

Application Note

Considerations When Using Interconnect Cables with Medical Devices

Devices may include: Monitors, Monitor/Defibrillators, Ultrasound, Balloon Pumps, etc.

Introduction

Many hospitals interface the defibrillator/monitor to other medical devices. Commonly referred to as "slaving", the patient's ECG signal is cabled from the analog output of one device to the patient input of another, for the purposes of remote monitoring. This document describes typical interconnection schemes, and clearly defines inappropriate uses.

Review: What is Synchronized Cardioversion?

With the **SYNC** mode selected on the defibrillator/monitor, each QRS complex the patient produces is identified and marked. The defibrillator only allows delivery of a shock immediately after a QRS complex is detected. In patients with certain arrhythmia, administering a random counter shock carries the risk of inducing ventricular fibrillation. In such cases, synchronized cardioversion is usually indicated. Without synchronization, a defibrillation shock delivered during the vulnerable period of the cardiac cycle may actually cause ventricular fibrillation. The Association for the Advancement of Medical Instrumentation (AAMI) recommends that defibrillators operating in synchronized mode deliver the synchronized shock prior to 60 ms after the peak of the R wave. Since the vulnerable period immediately follows this 60 ms "window", delivery of the shock **must not** occur more than 60 ms after the peak of the R wave.

Review: What is Noninvasive Pacing

The defibrillator/monitor is primarily used as a demand-mode pacer, which delivers pacing therapy based on the ECG signal acquired through its patient cable. Placing another device in the ECG signal path may result in unexpected distortions of the pacer-driven ECG waveform, which may, in turn, affect pacing therapy.

"Slaving" another device from the analog output of a defibrillator/monitor

When a defibrillator/monitor is used in conjunction with other devices, the clinical staff may want to view the patient's ECG signal on all units. A typical connection would allow the patient to be connected to the defibrillator/monitor plus have the ability to quickly interconnect a cable to the input of other devices. Since the 1960's *this has been the preferred method for synchronized Cardioversion or pacing. Current designs (since the mid 1990's) have significantly reduced the internal delays of medical devices.*

"Slaving" The Defibrillator/monitor from the analog output of another device.

It may be impractical or undesirable to place additional monitoring electrodes on the patient. This "slaving" is a convenient method if you desire to simply view the ECG waveform on the defibrillator/monitor.

However, the delivery of Synchronized Cardioversion therapy or pacing with devices interconnected in this fashion can result in specific patient risks thus should not be done when doing synchronized cardioversion or pacing. To use the defibrillator/monitor during a cardioversion procedure or pacing, the patient cable must be connected directly to the defibrillator/monitor.

Application Note *continued*

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Noninvasive Pacing

IMPORTANT: The defibrillator/monitor should not be slaved from the analog output of another device when used for pacing. When pacing, the defibrillator/monitor must be connected directly to the patient through the patient cable.

Patient Risk Current

When interconnecting medical equipment, chassis leakage or risk currents may be increased. To ensure patient safety, the hospital biomedical staff should perform electrical safety testing on the complete system to ensure that safe current limits are not exceeded.

Cable Availability

For assistance in acquiring the appropriate cables, contact MAGUIRE Enterprises at 800-548-9686 or visit our website to view our on-line catalog . Be prepared to provide the manufacturer and model number of the bedside monitor and defibrillator to be used. Patient cable input adapters are also available, allowing the monitor cable to be plugged into the defibrillator, even if the original connectors were non compatible.

Visit our website:

MaguireEnterprises.com

or contact us by:

Phone: 800-548-9686

Fax: 954-578-7100

Email: info@MaguireEnterprises.com

To connect from one device to one other device, interconnect cables are available.

Output multipliers are available to allow you to connect to multiple devices in parallel. Defibrillator, ultrasound, balloon pump, CCO etc. These output multipliers eliminate the cumulative delays previously incurred by daisy chaining.

Never 'daisy chain' from output to input and then from that output to input.