

# General Overview of RFID Control Circuit Board

## Dade Behring Corporation

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This document provides a high level overview of the RFID circuit board that was designed and manufactured by Impeco corporation in Italy and is used on the Dade Behring StreamLab™ track system.

Impeco Part Number: 027820002 Tag Reader Controller Assembly

Please reference electrical schematic 027820002.

This circuit board is best described by dividing the components into 6 unique sections as shown in the attached block diagram.

**Power:** The circuit board receives 24 Vdc via the dual USB connector labeled Y3. This 24 Vdc is then regulated on board via U6, which is a 24 to 5 Vdc DC to DC converter. All remaining components on the board are powered from this 5 Vdc source.

**Communications:** Communications to all tag reader boards is accomplished using a RS485 serial bus. U2 on the circuit board is a RS485 transceiver that acts as an interface between the USB connection and the programmable microcontroller, U4.

**Microcontroller:** U4 is a single chip microcontroller manufactured by Phillips Electronics. The microcontroller coordinates all communications to and from the circuit board and also generates the 125 k Hz, 50% duty cycle carrier frequency for the antenna driver. The microcontroller is clocked via a 12 Meg Hz crystal. Each tag reader circuit board contains a unique address that is set via 4 dipswitches (SW1) that are read by the microcontroller. Since the board is capable of driving two antenna, both the 125 k Hz drive signal and the returned signal from each antenna are connected via a quad bilateral switch (U1) that is also controlled by the microcontroller.

**Antenna Selection Switch:** The control line for the switch changes state every 165 ms such that antenna one is connected 165 ms and then antenna 2 is connected for 165 ms. When one antenna drive circuit is connected to the 125 kHz signal, the other antenna is connected to a fixed 5 Vdc and is therefore disabled. The antenna selection switch also connects the driven antenna to a common demodulation circuit that outputs the digital pallet identification data back to the microcontroller.

**Antenna Driver:** Each antenna is driven via a push pull driver using two transistors. This assures that the antennas are driven with adequate current.

**Demodulation:** The transponder chip within each pallet generates its own power from the RF energy of the 125 kHz carrier signal. Using amplitude modulation of the signal, the transponder then communicates its unique identification code that is demodulated on the tag reader board.

