

## SECTION V

### PERCENTAGE CORRECTOR M1

#### 91. DESCRIPTION.

a. The percentage corrector M1 (fig. 44) is a device for applying the ballistic and adjustment corrections to the uncorrected range to the set-forward point and for transforming the corrected range, when necessary, to the corresponding range in those units with which the pointing device on the gun is marked. The application of the corrections is made by two correction scales similar to those on the range correction board, one scale for each type of correction. The transformation is made by a range elevation relation scale or a range-range relation scale, depending on the type of pointing device on the gun. When no transformation is necessary a logarithmic scale is used. Each of the three types of scales mentioned is made up on a cloth-backed tape. Details of the construction of the scales are contained in appendix II. Only one scale is necessary under any particular set of conditions. The conditions under which each is required are as follows:

(1) When the gun is equipped with a range disk graduated for the combination of powder charge and projectile which is to be used, the scale required is a logarithmic range scale. (See note, (2) below.)

(2) When the gun is equipped to set ranges in angular units (that is, by setting elevations) a range elevation relation scale is used. This scale consists of a basic scale, which is a logarithmic range scale similar to that mentioned in (1) above; and a secondary scale which shows, beside the ranges in their proper relation, the elevations at which the gun must be pointed to attain those ranges with the particular combination of gun, powder charge, and projectile being used. These data are taken from the firing tables.

Note. If the gun is equipped with a range disk, as is the usual case with fixed seacoast artillery, the range disk acts as the range elevation relation scale.

(3) If a gun equipped with a range disk is to be fired with a combination of powder charge and projectile different from that for which the range disk is engraved, and entirely different range elevation relation exists for which the range disk alone will not suffice. The problem that arises in this case is still the same as before, that is, to point the gun at a certain elevation. However, its solution requires an added step – the transformation of the desired elevation into terms of the ranges with which the range disk is graduated. This is accomplished by means of a range-range relation scale. It consists of two range scales, the first of which is logarithmic scale similar to those mentioned in (1) and (2) above and which may be considered as the range to target scale. The second scale shows the ranges at which the range disk on the gun must be set in order to attain with the ammunition used the ranges given on the first scale.

b. To insure that the proper scales are furnished, requests should show Upon request, scales for the percentage corrector will be furnished by the Coast Artillery Board, Fort Monroe, Va.–

(1) Model of gun and carriage.

(2) Whether range disk or elevation quadrant is used.

(3) If range disk is used, the combination of projectile and powder charge for which the range disk is graduated, to include designation of firing tables used in graduating the range disk.

(4) Statement of the combination or combinations of projectile and powder charge which are to be used for firing, to include designation of corresponding firing tables.

c. The percentage corrector consists of a box containing two rollers on which the proper one of the three scales is mounted. This scale shows through a window of xylonite on which is engraved a fixed index line for setting the uncorrected range. The ballistic correction scale is fixed in place on the top of the

box alongside of the range scale with its normal opposite the setting line index line. An index for the ballistic correction scale, called the "ballistic pointer," is fixed to a slide on the top of the box. The adjustment correction scale is also carried on this slide, its normal coinciding with the ballistic pointer. The read pointer is carried on a slide within the first slide. All correction scales are graduated logarithmically. The percentage corrector has on one side an auxiliary device known as an "interpolator" which is designed for use when employing a firing interval less than the interval between predictions on the plotting board. The interpolator consists of a wooden frame with two rollers in which is wound a range tape or an elevation tape. An interpolating plate rides in guides on top of the interpolator and is engraved with lines and figures as shown in figure 44. The plate may be moved freely in and out and the tape is moved over it. A small rider may be improvised for use on the tape if desired.

## 92. OPERATION.

a. When the interpolator is not used one operator is required. He wears a telephone head set connecting him to the range and elevation setters at the guns. As soon as the uncorrected range to the set-forward point is called out from the plotting board, he sets that range on the range scale at the index line on the xylonite. He keeps the ballistic pointer set on the ballistic correction scale at the ballistic correction called out by the operator of the range correction board. If an adjustment correction has been ordered he sets the read pointer at that correction on the adjustment correction scale; otherwise the read pointer coincides with the ballistic pointer. He then calls out to the range or elevation setters at the guns the corrected range or elevation indicated by the read pointer on the range scale. He continues to make the proper settings of uncorrected ranges and corrections and to transmit the corrected firing data to the guns at the proper intervals. The new data should not be transmitted to the guns until after the sounding of the firing bell for which the previous data were figured. Whenever the operator receives a new adjustment correction he incorporates it into the next data and, when those data are sent, calls out CORRECTION APPLIED. All scales being logarithmic, the corrector acts as a logarithmic slide rule. Setting the ballistic pointer on the ballistic correction scale multiplied the range set at the normal of that scale by the amount of the ballistic correction. Setting the scale by the amount of the ballistic correction. Setting the read pointer on the adjustment correction scale multiplies the range set at its normal – that is, the range already corrected for the ballistic correction – by the amount of the adjustment correction. This is equivalent to multiplying the uncorrected range by the product of the two corrections. In figure 44, the corrector is set for an uncorrected range of 15,150 yards, a ballistic correction of 310 (101 percent) and an adjustment correction of 101.0 percent  $\times$  102.6 percent = 103.6 percent. The corrected range indicated is 15,700 yards which is 103.6 percent of 15,150 yards. The elevation corresponding to the corrected range is indicated by the corrector in 477 mils.

b. When the interpolator is used two operators are required. The duties of the percentage corrector operator consist simply of setting the uncorrected ranges and the ballistic and read pointers. An additional operator operates the interpolator, wears the telephone headset, and transmits the corrected ranges or elevations to the guns. For the purpose of this explanation it will be assumed that predictions are to be made every 30 seconds, that elevations are to be sent to the guns every 15 seconds, and that the time interval system is arranged to give three strokes of the bell every 30 seconds (known as the "3 bell") and one stroke at each intermediate interval of 15 seconds (known as the "1 bell"). The operation of the interpolator is then as follows:

- (1) On the 1 bell, or as soon thereafter as practicable, the interpolator operator transmits to the guns the elevation (or corrected range) indicated by the read pointer. (This elevation is for firing on the next 3 bell.) He moves the tape so that this elevation is exactly over the center line of the interpolating plate and fastens the rider on the tape at this point.
- (2) Immediately after the next 1 bell he transmits to the guns the elevation indicated by the read pointer and moves the interpolator tape to that the new elevation is exactly over the center line on the interpolating tape. This operation displacing the rider, he moves the interpolating tape in or out until one of the outer lines of the plate marked 1 intersects the tape at the index of the rider. The rider is then moved back to a position above the center line of the plate. If the range is increasing, the elevation to be sent to the guns on the next 3 bell is indicated where the tape is intersected by the 3 line

on the side of the plate marked "increasing." For decreasing ranges the readings are on the other side of the center line. In figure 44 the elevation for the first 1 bell was 467 mils; for the second 1 bell, 477 mils. The elevation to be sent to the guns on the next 3 bell is indicated by the intersection of the 3 line with the tape on the increasing side of the plate, or 482 mils.

- (3) The operations just described are repeated at the proper times, directly computed elevations (good for firing on the 3 bell) being sent to the guns immediately after each 1 bell and interpolated elevations (good for firing on the 1 bell) immediately after each 3 bell. In case a prediction is missed for any reason, an approximate elevation for the next 1 bell is always indicated by the intersection of the outer 1 line on the proper side of the plate.
- (4) Should it be desired to lay the gun in elevation (or range) for times between 15 and 30 seconds data, resort may be had to "creeping" on the range drum, or the operator of the interpolator may be taught to estimate readings, synchronizing them with a stop watch. In this way an almost continuous flow of elevations (or ranges) may be maintained and the guns fired whenever they are ready.
- (5) If it is desired to furnish data at intervals that are smaller subdivisions of the interval between predictions, appropriately spaced lines may be marked on the reverse side of the interpolating plate and interpolations made in a manner similar to that described in (2) above.