of the specimens, and to improve the accuracy of the measurements in this region we rapidly cooled the specimens after each reading to a low temperature at which no reaction could occur. By measuring the resistance at this low temperature and comparing it with its previous value we were able to make a correction for the change in shape factor of the specimen. Any oxidation of the specimen during cooling was, we believe, negligible compared with that during the slow warming up.

2·1. *The specimens*

Details of the various specimens used are summarized in tables 1 and 2. The rubidium for specimen Rb (5) was distilled in this laboratory in order to reduce its residual resistivity. The distillation was carried out in three stages in a quartz apparatus specially designed for the purpose. The first and third fractions were

TABLE 1. THE RUBIDIUM SPECIMENS

no.	source of material	resistance ratio	residual resistance
1*		$\dfrac{R_{78}}{R_{4\cdot2}} = 52$	$0\cdot00042\ \Omega$
2*			
3*	L. Light and Co. Ltd., Colnbrook, England	$\dfrac{R_{78}}{R_{4\cdot2}} = 54$	$0\cdot00037\ \Omega$
4†		$\dfrac{R_{78}}{R_{4\cdot2}} = 146,\ \dfrac{R_{273}}{R_{4\cdot2}} = 615$	$0\cdot00009_0\ \Omega$
5‡		$\dfrac{R_{78}}{R_{4\cdot2}} = 230$	$0\cdot000044\ \Omega$
6§ 7§ 8§		$\dfrac{R_{295}}{R_{4\cdot2}} = 580$	

    * High pressure apparatus.
    † Low pressure apparatus.
    ‡ Redistilled in this laboratory.
    § Used for absolute resistivity measurements.

TABLE 2. THE CAESIUM SPECIMENS

no.	source of material	resistance ratio	residual resistance
1*		$\dfrac{R_{78}}{R_{4\cdot2}} = 67$	$0\cdot00029\ \Omega$
2†	A. D. Mackay and Co., New York	$\dfrac{R_{78}}{R_{4\cdot2}} = 74,\ \dfrac{R_{273}}{R_{4\cdot2}} = 298$	$0\cdot00024\ \Omega$
3*		$\dfrac{R_{78}}{R_{4\cdot2}} = 73$	$0\cdot00025\ \Omega$
4‡ 5‡ 6‡	L. Light and Co. Ltd., Colnbrook, England	$\dfrac{R_{295}}{R_{4\cdot2}} = 250$	—

    * High pressure apparatus.
    † Low pressure apparatus.
    ‡ Used for absolute resistivity measurements.

discarded and only the middle fraction kept. This fraction was then melted into the extruding cell and transferred into the glove box in the usual way. Such a distillation improved the resistance ratio of the rubidium by a factor of nearly 5.

2·2. *Absolute values of the resistivity*

To measure the absolute resistivities of rubidium and caesium we extruded a wire (2 mm in diameter for rubidium and 3 mm for caesium) under distilled paraffin oil. We then put a length of this into a transparent, rigid plastic tube of about 3 mm diameter. Next we pushed four platinum electrodes through holes in the tube into the wire. These electrodes were used as current and potential leads for the measurement of the resistance of the wire. The distance between the potential electrodes was determined afterwards from the distance between the holes in the plastic tube which held these electrodes.

To determine the diameter of the wire a known length of it (equal to the total length of the plastic tube) was allowed to react with ethyl alcohol. The solution formed in this way was then titrated against a standard acid solution to determine the amount of metal. From the mass of metal and its density the diameter of the wire could then be found. (Dr Z. S. Basinski suggested this method of determining the diameter and we are grateful to him for the idea and for carrying out the titrations.) The reaction of cold ethyl alcohol with the rubidium was fairly slow but with the caesium it was rather fast; fortunately, this did not cause any liquid to spill out of the spherical flask which held the alcohol.

Apart from holding the electrodes and fixing the total length of the specimen, the plastic tube also served to keep down the oxidation of the specimens by protecting them from the bulk of the oil in the open tank. Chemical reaction in the caesium specimens was further reduced by having the oil cool (about 9 °C for specimen 6 and about 2 °C for specimens 7 and 8). These precautions seemed sufficient since the specimens stayed bright and shiny and their resistance did not increase appreciably with time (except for caesium specimen 7 which may have contained some oxide). The error in the absolute resistivities determined in this way is probably about $\pm 2 \%$.

3. EXPERIMENTAL RESULTS

3·1. *Absolute resistivity*

Our values of absolute resistivity are compared with those of other observers in table 3; it is seen that there are large discrepancies among these values (up to 15 % for rubidium). It is clear from Hackspill's (1910, 1911) account of his experiments that they are more reliable than those of Guntz & Broniewski (1909). The measurements by MacDonald, White & Woods (1956) of *absolute* resistivity were incidental to their main objective and their methods were not very reliable as they themselves admit in discussing the unreproducible values they found for potassium. Our results confirm those of Hackspill and we believe that there is now no serious doubt (within $\pm 2 \%$) of the values to be adopted for the absolute resistivities of rubidium and caesium.