chassis. Whilst OK **for DC use, and at Audio frequencies,** wirewound types are useless for RF work due to the fact that they are also nice inductors if you consider how they are wound!

Incidentally, there are **some wirewound types** that are encapsulated and **look just like carbon composition** resistors, complete with coloured band coding. However, **they can be identified by the fact that the first band is always wider than the others.** You might even find both ends have wide bands, in which case the resistor is flameproof (the right hand band will be blue).

Tolerances

A word about tolerances may be in order. If you have a 4.7K (4700 ohms) resistor of 5% tolerance, then you can expect its value to lie between 4935 and 4465 ohms (probably well within these limits). Depending on the application, this shouldn't be any problem, but if you were using two resistors as a divider chain to get a specific critical voltage, then probably a closer tolerance would be called for (you can always select resistors using a multimeter, and if this is a digital type, even better).

At one time, values under 10 ohms used to be referred to as 6.8 or 4.7 ohms. Like pounds, shillings and pence, this had to go for some reason or other to appease the great God of Standardisation. Now, these two values are 6R8 and 4R7, with the "R" replacing the decimal point. Likewise, under one ohm, we now have R47, rather than 0.47 ohm. Also, the "R" creeps under 1000 ohms, so that we have 470R for 470 ohms. You can now conclude that the "R" stands for ohms, and its position indicates the decimal point location.

Above 1000 ohms, we change to "K" (for times 1000), so that 68K is 68,000 ohms, and 6K8 is 6,800 ohms. Then up to "M" for times 1,000,000. 1M2 is then 1.2 megohm, or 1,200,000 ohms.

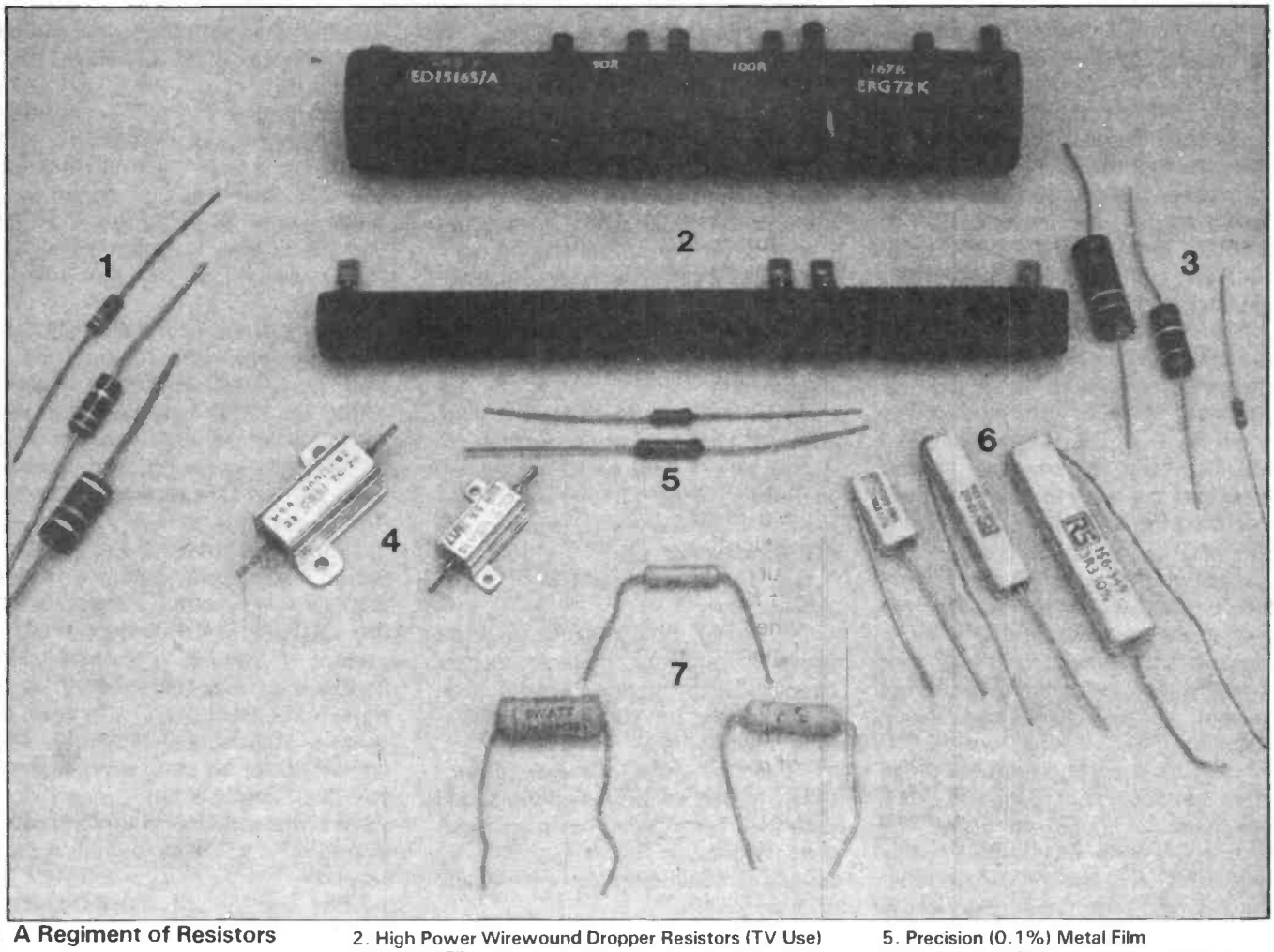
All the resistors we have referred to so far generally carry four colour coded bands — three for the actual value, and one to indicate the tolerance.

Metal film

These are normally used where better tolerances are required, and 1 and 2% tolerance types are easily obtainable. Suitable applications are where the value has to be very close to a calculated value (say, in active filter circuits), and, also, **where high long term stability, and low noise are important.** They are made like carbon film types, but use a deposited metal oxide film (some types are often referred to as 'metox').

Most people find the bigger problem with metal film resistors is deciphering their coding and I won't be the first person to resort to a multimeter to find out a metox resistor value! Firstly, they have five (sometimes six) bands of coding, and secondly, they are obtainable in a much wider range of values, so the coding can be an unfamiliar combination of colours.

As an example, say we have a



A Regiment of Resistors

1. Carbon Composition
2. High Power Wirewound Dropper Resistors (TV Use)
3. Carbon Film
4. Metal Cased Wirewound
5. Precision (0.1%) Metal Film
6. High Power Wirewound (Flame Proof)
7. Wirewound