

# Simple Ion Chamber “package design” Monitors for TRIUMF’s Proton Beamlines

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## Abstract

In the beam line supplying 100  $\mu$ a of 500MeV protons to the ISAC target stations at TRIUMF, 13 profile monitor stations were required. The design allows each station to be fitted with either an air driven wire scanner module for higher currents or a ion chamber for lower currents. Multilayer G10 circuit boards were designed to enable a simple modular “gas package” that is easily serviced and aligned. These “gas packages” have only five basic parts, two outer window frames with .010 “thick E-beam welded A1 windows, two ring shaped circuit boards with 2mm wire spacing and edge card connectors (X and Y use the same design of board), and one center frame for mounting to the inserting mechanism and holding a .001” A1 foil. Circuit boards are critical components due to the necessity to hold vacuum along its edge. Signal traces pass from the center of the ring, which is gas filled to the outside of the ring, which is in vacuum. The windows and center foil frame are at  $-300$  V bias. This gas package design led to a similar design used to upgrade the existing proton beamline ion chamber monitors. These original monitors have been in service since the mid 1970’s and suffer from many age related problems.