Figures 1, 2, and 2a illustrate fast and slow systems for counting events versus time. In Fig. 1, single photons are detected by a photomultiplier tube. The excellent pulse-pair resolution of the photomultiplier tube is preserved by using fast amplifiers to process the anode output pulses. The discriminator in the Model 9302 is adjusted to reject the low-amplitude noise, while allowing virtually all of the photon pulses to be counted. The events can be recorded on a simple counter controlled by a timer (Model 994), or a multichannel scaler (MCS-pci™) can be used to measure the profile of counting rate versus time.

Other detector types may be used to perform a variety of counting applications. Examples are using charged-particle detectors to gauge thickness of a material by placing a sample material between a known source and the detector. Once the sample material thickness is calibrated using a specific region of the energy spectrum, deviations can be measured. Figure 3 shows an example system.

Figures 2 and 2a illustrate a counting system wherein pulse-pair resolving time has been compromised in favor of achieving better pulse-height (energy) resolution. The Model 113 Charge-Integrating Preamplifier and the Model 575A Amplifier provide the slower pulse shaping needed for acceptable energy resolution with the NaI(Tl) scintillation detector. A narrow range of pulse amplitudes corresponding to a particular gamma-ray energy can be selected by the Model 550A Single-Channel Pulse-Height Analyzer (SCA) or the SCA built into the multichannel scaler. An alternate to the Model 575A and 550A could be the Model 590A which incorporates an SCA in the same module as the shaping amplifier. The selected events can be recorded in either a counter/timer, ratemeter, or the multichannel scaler.

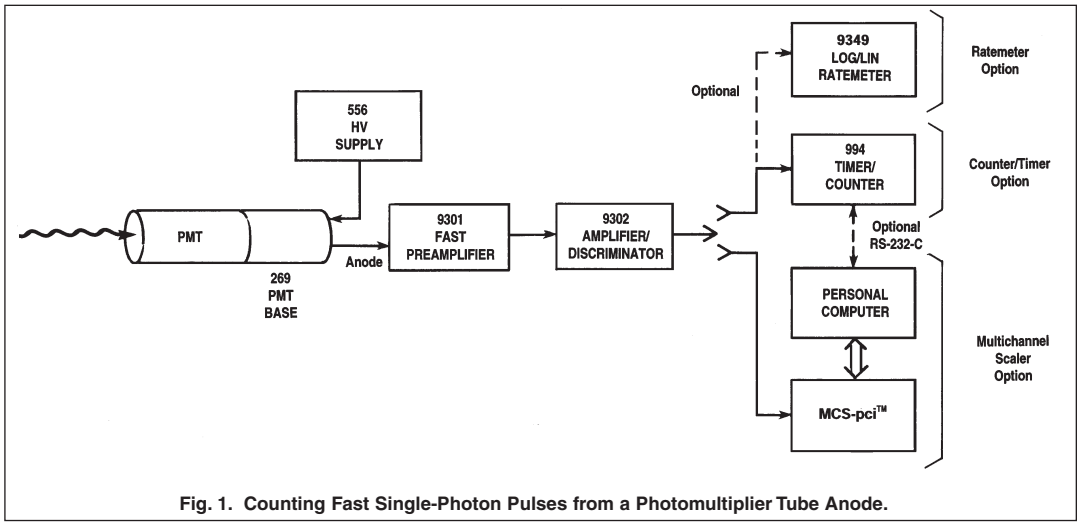

Fig. 1. Counting Fast Single-Photon Pulses from a Photomultiplier Tube Anode.

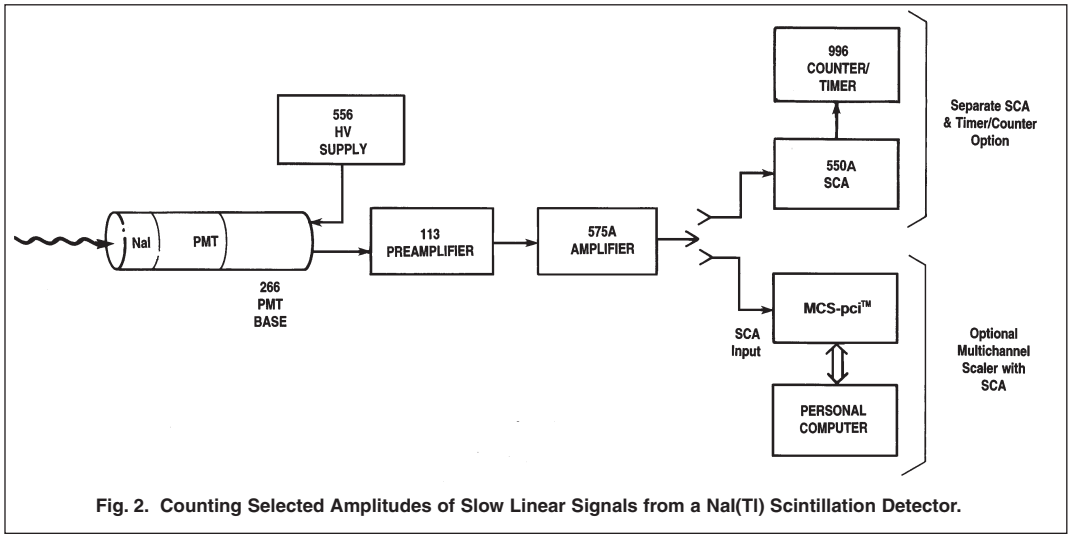

Fig. 2. Counting Selected Amplitudes of Slow Linear Signals from a NaI(Tl) Scintillation Detector.

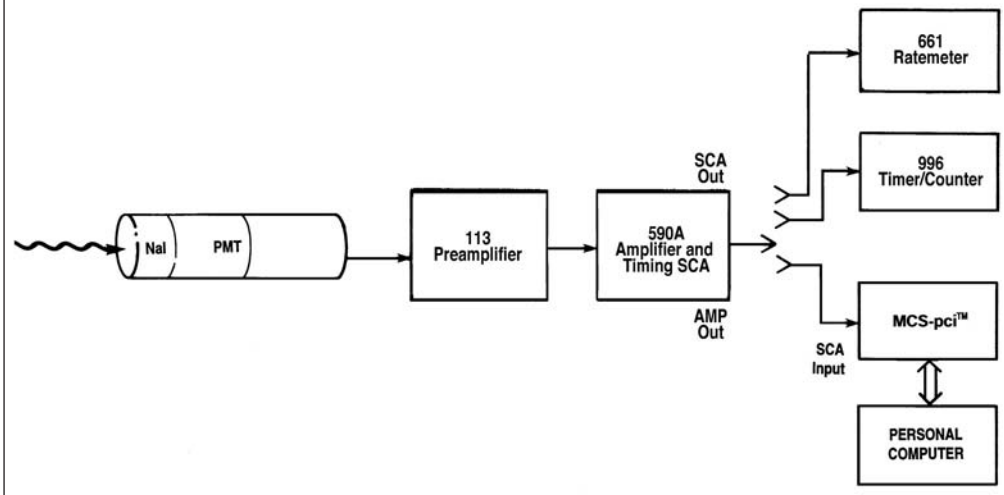

Fig. 2a. Counting Selected Amplitudes of Slow Linear Signals from a NaI(Tl) Scintillation Detector.

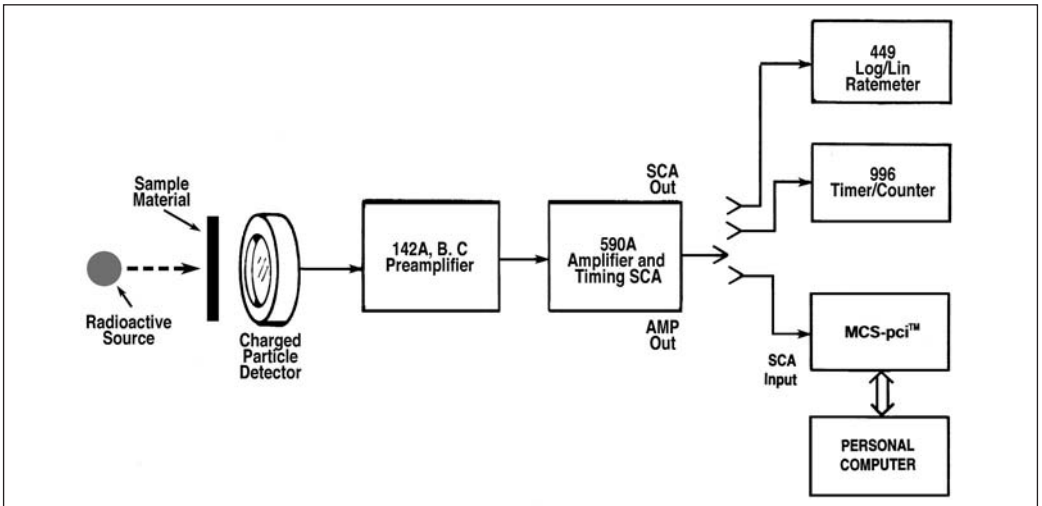

Fig. 3.

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