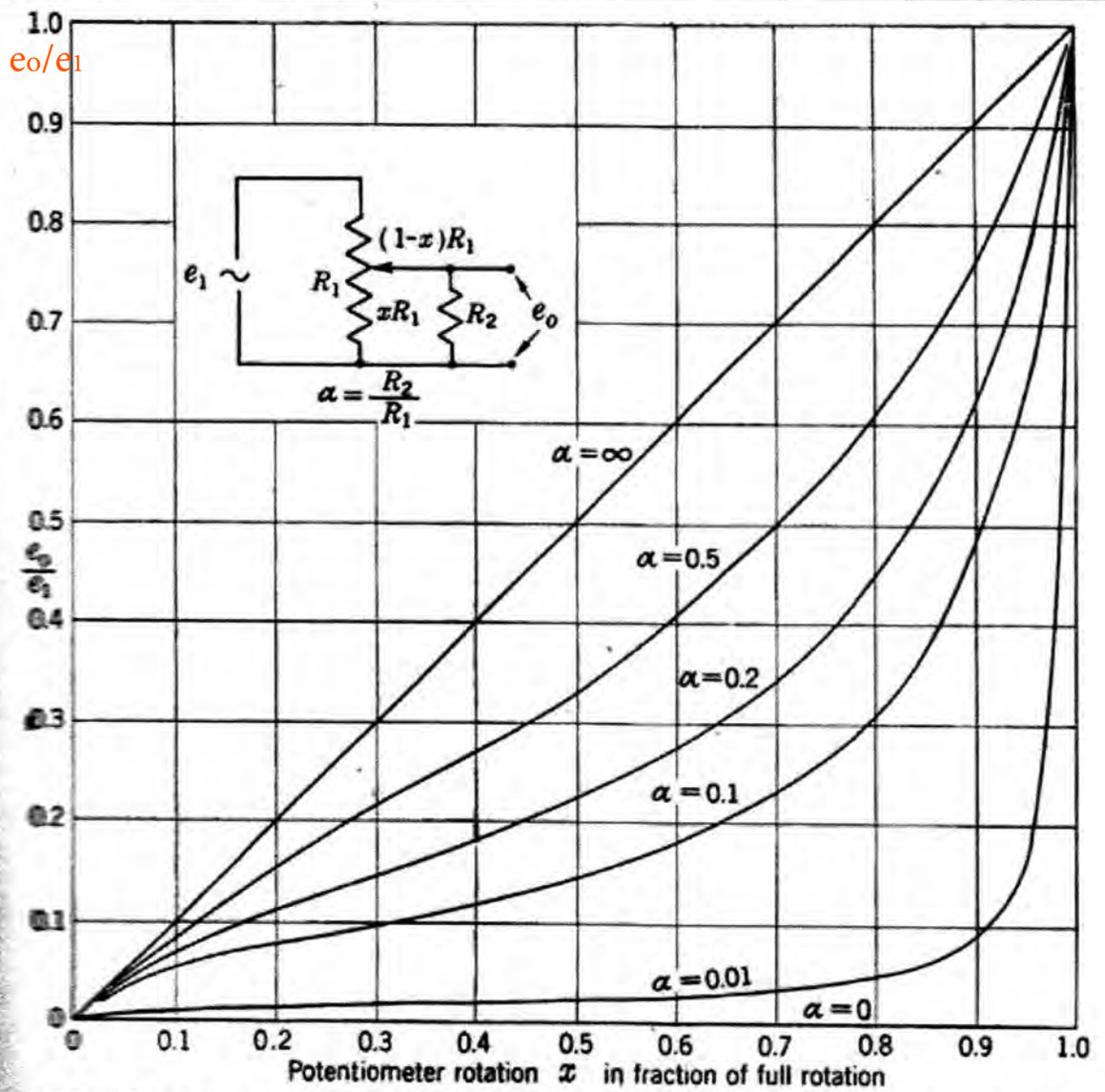

FIG. 5-5.—Output curves for loaded potentiometer with load connected to bottom end ($e_2 = 0$). e2 ≈ e0

Log potentiometers and their replacement

Yes, this is a difficult repair of considerable effort, due to the required accuracy and to the small size of the parts, but several times we have had to rebuild broken shafts, worn brushes or resistive elements. Whenever possible, I prefer to replace old pots with carbon composition types, Allen Bradley type J or similar, for their superior performances and low noise. Unfortunately today the availability of log or antilog potentiometers is quite poor and the linear types are not suitable for use in volume control circuits.

As usual, a solution can be find in the old literature, based upon the resistive loading of linear potentiometers. If we put a load resistor from the cursor to one end of a linear potentiometer, we have a non-linear voltage variation at the output. Depending upon the side where the load is connected, we have quadratic curves, which approach enough either antilog or log ones. Here are plotted the output curves for both configurations, assuming that the circuits are driven by a voltage generator:

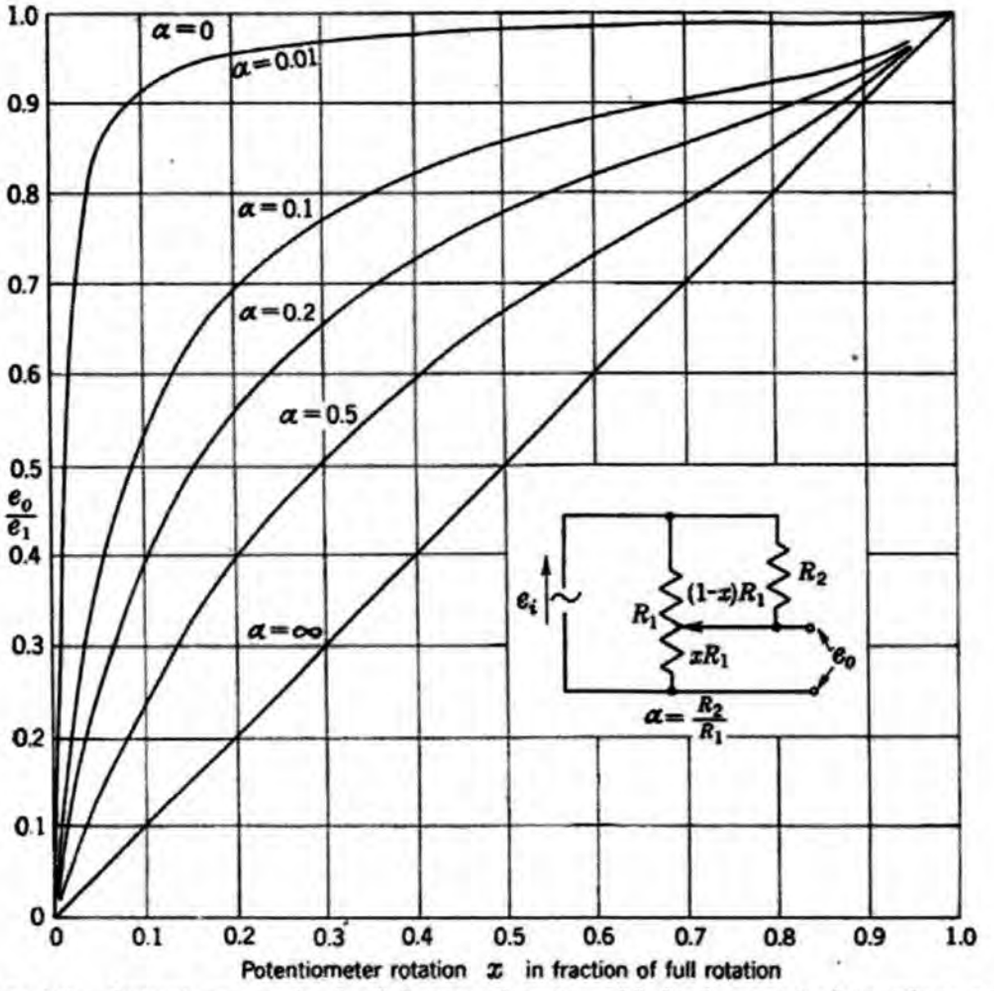

Fig. 5-6.—Output curves for loaded potentiometer with load connected to upper end ($e_2 = e_i$).

As we can see in both cases, the middle curves approximate the typical curves of antilog and log potentiometers. Linear potentiometers over 1 megaohm, required to have the best fitted curves, are usually available at affordable prices, coming from inventories of old television shops. In many cases the error due to the resistance of the source is relatively low and can be ignored.

Reference: Electronic Instruments, MIT Radiation Lab Series, Vol. 21, section 5-4, 'Curve fitting with linear potentiometers'