XVIII. SHOP NOTES

A. LIGHT-BEAM CORRELATOR

This optical instrument, shown in Fig. XVIII-1, was designed and built for S. Gruber and G. Bekefi, of the Plasma Physics Group, to measure and correlate light from a plasma source.

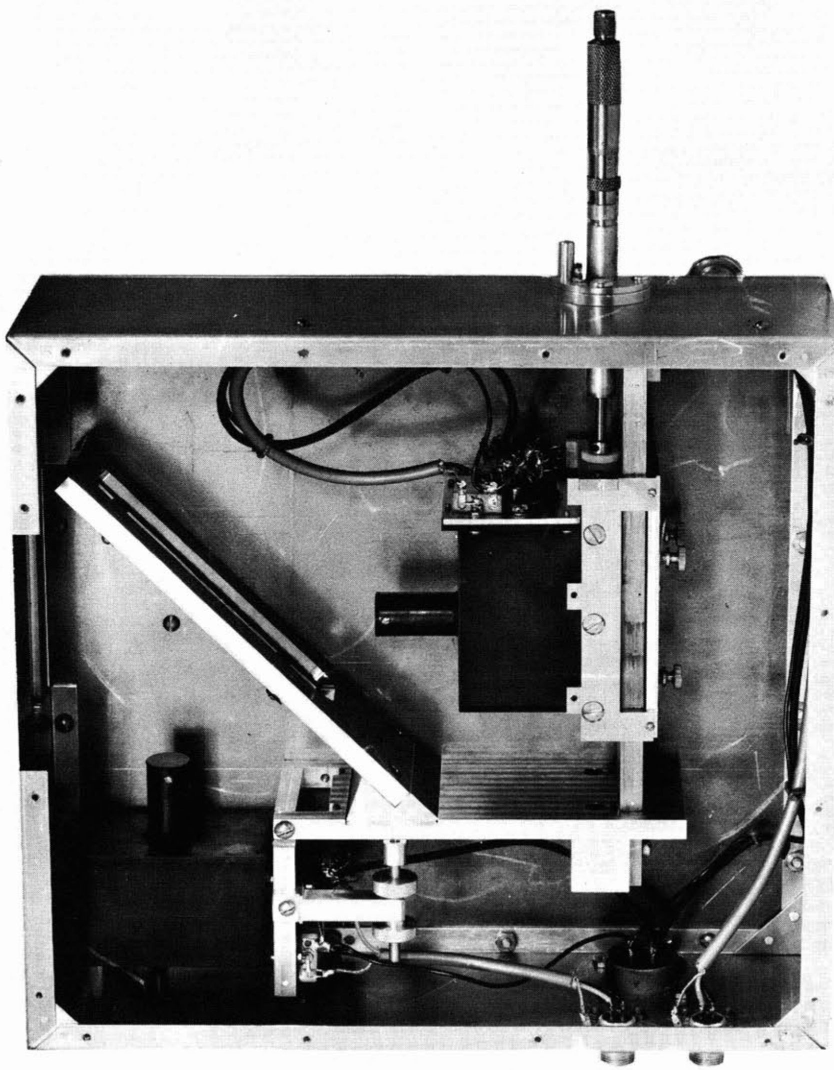

Fig. XVIII-1. The light-beam correlator.

The light from the plasma source is picked up by two photomultiplier tubes and the fluctuations of light intensity are observed. The tubes are mounted in light-tight boxes, each having a barrel with a hole, 0.010 inch in diameter.

An optically ground, half-silvered mirror is mounted at a 45° angle above the tubes.

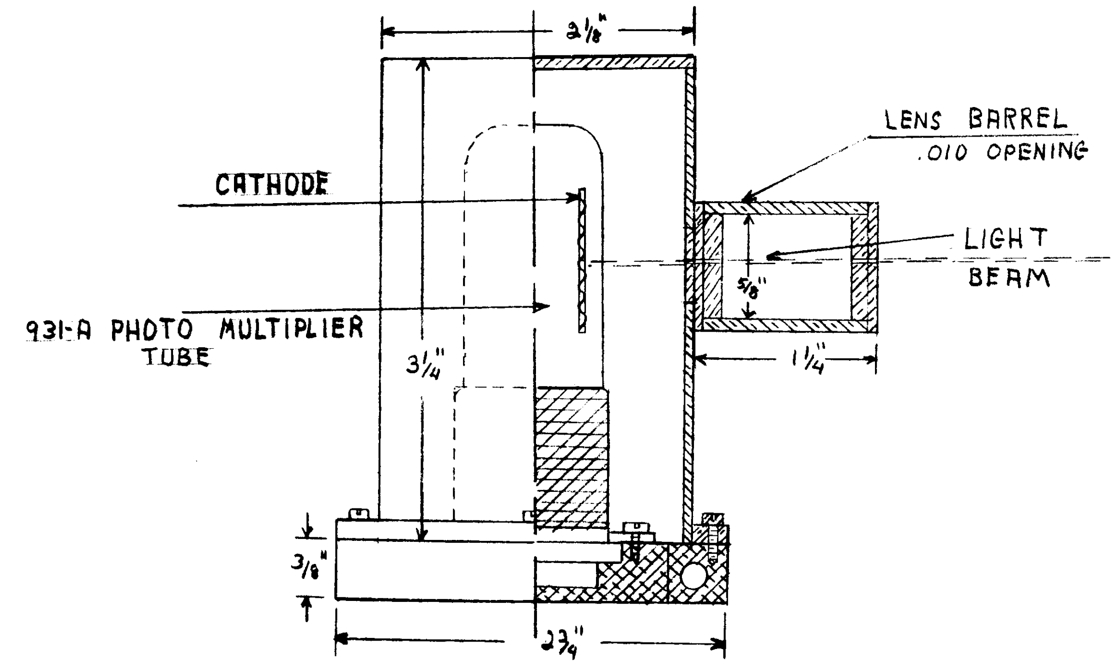

Fig. XVIII-2. Photomultiplier assembly.

The mirror allows the two beams to become superimposed.

The photomultiplier assembly is illustrated in Fig. XVIII-2. One of two phototubes is fixed in a vertical position. The other is mounted horizontally on a movable carriage. The carriage, which has a travel of 3 inches, allows measurements to be taken at any point in this distance.

The movement of the carriage is achieved by a 1-inch micrometer fitted with an extension containing three grooves exactly 1 inch apart; this arrangement allows a full inch of measurement because each groove is engaged and held by a stop ring.

The carriage moves on three hardened steel balls placed in pyramid fashion to allow a smooth movement on a hardened and hand-lapped surface.

The plunger of the micrometer is connected to the carriage by a floating Teflon bushing to avoid interference with the movement of the carriage which results from a sudden vibration or jarring of the micrometer head.

J. E. Coyle

B. VACUUM CUTOFF SWITCH

The thermocouple vacuum gauge has long been in existence as a means of detecting small leaks in a vacuum system. It operates in the range 10 μ-500 μ and will detect a

Fig. XVIII-3. The vacuum cutoff switch.

minor leak within that range; it allows the pump to maintain a partial vacuum until the leak is discovered. However, when a large leak occurs and this range is exceeded the forepump may sustain serious damage.

J. J. McCarthy, of the Plasma Physics Group, suggested the need for a vacuum cutoff switch that would operate in the range beyond that of the thermocouple gauge, and in case of a larger leak would shut off the forepump and the whole system.

The cutoff switch shown in the photograph of Fig. XVIII-3 has been designed and built for R. E. Whitney, of the Research Laboratory of Electronics, and is incorporated in the hollow-cathode discharge system. A cross section drawing is shown in Fig. XVIII-4.

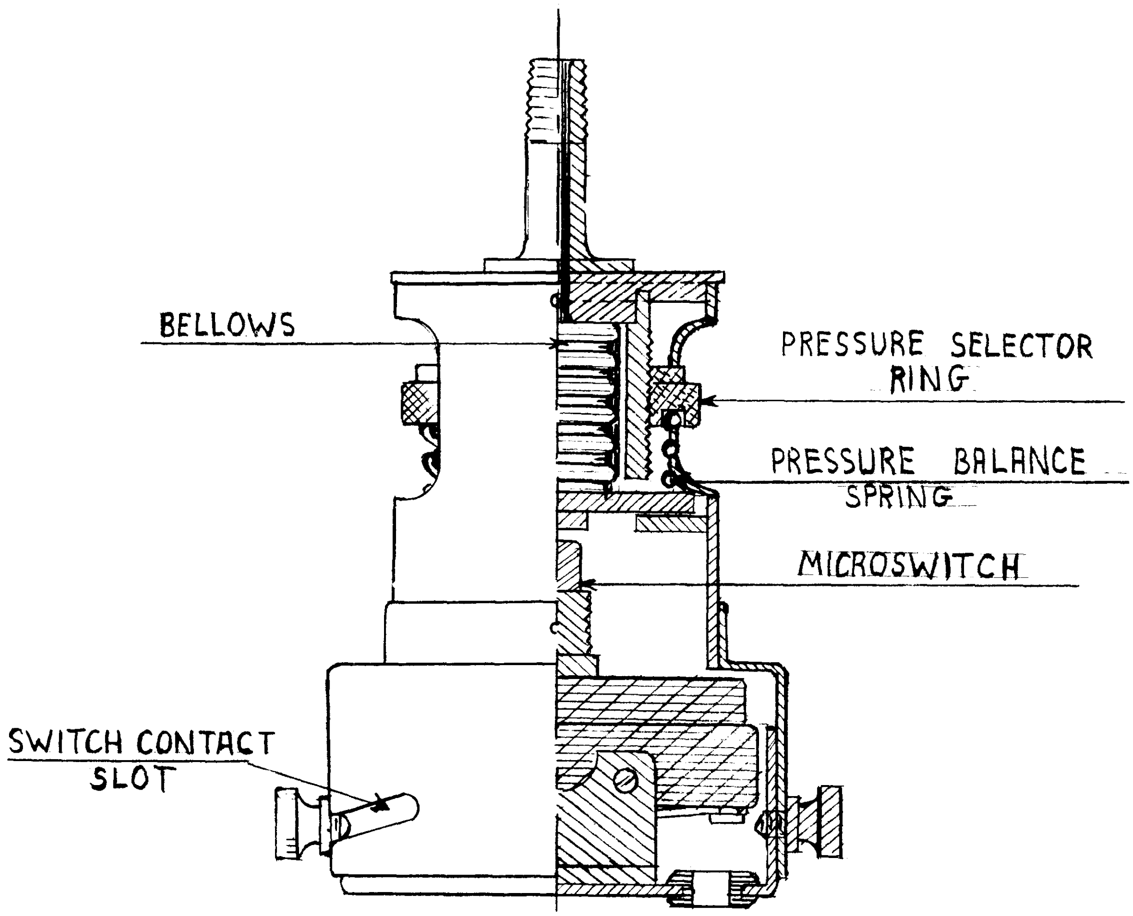

Fig. XVIII-4. Cross-section view of the vacuum cutoff switch.

This vacuum cutoff switch was first calibrated by a manometer to operate in the range 1 cm Hg and higher; at any selected pressure within this range a microswitch is tripped and the system is shut off. A pressure selector ring compresses a spring of predetermined tension to adjust the outside pressure to that of the Sylphon bellows. The desired pressure is achieved by compressing the spring in one direction or releasing it in the other at a rate of 4 mm per revolution at the ring.

The vacuum cutoff switch is used in conjunction with the thermocouple gauge, and when the gauge reaches the limit of its range in small-leak detection the vacuum cutoff switch takes over to detect larger leaks.

J. E. Coyle