mentioned in an article by Meckelnburg (*6*) is about 3½ times as high as ours although he uses a similar formula from Johns (*7*).

We have one main objection to his calculation, besides the fact that he does not take into account the dose contribution of the conversion electrons; recalculation, after substituting the figures he uses, leads us to a value of 4.03 mrad instead of 40.3 mrad. Consequently we come to the conclusion there is a mathematical error by a factor of 10. This reaction may seem a little late, but up until now the error has never been corrected. Many references have been made to the erroneous result of this calculation without any correction by other authors, the industry (*8*), and the ICRP (*9*).

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AN INEXPENSIVE REMOTE START SWITCH FOR THE PHO/GAMMA CAMERA

Dynamic function studies are not easily performed by a lone technologist with the Nuclear-Chicago Pho/Gamma III camera because the automatic mode must be initiated from the console. A common solution to this dilemma requires two persons: one to inject and the other to operate the camera. Others have lamented this situation and described an alternative employing a foot-actuated relay (*1*). Our device offers the added advantages of low cost (about $10), less bulk, and the elimination of the potentially hazardous 120-volt a-c cabling underfoot.

Activation of the camera in our lab is accomplished by a ribbon switch fastened around the detector head within easy reach of the technologist. Before initiating a study, the technologist switches on the new "remote" circuit (Fig. 1) and momentarily depresses the "stop" button. The "photo record" switch is then set to "auto". When the injection is made, the technologist depresses the ribbon switch, allowing the study to proceed by the preset controls. At the end of the serial phase, the circuit is switched off and the examination completed in the normal manner.

Figure 1 illustrates the location of the new "remote" toggle switch on the Pho/Gamma console and the placement of the ribbon switch around the detector head. In the interest of simplicity, it was decided to fit the few components involved in the control circuit directly to the back of the miniature toggle switch, and to make the four electrical connections to the Pho/Gamma at the S/C control card located immediately behind the center console front panel. The Type 141-BPH ribbon switch is manufactured by Tapeswitch Corporation, Farmingdale, New York. It may be glued to the detector head, or as we have done, fastened beneath a strip of adhesive tape.

Camera operation in the "auto" mode may be halted by continuous depression of the "stop" button on the console, which grounds point R on the S/C control card. The added circuitry maintains this ground electronically when the "stop" button is released. Operation may then be initiated only through the ribbon switch.

Figure 2 is a schematic of the device; basically a

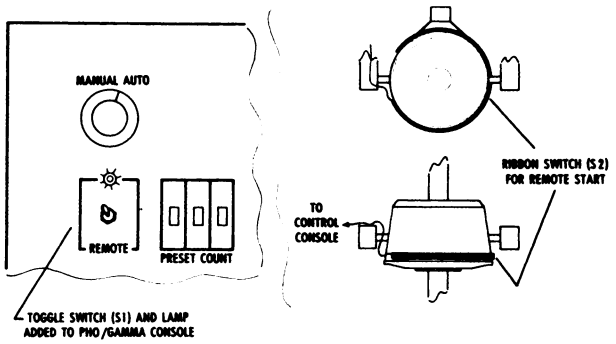

FIG. 1. Location of added switches on console and around detector head.

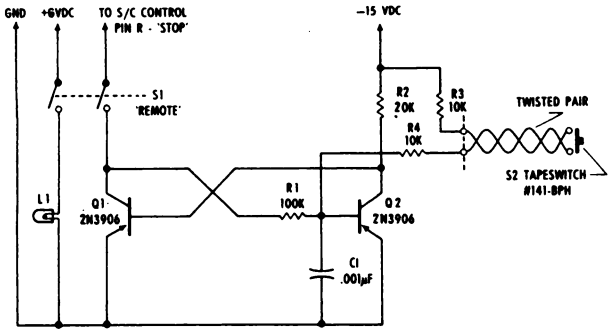

FIG. 2. Schematic of remote start circuit.

simple direct-coupled bistable. With switch S1 closed, momentary depression of the "stop" button removes the base drive from Q2, turning it off and allowing Q1 to turn on through R2. Q1 maintains the ground at point R when the camera is switched to "auto". Actuation of ribbon switch S2 turns on Q2, turning off Q1 to remove the ground and permit normal operation.

Lamp L1 facilitates determination by the technologist that the circuit is active. Component values were dictated by convenience and are not critical, and the circuit draws only minimal power from the Pho/Gamma supplies.

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ADAPTATION OF A WELL COUNTER FOR MEASUREMENT OF CARDIAC OUTPUT

In their paper on cardiac output determination using short-lived radionuclides (*1*), Myers and colleagues measured the activity passing through the arteriovenous line by winding the tubing around a scintillation crystal. The same measurement can be made using a standard well counter, fitted with an easily machined perspex former to hold the tubing in position. Details of such a former and its position when in use are shown in Figs. 1A and B.

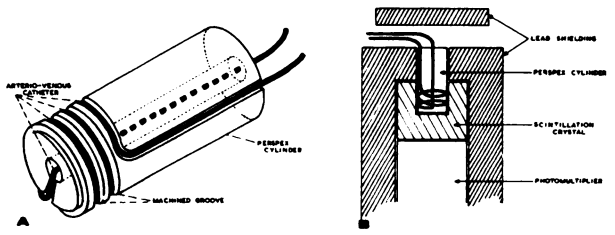

FIG. 1. (A) Enlarged view of perspex former. (B) Schematic diagram showing former in position within well counter.

This arrangement has the following advantages:

1. A purpose-built piece of apparatus is not necessary as any well counter can be adapted. It can still be used in the normal way for sample counting at other times.
2. The geometry is such that the counting efficiency is more than twice as great as when the tubing is wound round the scintillation crystal.
3. As the perspex former is removable the tubing can easily be changed. If desired, fresh sterile tubing can be inserted before each patient measurement.

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SULFUR COLLOID FLOCCULATION DUE TO ACID-LEACHED ALUMINUM

Kits for the rapid preparation of routinely formulated radiopharmaceutical products have grown in popularity over the last several years. A kit for the preparation of ^{99m}Tc-sulfur-colloid has recently been marketed which contains syringes with an aluminum disposable needle attached to the glass barrel of the syringe by means of an aluminum crimp. One of the syringes in the kit contains 2 ml of sterile 0.25 *N* hydrochloric acid. In a large percentage of the kits received in this laboratory, the acid syringe leaks when pressure is applied during use of the syringe to prepare the sulfur colloid product. The leak occurs around the aluminum crimp previously mentioned and is not evident until attempted use.

Recently, a batch of ^{99m}Tc-sulfur-colloid was prepared using a leaking acid syringe and another (non-