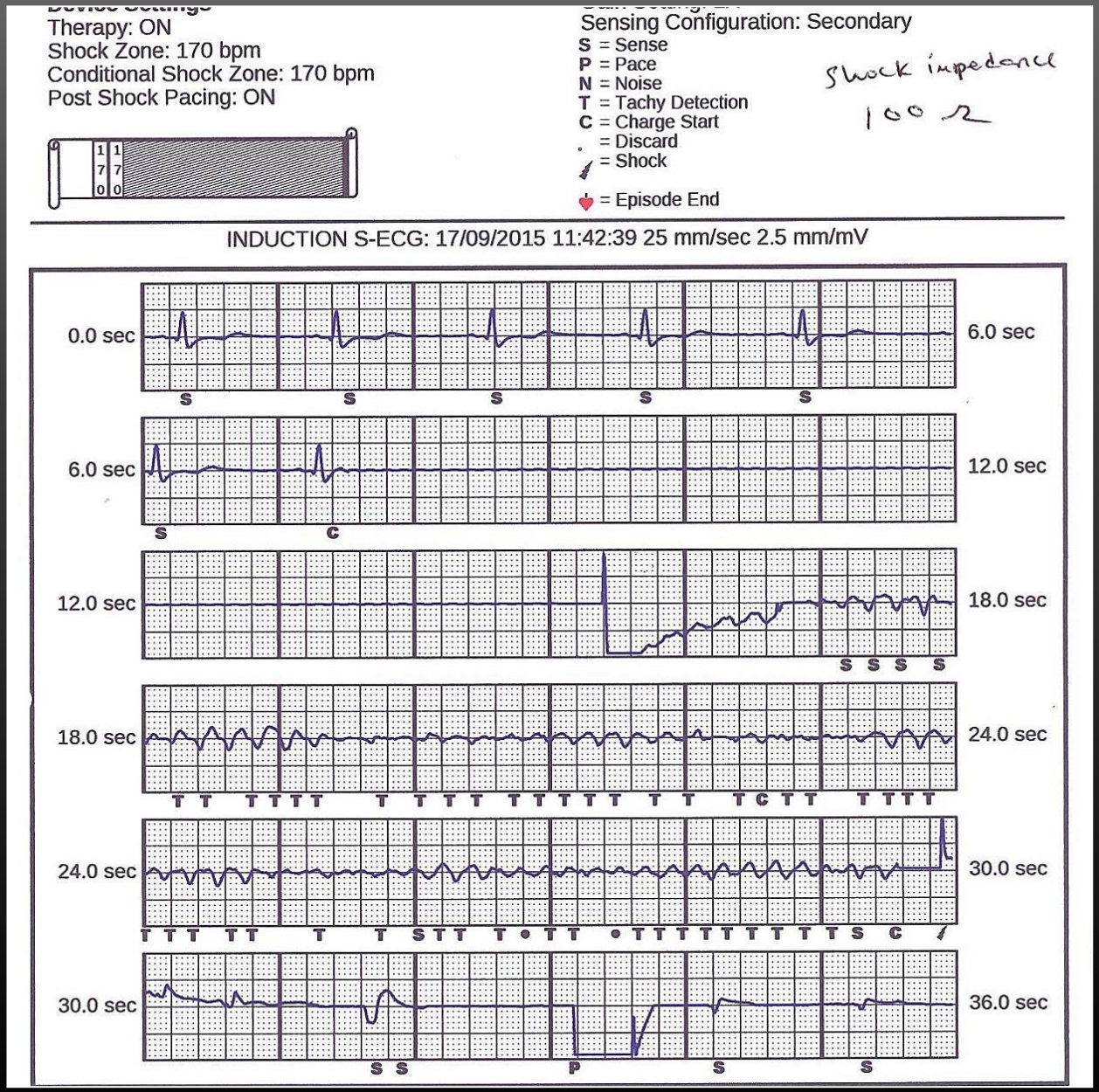
- Capture the reference S-ECG

VF induction

- Device therapies and post shock pacing ON
- Single shock zone at 170 bpm programmed
- 65J shock first shock, 80 J 2nd shock with reversed polarity
- VF induce with a 50 Hz burst
- Physiologists job to assess rhythm, talk through what the device is doing and review strips post shock
- Impedance and time to shock particularly important

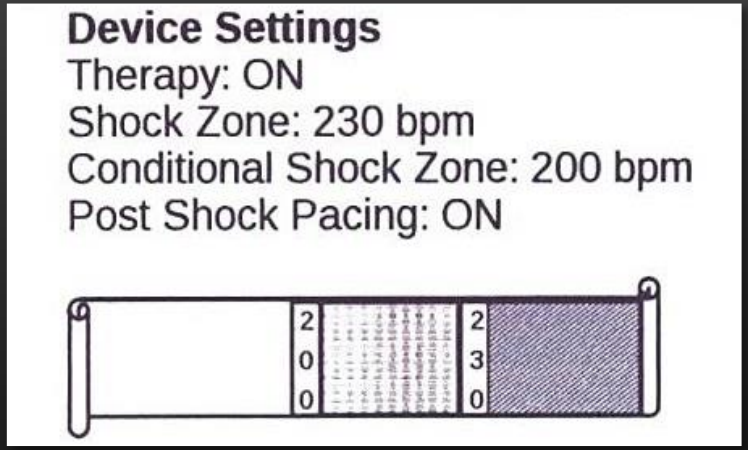
VF induction

- 50Hz burst
- Rhythm VF
- Sensing
- Tachy sensing
- Device charging
- Shock delivered
- Back to sinus rhythm
- One beat of post shock pacing seen
- Shock impedance 100 ohms
- Time to shock ~ 13 secs



Recommended Programming

- Two zone programming
- Discriminators applied to the conditional zone
  - Insight algorithm
    - Morphology
    - QRS width
    - Interval analysis
  - Smart Pass
- Post shock pacing ON
  - VVI at 50 bpm for 30 seconds

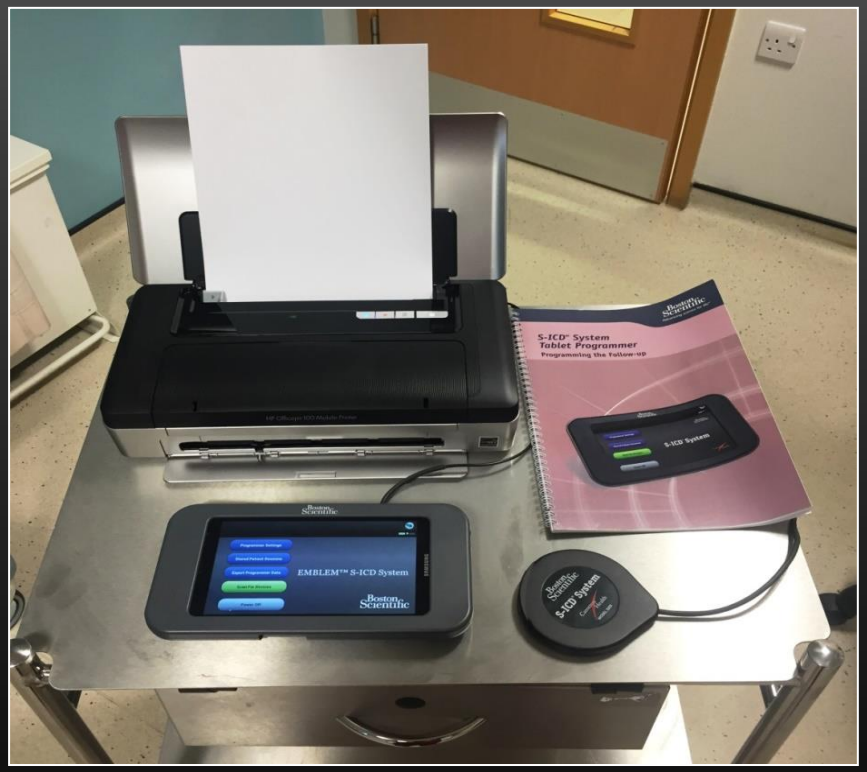


S-ICD follow up

- Post implant check
- 4-6 week check
- 3/12 post implant if wound not healed by 4-6 week check
- 6/12 if wound has healed well. If enrolled on Latitude this would be a remote follow up
- 6/12 follow up alternating between remote and in clinic checks

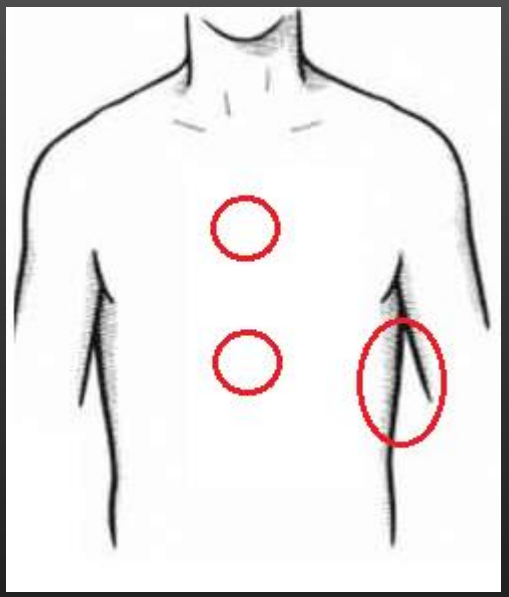
Post implant check

- Prompted to complete auto set up
- Store S-ECG template
- Print captured S-ECGs
- Info booklet, ID card, post surgery recovery advice

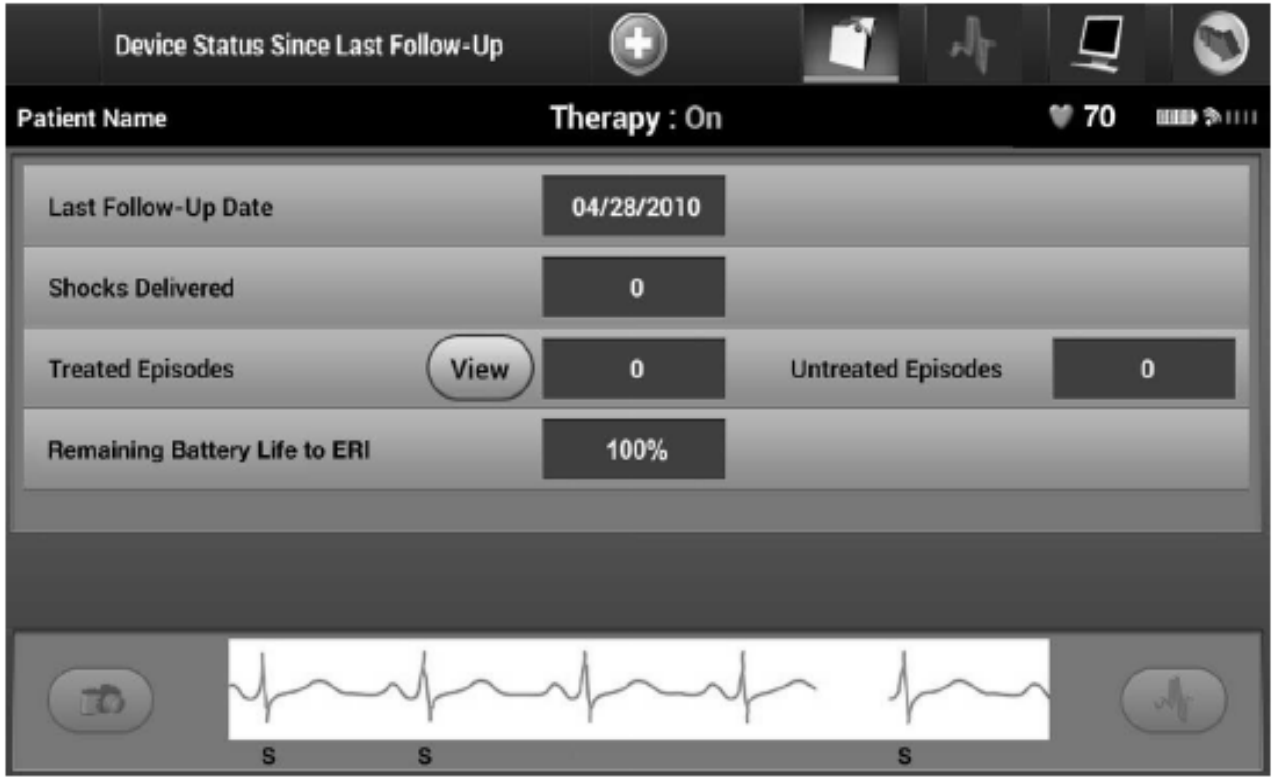


4-6 week post implant check

- Wound checks
- Battery and lead impedance status
- View arrhythmias
- Repeat auto set up supine and standing
- Store S-ECG template and print captured S-ECGs
- Enrol to Latitude HM

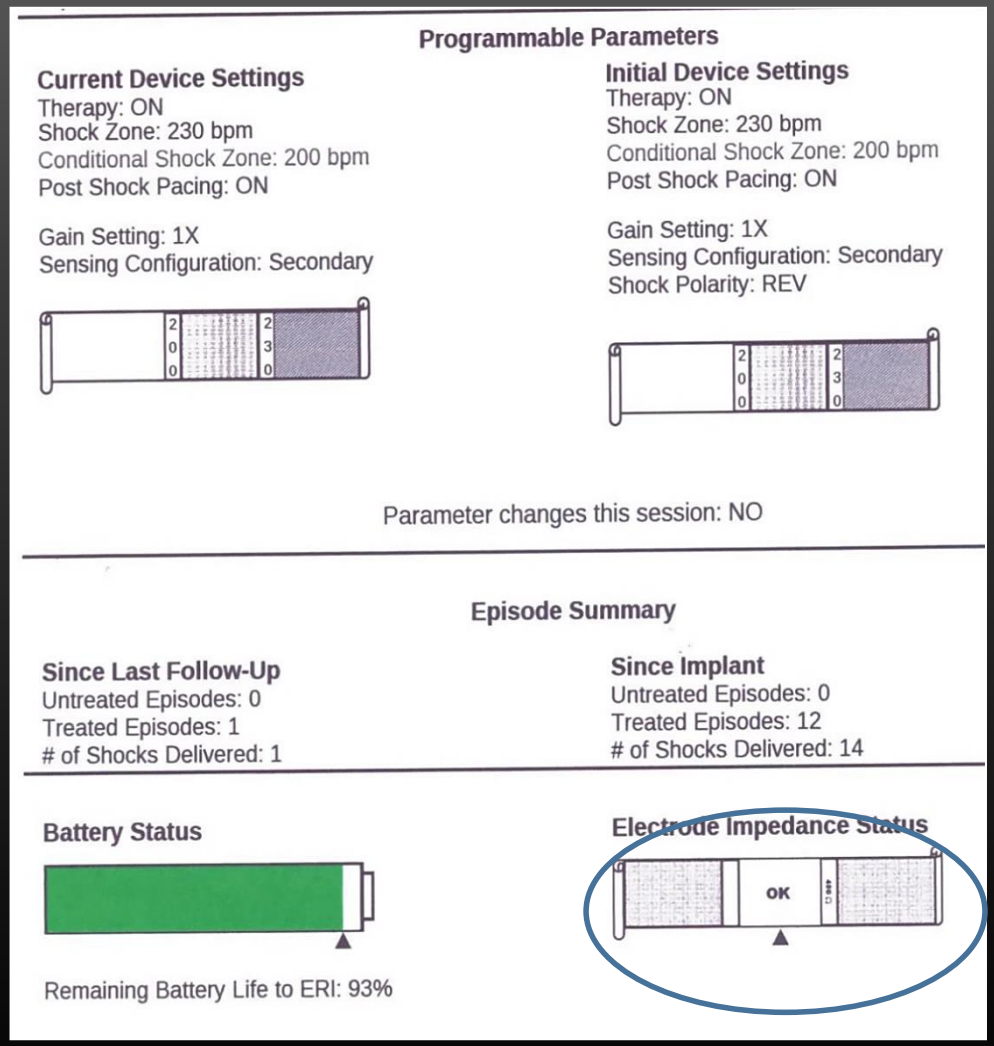


Device status screen



Battery and Lead impedance

- Expected battery life
  - 1st generation ~ 5 years
  - 2nd generation ~ 7 years
- Battery status at 10% see patient every 3/12
- Battery at 0% is ERI
- ERI
  - Battery life remaining 3/12 or 5 shocks



Programmable Parameters

Current Device Settings
Therapy: ON
Shock Zone: 230 bpm
Conditional Shock Zone: 200 bpm
Post Shock Pacing: ON

Gain Setting: 1X
Sensing Configuration: Secondary

Initial Device Settings
Therapy: ON
Shock Zone: 230 bpm
Conditional Shock Zone: 200 bpm
Post Shock Pacing: ON

Gain Setting: 1X
Sensing Configuration: Secondary
Shock Polarity: REV

Parameter changes this session: NO

Episode Summary

Since Last Follow-Up
Untreated Episodes: 0
Treated Episodes: 1
# of Shocks Delivered: 1

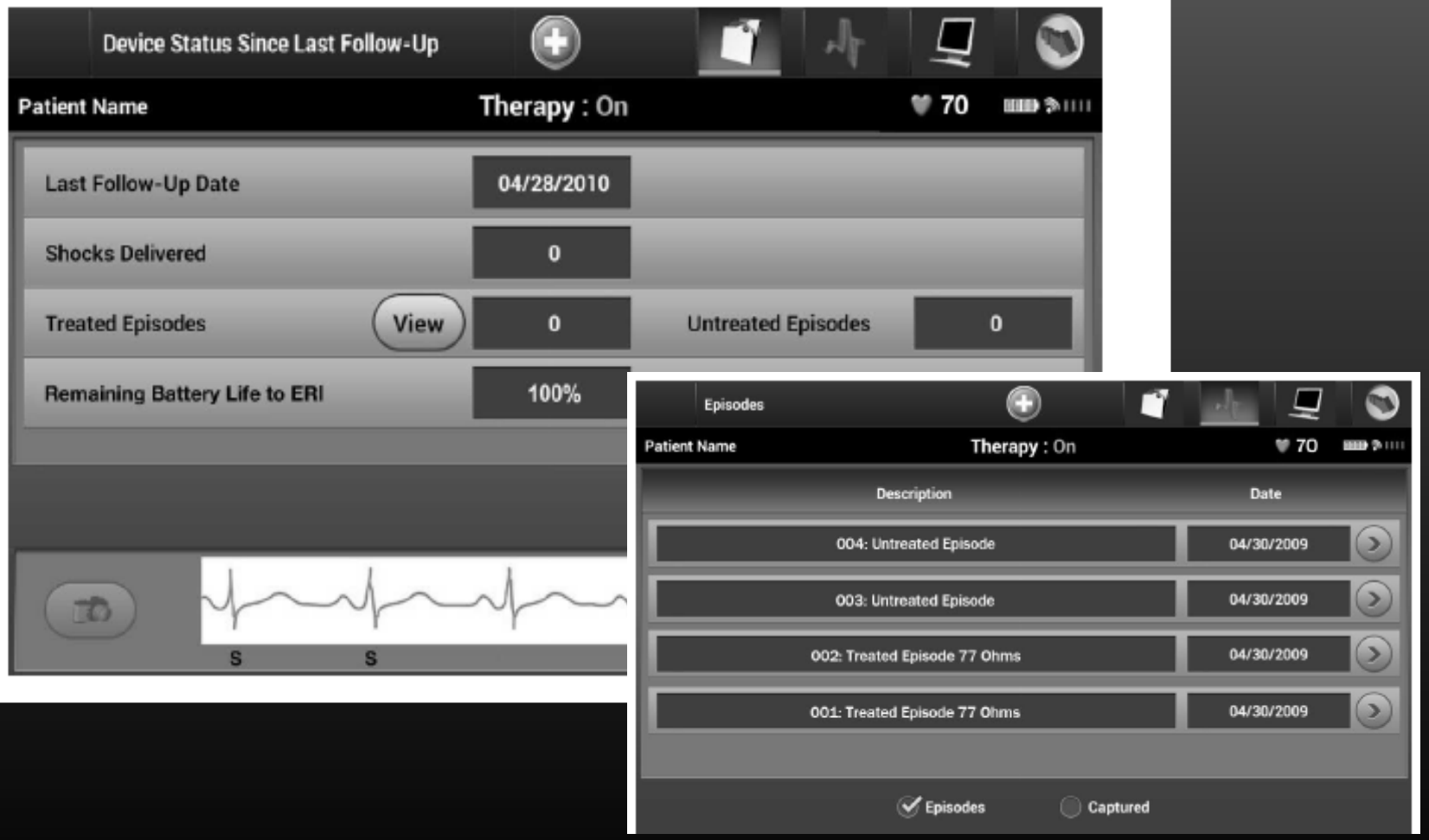
Since Implant
Untreated Episodes: 0
Treated Episodes: 12
# of Shocks Delivered: 14

Battery Status

Remaining Battery Life to ERI: 93%

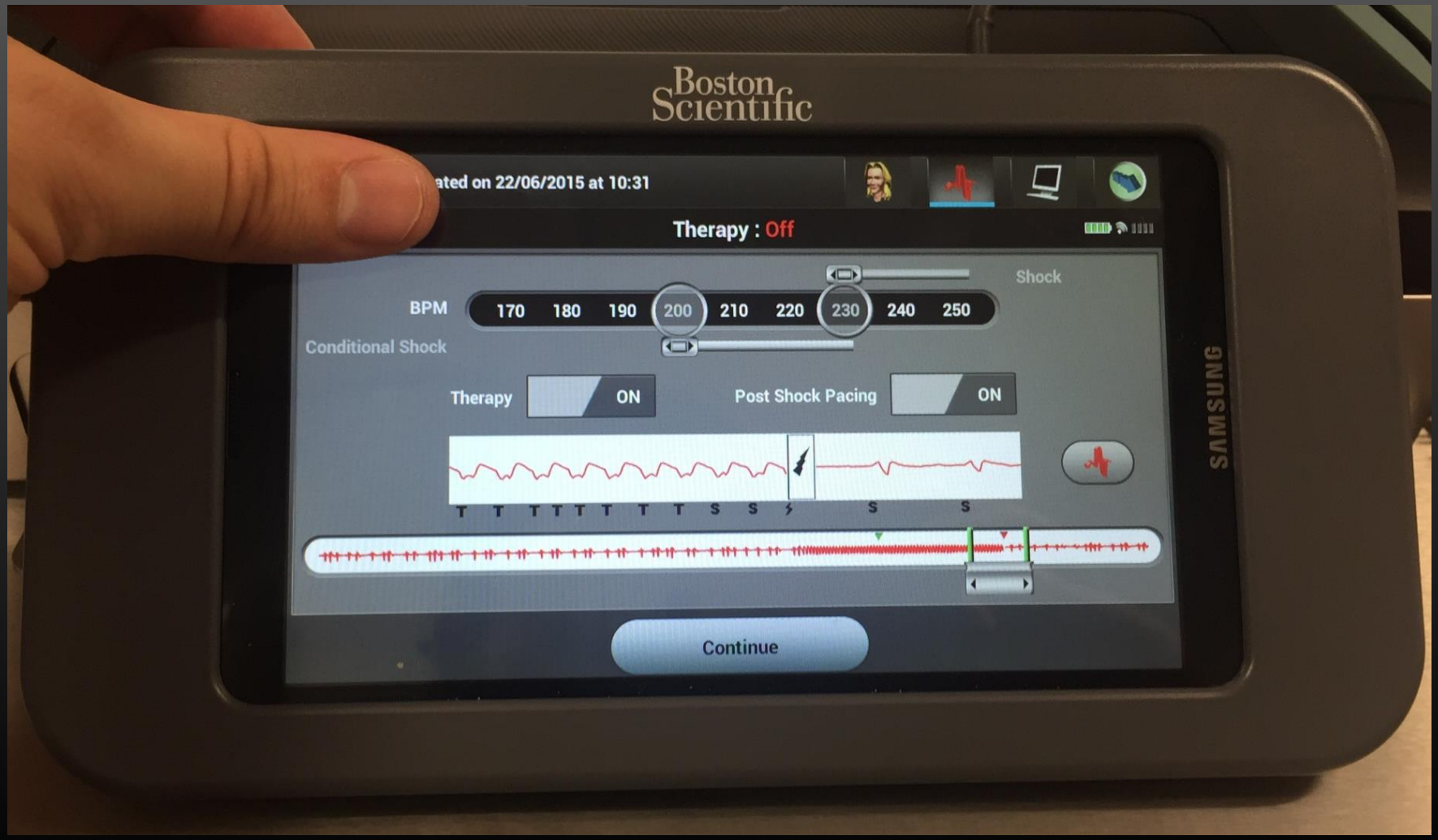
Electrode Impedance Status

View Arrhythmias

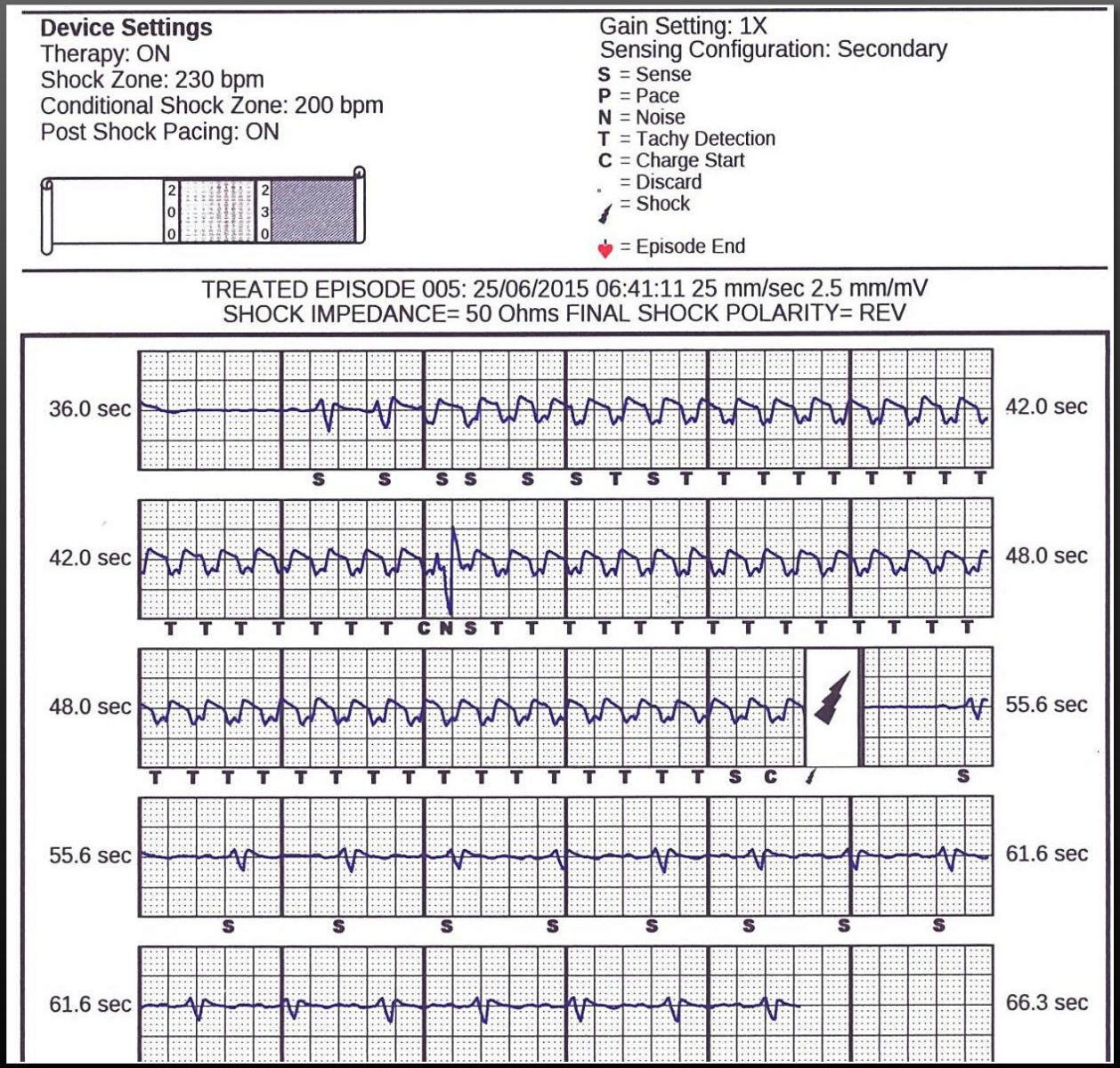


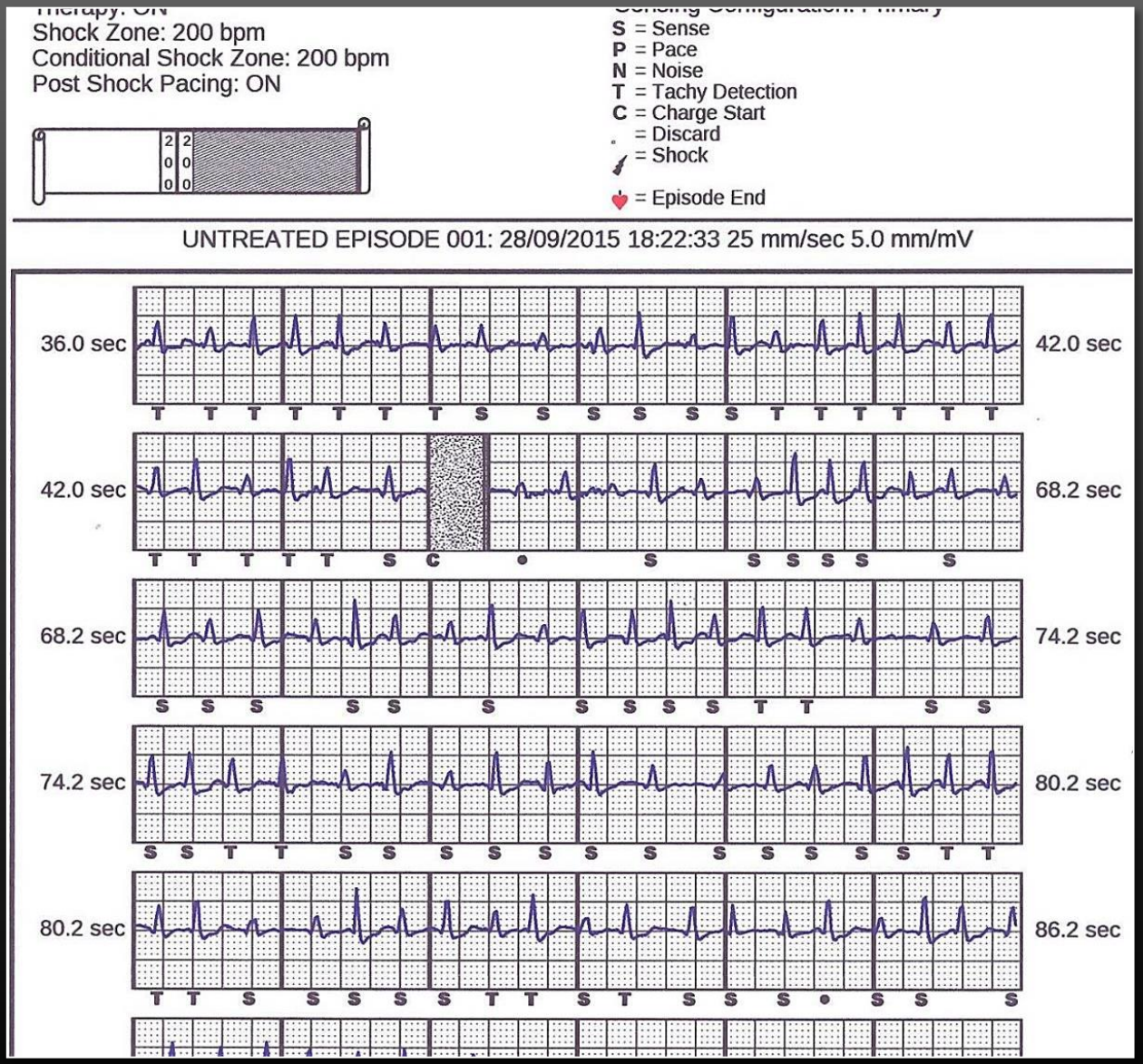
All episodes viewed will be stored on the programmer

Episode as seen on the programmer



VT with appropriate shock





Untreated Episode

Features

- Smart charge
  - If non sustained episode smart charge will extend detection by 3 beats up to 5 times
  - Non sustained episode is an episode where detection met starts charging but self terminates before shock delivered
  - Not programmable
- Smart pass
  - Algorithm to reduce T wave oversensing
- AF monitoring
- MRI compatible mode

S-ICD Home Monitoring with Latitude

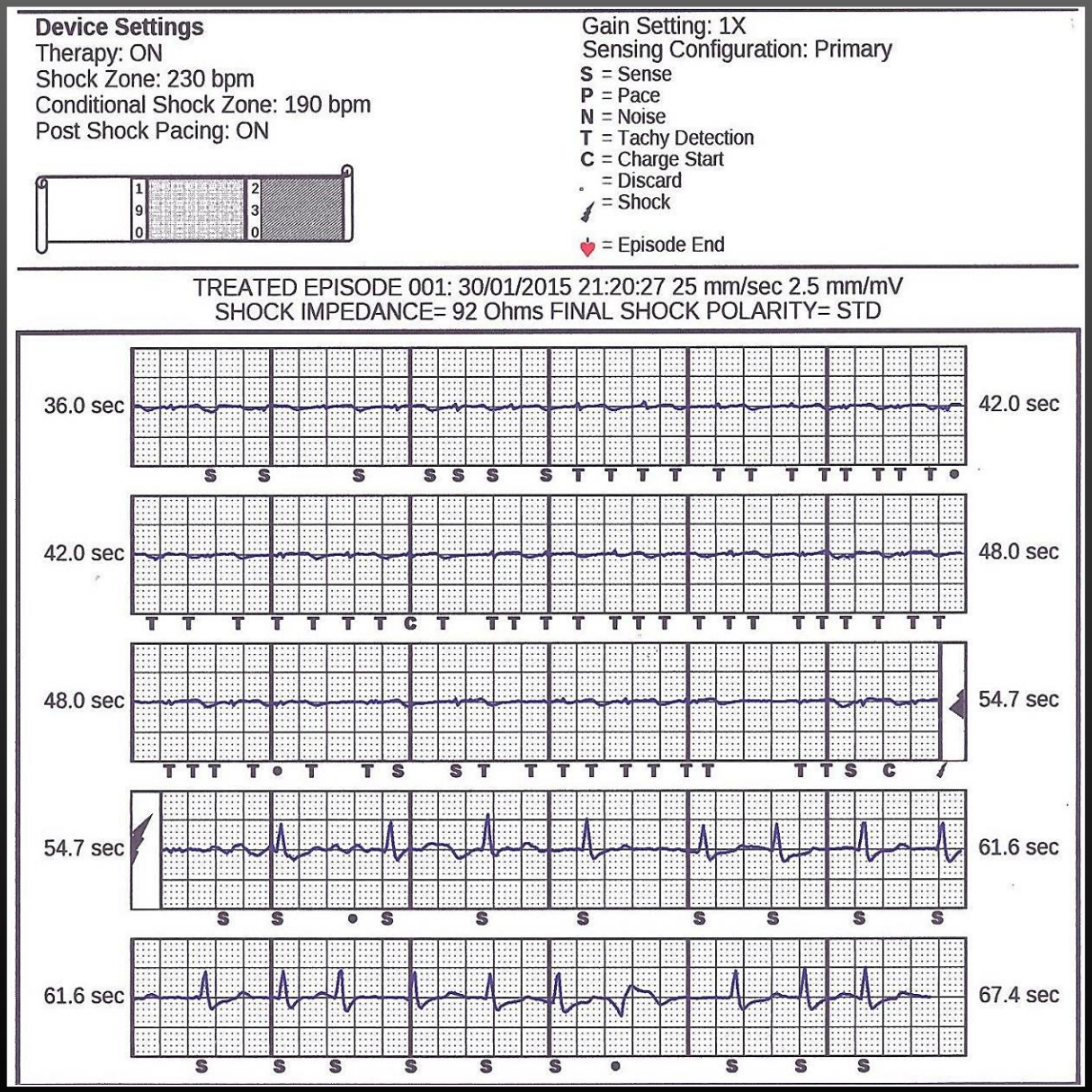
- Emblem S-ICDs only
- Communicator 6290 with a USB cellular adaptor
- Manual downloads only.
- 3 feet range and will need to be plugged in all the time
- Manual downloads for: (Basildon approach)
  - Initial set up
  - If a shock occurs
  - If an audible alert heard
  - The day before a scheduled remote follow up
- Enrol to S-ICD group on Latitude

Management of Appropriate shocks

- Same as trans-venous system
- DVLA guidelines apply
- Reassure patient
- Discuss with Dr's if recurrent appropriate shocks
- Review medication

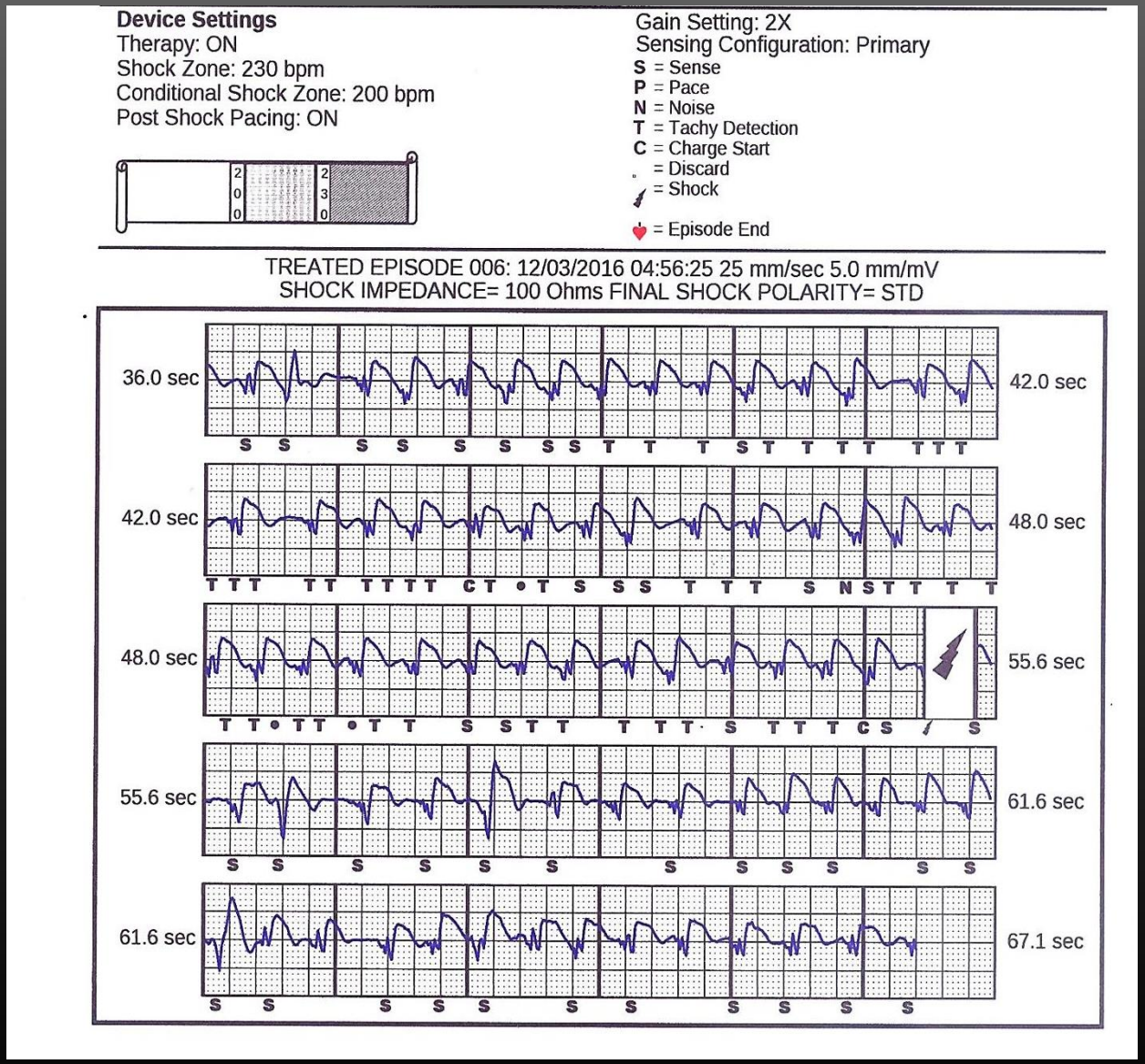
Management of Inappropriate shocks

- Need to review ECG traces and determine the cause
  - T wave oversensing
  - EMI
  - rate related aberrancy/morphology change
- Print off vector ECG strips and check against 4-6 week vector morphologies (?any significant morphology change)
- Manually change vector (make sure it is a vector that is suitable check screening documentation)
- If rate related morphology change or occurred during exercise → ETT (if aberrates store reference ECG with aberrant morphology)



Inappropriate Shock

Inappropriate shock due to T wave oversensing



What if an S-ICD patient turns up at my Hospital?

- Shocks
- Wound infection
- Audible alert heard
- Pre surgery/endoscopy/colonoscopy
- Scheduled for an MRI

Shocks

Stable and ok to discharge ---> Advise to contact f/u centre

Admitted as an IP for recurrent shocks

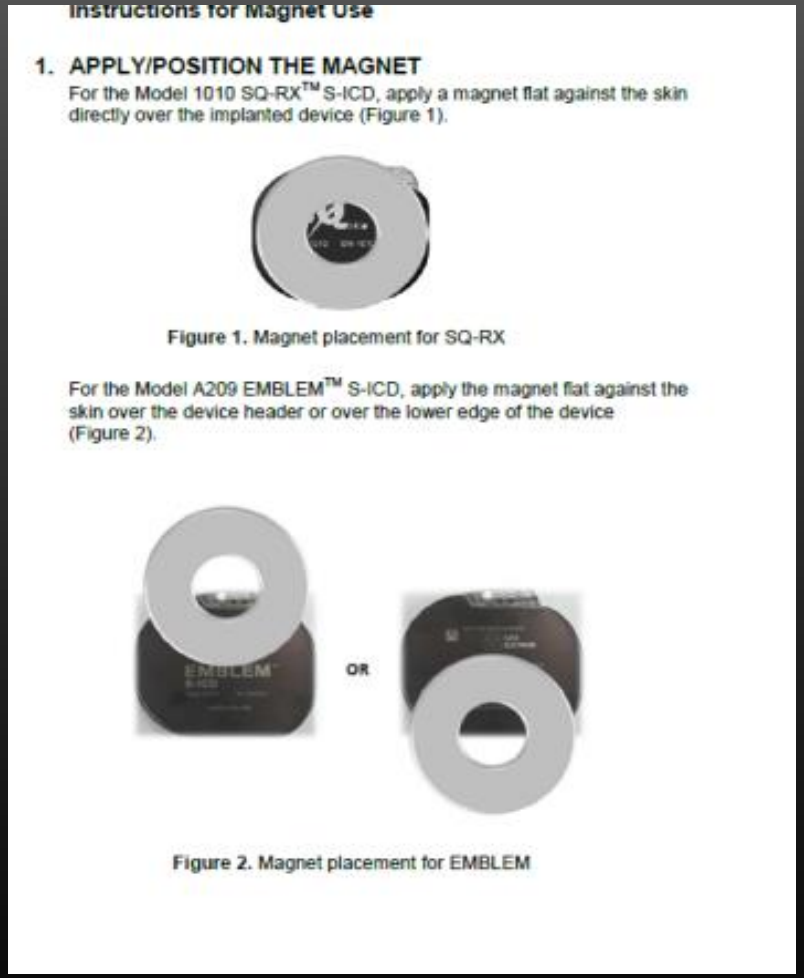
- Look to have transferred to f/u centre for device interrogation.
- If not possible liaise with local Boston rep to attend with a programmer

Conscious and receiving shocks

- Use a magnet and temporarily disable tachy therapies

Magnet Application

- Disables/Inhibits shock therapy
- Terminates post shock pacing therapy
- Prohibits arrhythmia induction testing
- Activate the pulse generators beeper with each detected QRS complex for 60 seconds



Instructions for Magnet Use

1. **APPLY/POSITION THE MAGNET**

For the Model 1010 SQ-RX™ S-ICD, apply a magnet flat against the skin directly over the implanted device (Figure 1).

Figure 1. Magnet placement for SQ-RX

For the Model A209 EMBLEM™ S-ICD, apply the magnet flat against the skin over the device header or over the lower edge of the device (Figure 2).

OR

Figure 2. Magnet placement for EMBLEM

Wound infections

To be reviewed by the local device cardiologist

- options are to treat with antibiotics

- d/w implanting centre for device explant

- transfer to the implanting centre

Audible alarms

- Alarms – 16 audible tones emitted every 9 hours for:
  - ERI
  - EOL
  - Impedance out of range
  - Prolonged charge times
  - Failed device integrity check
  - Irregular battery depletion

Stable and ok to discharge ---> Advise to contact f/u centre

Pre surgery/endoscopy/colonoscopy

- For procedures where temporary device therapy deactivation is necessary
- Forward planning
- Best option would be to use a magnet during the procedure
- May be possible to arrange for a Boston rep to attend

Patients undergoing an MRI

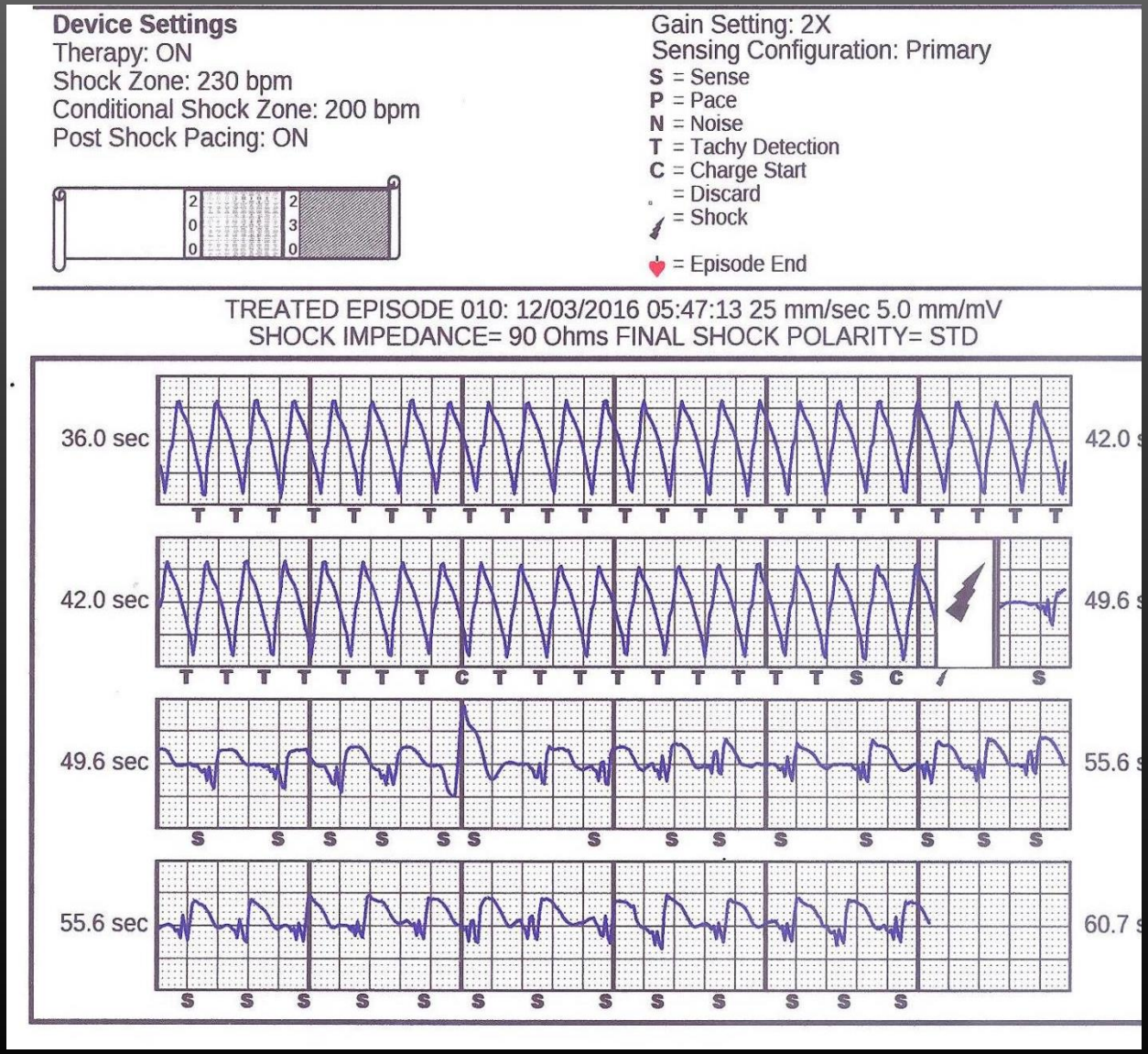
- 2nd generation with update and new 3rd generation devices are MRI compatible
- Programming required
- Risk of losing beeper function
- May be possible to arrange for a Boston rep to attend

Final thought

- Overall despite limited programming options there is more to know about the S-ICD system than first thought
- A team approach is very important
- Boston Scientific support is much appreciated
- Learning with experience
- Offers the right patient an alternative to a transvenous system

ANY QUESTIONS?

VT with appropriate shock



Untreated Episode