

Pacemaker and ICD Electrogram Channel Configurations

Current St. Jude Medical pacemakers and ICDs provide the clinician with the ability to view real time intracardiac electrograms (EGMs), as well as the ability to capture stored electrograms (SEGMs) once programmable trigger criteria are met. Real time EGMs and SEGMs provide the clinician valuable information as to how the pacemaker or ICD is sensing and responding to a patient's cardiac rhythms.

There are many options to choose from when deciding which channels to set for SEGM storage and real-time viewing. The most commonly programmed channels are the Bipolar, Sense Amp, Leadless ECG, and Discrimination. Figure 1 shows programmable EGM options available for a biventricular device. The displayed options are available on the majority of SJM pacemakers and ICDs (for DR or SR devices, the menu would change accordingly and would only display those choices that are relevant to the device type).

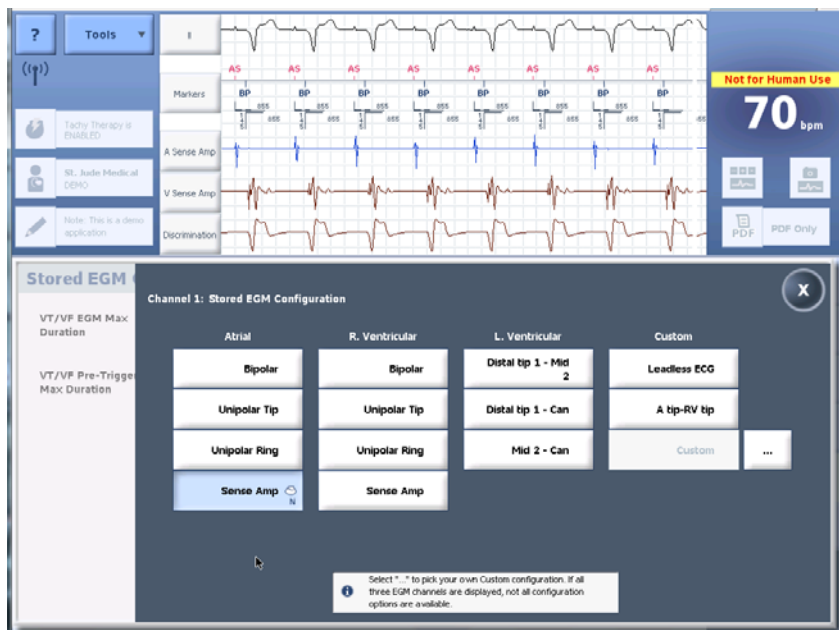


Figure 1: Available EGM configurations for a biventricular device

Bipolar

The Bipolar channel displays EGMs sensed between the Tip and the Ring electrode (for a device using an integrated bipolar HV lead, the Bipolar channel will display Tip to RV Coil, since the ring is integrated with the RV Coil). The EGM resulting from this option looks closer to the R-wave and P-wave morphology most clinicians are comfortable with since a wideband filter is applied. These channels can be useful while the patient is in-clinic to provide additional information during testing. One such instance where the Bipolar channel can be useful is while

running manual capture tests. Changes in the signal may be more obvious thereby allowing the clinician to confirm loss of capture during the test.

Sense Amp

The Sense Amp EGM is very similar to the Bipolar channel in that it also uses the Tip to Ring sensing vector; however, the device applies several additional filters resulting in a cleaner signal. The major advantage to programming the EGM configuration to this channel is that the device uses this same channel while sensing, allowing the clinician to directly see what the device is responding to. There are a number of situations where the Sense Amp channels are the most appropriate channels to have displayed. One such example is in the case of T-wave oversensing. If the V Sense Amp channel is programmed on, the amplitude of the oversensed T-wave can be measured directly by the clinician. If the RV Bipolar channel were programmed on instead, the amplitude of the T-wave seen on this channel would vary from the actual sensed signal amplitude. Consequently, any measurements taken in a bipolar configuration cannot be used to adjust the device’s settings.

Leadless ECG

The Leadless ECG setting varies between different device types (CRT-Ds and Dual Chamber ICDs, CRT-Ps and Dual Chamber Pacemakers, Single Chamber ICDs, and Single Chamber Pacemakers) and it is a representation of what a surface ECG may have recorded during the episode. This setting may be useful for clinicians who are used to seeing surface ECGs and wish to analyze a patient’s rhythm utilizing this representation. Table 1 specifies the Leadless ECG vector that each type of device uses.

Table 1: Leadless ECG vectors

Device Type	Single Chamber ICDs	Single Chamber Pacemakers	CRT-Ds and Dual Chamber ICDs	CRT-Ps and Dual Chamber Pacemakers
Leadless ECG Vector	SVC to Can*	N/A	A-Tip to RV Coil	A-Tip to RV ring

* If a single coil lead is implanted, an alternative custom channel should be selected

Discrimination

The Discrimination channel is used in ICDs and is shared between the Far Field Morphology Discrimination (FFMD) and SecureSense (SS) algorithms. The nominal setting for this channel is RV Coil-Can but can be reprogrammed to RV Tip-Can when necessary. When FFMD/SS is active, the Discrimination channel is automatically added to VT/VF stored EGMs. When selecting channels for EGM storage, it’s important not to repeat the same channel twice by selecting RV Coil-Can since this will result in two identical tracings.

In summary, the Leadless and Bipolar EGM configurations are often used because of the familiar signal morphology, but the Sense Amp option should always be used if the clinician is interested in measuring the amplitude of signals.

If you have any questions or would like to discuss this topic in greater detail, please contact CRM Technical Services.