B.I.O.S. FINAL REPORT No. 415
ITEM No. 27

P. J. KIPP en ZONEN

BRITISH INTELLIGENCE OBJECTIVES SUB-COMMITTEE

LONDON—H.M. STATIONERY OFFICE

P. J. KIPP en ZONEN

Reported by

N.L.Kusters NRC
Ottawa, Can.

BIOS Item No 27

B.I.O.S. Target No:
C27/420.

BRITISH INTELLIGENCE OBJECTIVES SUB-COMMITTEE
32, Bryanston Square, W.1

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Personnel of Team

J.L.Kusters

Firm: P.J.Kipp en Zonen

Location: Delft - Holland

Condition of Plant: Intact

Persons Interviewed: Mr Ankersmit, Manager

Ing. Reichert, Chief Engineer

Products Made:

Scientific instruments such as: galvanometers, vacuum thermocouples, thermopiles, bolometers, photometers, spectrographs and monochromators.

Galvanometers

The firm makes a full line of very fine galvanometers. All these instruments are equipped with a variable magnetic shunt, making it possible to get critical damping over a wide range of external resistance values. Of particular interest is the Moll Microgalvanometer with a time constant of 0.2 sec and the Zernike galvanometers. The latter are instruments with a very high voltage sensitivity combined with a high stability of the zero position. These properties are obtained by the use of a quartz suspension in combination with a high flux density 5000 Gauss. The absence of permanent Deformation makes quartz particularly suited for this application. The smallest quartz suspension has a diameter of 6 micron. They are drawn from a drop of molten quartz. This operation has to be performed at very high speed in order to finish the operation before the quartz has become too cold. A bow and arrow method is used, the arrow being shot through a glass tube about 6 feet long, in which the quartz thread is automatically deposited. For corrent leads, two gold strips are used on the same coil end. These strips are 0.4 micron thick. They are deposited electrolytically on copper, which is dissolved later. Commercial electrolytic copper wire, being drawn through steel dies, is ferro-magnetic and cannot be used for the coils of Zernike galvanometers. Extremely pure copper wire is para-magnetic and also produces a torque in the magnetic field. The coils for the Zernike galvanometers are made of extremely pure copper wire, insulated and held together by slightly ferro-magnetic enamel, or varnish. This combination is balanced so that it experiences no torque

in the magnetic field. The extremly pure copper wire is produced by Kipp. It is obtained by repeated electrolytic depositing on a commercial electrolytic copper wire, followed by repeated drawings through stone dies. The original Zernike galvanometer had a single suspension. Lately a new type has been developed using a double suspension and a double coil. This arrangement makes a very flexible galvanometer which does not have to be levelled so carefully.

Another interesting instrument was the "Moll Thermo-Relay". This is an instrument used for magnifying galvanometer deflections. It consists of two thermo-junctions mounted in line in a glass vacuum container. An illuminated slit is reflected by the galvanometer mirror and is focussed in the middle of the two thermo junctions. These thermo junctions are connected in series with a second galvanometer. Any deflection of the primary galvanometer produces a difference in temperature of the two thermo junctions thus causing the second galvanometer to deflect. It is claimed that magnifications of 400 to 600 can be obtained.