

Gamma Spectroscopy Sample Changer

for Small Containers and Environmental, Neutron Activation Analysis (NAA), Gamma Spectroscopy



Front View of the *Assistant*

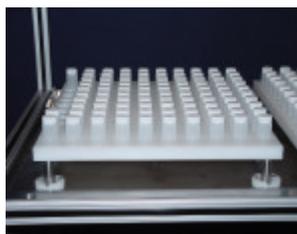
The *Assistant* from **Changer Labs** has been designed to fill the need for an easily customized sample changer that can handle the smaller samples of applications such as NAA or the environmental samples now possible with the new larger Germanium detectors. The *Assistant's* design is highly flexible so that the sample staging area and shielding can be scaled up or down to tailor the system to the sample size and number needed. The *Assistant* is equally adept at placing a sample in a well detector or placing the sample on the end cap of a coaxial detector. NaI detectors can be accommodated in either the floor mount configuration or a table top version. The system software adapts to multiple sample trays where the size and spacing of samples is independently defined for each tray.

SYSTEM SIZE

The *Assistant's* structural components are standard industrial extrusions and linear motion bearings. They are available in a wide variety of lengths so that the width, depth, and height of the cabinet and the length of the vertical travel can be customized to optimize sample capacity and shield requirements for any application.

SAMPLE CONTAINER SIZE

Sample containers from 10 mm test tubes to 3 inch diameter wide mouth jars can be accommodated. The samples are loaded into a removable sample tray that is positioned over a stainless steel drip pan for easy decontamination. Sample container size determines



The “*Assistant*”

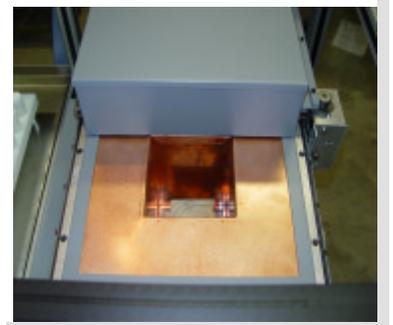
- Compatible with **all popular MCAs**
- Accommodates all **streamlined cryostats**
- Handles samples from **$\frac{1}{4}$ to 3 in diameter**
- **High capacity**, up to 200 samples, with 20 mL LSC vials
- Suitable for **well or coaxial Germanium or NaI detectors**
- **Table top** configuration available for NaI
- Highly **flexible** design easy to scale up or down
- **Small foot print** for efficient space utilization
- **Power lid** option for **4 pi** shielding
- Automated pull back for **dead time control in NAA**
- Stainless Steel drip pan for **easy clean up**
- **Removable sample trays**
- **Safe shutdown** in the event of power loss
- **Complete systems available** including detector, electronics, and PC-based MCA

minimum spacing between samples in the tray which determines the maximum number of samples for the system. High sample density in the tray helps to minimize floor space requirements. The sample positions in the tray are defined in software for maximum flexibility

SHIELD

The system shield can range from a simple insertion shield with no lid, to a full 4 pi shield with an automatic top as shown below. There are several standard shields available that are designed to fit the sample size that will be utilized.

Most shields use lead bricks stacked into a steel shell and lined with either copper/cadmium (Cu/Cd) or copper/tin (Cu/Sn). Standard wall thickness is 4 inches but 6 inches is available. Extra shielding can be added between the sample storage area and the counting cavity via an optional separate 4 inch wall on the sample storage area side.



Keeping the counting cavity small minimizes the total shield weight. The system design leaves **ONLY** the detector and the sample inside the cavity during counting. This helps maintain the lowest background possible.

THE HAND

A self-centering, four point hand is used to provide a wide tolerance for variations in the sample container's dimensions, weight, and positioning. The hand features a positive close and grasp design, so that an unexpected power loss will not cause the sample to drop. The hand senses the absence of a sample when the hand fully closes and a sample is supposed to be present. This condition is treated as a fault condition by the software and results in a safe system shut down.

OPERATING MODES

The system has three operating modes: Master, Slave, and Local. Slave mode is the most typical the whole sample changer is controlled as a peripheral device with high level commands such as load#1, loadnext, reset, unload. Control of the spectral acquisition is through the MCA's native script/batch/job language. Responsibility for defining the sample queue and taking control of the MCA system rest with a Changer Lab Windows program that runs on the MCA computer system.

In the Master mode the *Assistant's* software is in control of the sample queue and runs the MCA system through MCA batch commands. Local control allows the user to control all axis movements with easily accessible switches for set up without a computer.

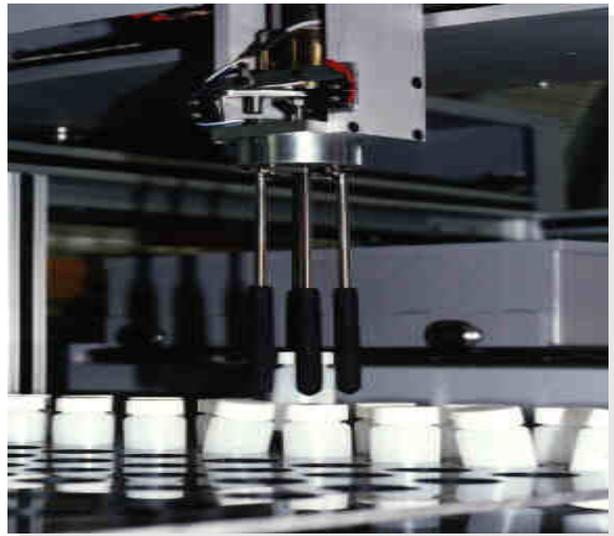
SAMPLE WALL

With a significant number of samples loaded into a changer tray there is always the possibility of a hot sample interfering with the background of a low level sample. This may require more shielding between the samples in the tray and the sample in the counting position than is required in the counting shield in general. In this situation the system can be supplied with an additional shield wall between the sample tray and the counting shield.

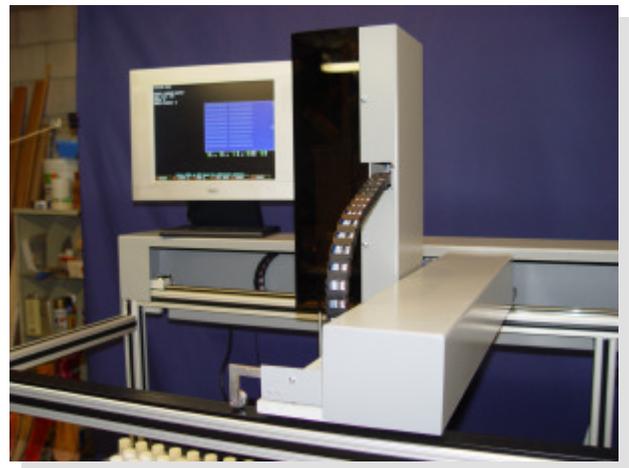
DETECTOR ACCOMMODATIONS

The system can be configured for either NaI (TI) or Germanium detector systems. Any standard detector cryostat can be accommodated. Vertical dipstick Germanium detectors have the dewar located underneath the shield inside the system cabinet, while horizontal dipsticks can have the end cap penetrate the shield side wall. An "in-line" type cryostat simplifies the installation and removal of the detector. Well detectors do not represent any special problems as long as the container is longer than the well depth so that there is a place for the hand to grab the sample.

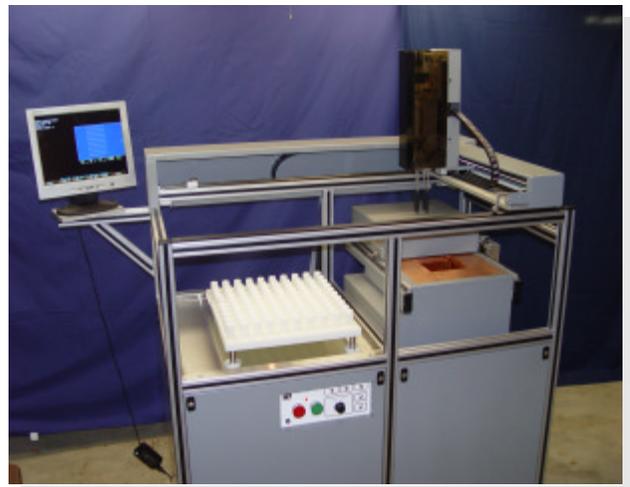
Using two detectors at the same time is possible, as is a split spectrum with low energy and high energy spectra accumulated simultaneously from a single detector



Versatile, Four-Point Sample Hand



Display, Hand, and Sample Changing Mechanism



Assistant Overview



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