The so-called “three-term” or “proportional + integral + derivative” (PID) control algorithm has been and continues to be very widely used. Its use stems largely from the development of the three-term controllers by the instrument and process control companies. It is claimed that the first three-term controller was introduced by the Taylor Instrument Company in 1936 when preact, that is, derivative action, was added to their double response controller: initially, the amount of preact was fixed in the factory, but in 1939, a controller with a continuously variable derivative action was introduced [1]. It is interesting to note that it was during this period (1939–40) that George A. Philbrick was developing his electronic analog simulator, which included a three-term controller [2].

The use of derivative and integral action was, in the 1930s, not new: many controllers using it had been designed and used throughout the nineteenth century: it had been recognized early in the work on governors that offset could be removed by the introduction of integral action [3]. What was new was the introduction of general purpose controllers with continuously variable control action. A consequence of the gradual introduction of such controllers into the process industries was a growing interest in the dynamics of various typical processes and attempts to analyze the behavior of controllers [4]. The writers of many of these papers were, however, unaware that Nicolas Minorsky, in 1922, in his paper on the “Directional stability of automatically steered bodies,” had analyzed and discussed the properties of the three-term controller [5]: this paper stands alongside those of Maxwell, Routh, and Hurwitz as one of the early formal discussions of control theory.

The paper arose out of work on the installation and preparation for the testing of the automatic steering gear on the battleship New Mexico, the trials of which took place in 1923. There had been some interest in fully automatic steering systems almost from the first introduction of servo-controlled steering engines in 1864, but little advance was made until the major naval powers began to review their

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fire control techniques at the beginning of this century [6]. This review was made necessary by the increasing range of naval guns. The outcome of the review was an increased interest in (i) the development of the gyro-compass—in iron ships, and with the increasing use of electricity in ships, great difficulty was experienced in using the magnetic compass—and (ii) in the stabilization of either the ship or the gun platforms and gun directors. Consideration was given to the possible improvement in accuracy through the reduction or elimination of yaw: “…my first approach to the problem of automatic steering in order to eliminate yaw was therefore made more in connection with gunnery than with navigation” recalled Sir James Henderson in 1934 [7], who was against automatic steering, and this attitude did not change until the successful introduction of the commercial autopilot [8]. So although the tests carried out by Minorsky on the New Mexico were successful, the automatic steering was removed and further work discontinued.

REFERENCES
[4] Many papers on process control were published in Trans. ASME during the late 1930s and early 1940s, and a book summarizing some of the work was prepared by Ed. S. Smith, Automatic Control Engineering, New York: McGraw-Hill, 1944.