# Metro Slide for GFT

By Maj. C. E. Bartlett, FA

A new metro slide for use with the conventional stock of the graphical firing table in computing meteorological data for the 3″ guns M5 (towed) and M7 (self-propelled) employed by TD units has stood up well in tests. In one conducted under controlled conditions the time for computing metro data with the new slide was less than half that consumed in computing the same data by the usual method. Two officers worked 10 problems with the slide in an average time of 1.5 minutes; their average by the usual method was 3.7 minutes. There were three appreciable errors in the results obtained by the regular method, but none in results obtained with the metro slide.

Tables for the new metro slide are based on data from FT-3-Q-1 and are therefore applicable to the 3″ guns. Similar slides for use with field artillery weapons can be designed in the same manner through use of appropriate firing tables.

RANGE

The only alteration made in the conventional stock of the graphical firing table for use with the metro slide is the addition of a scale showing "Total Metro Effect in Yards." This, called the M scale, is placed just below the D scale on the lower half of the stock. Net result of computed metro data is read from this scale.

The front of the 3″ gun's metro slide is divided into three sections for ranges of 6,000, 7,500, and 9,000 yards. The reverse side has two sections, one for a 10,500-yard range and a second for a 12,000-yard range. The 1,500-yard gap between sections represents one half of the limits to which *K* transfers can be made accurately. These five sections cover ranges at which indirect fire normally will be conducted by tank destroyers reinforcing field artillery units.

Each of the five sections on the slide has six scales, one for each of the elements considered in making a metro calculation. Each scale is designed in the proper relation to its range section and the M scale. From bottom to top the scales are, weight of projectile, powder temperature, air temperature, rear wind velocity, air density, and VE correction. The combination of these factors in their proper relation gives total metro effect on the M scale.

Each range section has a line running through the six scales at a point adopted as standard conditions of materiel, ammunition, and atmosphere in the preparation of firing tables from which this data was compiled (see Fig. 1). This line will be referred to as the standard line. The standard conditions are: weight of projectile, 1 square; temperature of powder, 70° F; air temperature, 59° F; rear wind velocity, zero miles per hour; air density, 100%.

Operation of the slide rule is best explained by working an illustrative problem in conjunction with accompanying phographs.

EXAMPLE

*Situation*

A 3″ gun is to fire on an 800m sector, the Y-azimuth of the center of the sector being 4100m. It is to cover ranges from 6,000 to 9,000 yards. The metro check point selected is at 7,500 yards.

Officer in charge of gun reports:
- Weight of projectiles, 3 squares
- Powder temperature, 31° F.

Metro message information:
- Air temperature, 36° F.
- Wind direction, 600m.
- Wind velocity, 35 mph.
- Air density, 98%.

*Procedure*

*Step 1*. Line up the hairline on the window with the zero on the *M* (total metro effect) scale and the standard line of the 7,500-yard range section (Fig. 1).

*Step 2*. Set the hairline to the 3-square graduation on the weight of projectile scale (Fig. 2).

*Step 3*. Move the slide so the standard line of the 7,500-yard range coincides with the hairline (Fig. 3).

*Step 4*. Set the hairline to 31° F on the powder temperature scale (Fig. 4).

*Step 5*. Move the slide so the standard line again coincides with the hairline (Fig. 5).

*Step 6*. Set the hairline to 36° F on the air temperature scale (Fig. 6).

*Step 7*. Move the slide so the standard line again coincides with the hairline (Fig. 7).

*Step 8*. The azimuth of the wind is 600, and since the direction of fire is 4100 the chart direction of the wind is 600 + 6400 — 4100 = 2900m. From the "Wind Components" tale on the back of the rule (Fig. 8), the wind components

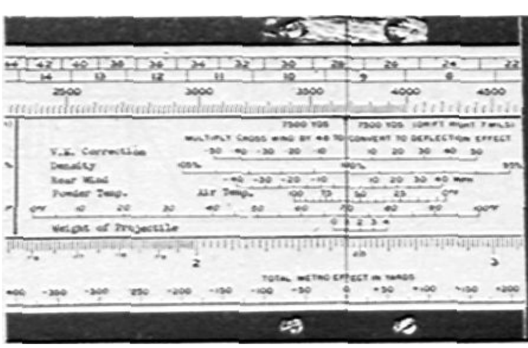

*Figure 1*

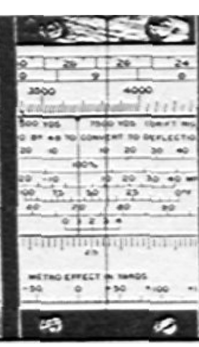

*Figure 2*

*Figure 3*

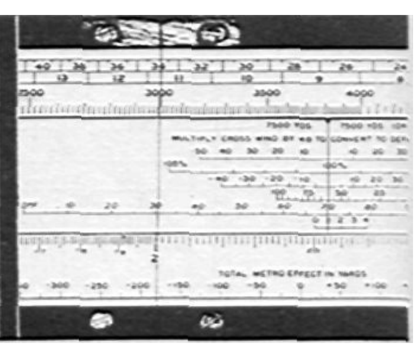

*Figure 4*

| Chart Direction of Wind | Cross Wind MPH | Range Wind MPH | Chart Direction of Wind | Cross Wind MPH | Range Wind MPH |
|---|---|---|---|---|---|
| 0 | 0 | -1.00 | 3200 | 0 | +1.00 |
| 100 | L .10 | - .99 | 3300 | R .10 | + .99 |
| 200 | L .20 | - .98 | 3400 | R .20 | + .98 |
| 300 | L .29 | - .96 | 3600 | R .29 | + .96 |
| 400 | L .38 | - .92 | 3600 | R .38 | + .92 |
| 600 | L .47 | - .88 | 3700 | R .47 | + .88 |
| 600 | L .56 | - .83 | 3800 | R .56 | + .83 |
| 700 | L .63 | - .77 | 3900 | R .63 | + .77 |
| 800 | L .71 | - .71 | 4000 | R .71 | + .71 |
| 900 | L .77 | - .63 | 4100 | R .77 | + .63 |
| 1000 | L .83 | - .56 | 4200 | R .83 | + .56 |
| 1100 | L .88 | - .47 | 4300 | R .88 | + .47 |
| 1200 | L .92 | - .38 | 4400 | R .92 | + .38 |
| 1300 | L .96 | - .29 | 4500 | R .96 | + .29 |
| 1400 | L .98 | - .20 | 4600 | R .98 | + .20 |
| 1500 | L .99 | - .10 | 4700 | R .99 | + .10 |
| 1600 | L1.00 | 0 | 4800 | R1.00 | 0 |
| 1700 | L .99 | + .10 | 4900 | R .99 | - .10 |
| 1800 | L .98 | + .20 | 5000 | R .98 | - .20 |
| 1900 | L .96 | + .29 | 5100 | R .96 | - .29 |
| 2000 | L .92 | + .38 | 5200 | R .92 | - .38 |
| 2100 | L .88 | + .47 | 5300 | R .88 | - .47 |
| 2200 | L .83 | + .56 | 5400 | R .83 | - .56 |
| 2300 | L .77 | + .63 | 5500 | R .77 | - .63 |
| 2400 | L .71 | + .71 | 5600 | R .71 | - .71 |
| 2500 | L .63 | + .77 | 5700 | R .63 | - .77 |
| 2600 | L .56 | + .83 | 5800 | R .56 | - .83 |
| 2700 | L .47 | + .88 | 5900 | R .47 | - .88 |
| 2800 | L .38 | + .92 | 6000 | R .38 | - .92 |
| 2900 | L .29 | + .96 | 6100 | R .29 | - .96 |
| 3000 | L .20 | + .98 | 6200 | R .20 | - .98 |
| 3100 | L .10 | + .99 | 6300 | R .10 | - .99 |
| 3200 | 0 | +1.00 | 6400 | 0 | -1.00 |

YAZ Wind - YAZ Dir Fire

*Figure 8*

for a chart direction of 2900 are L.29 and + .96. Using the range wind component only, + .96 × 35 mph (wind velocity given) = + 34 mph. Set the hairline to 34 mph on the rear wind scale (Fig. 9).

*Step 9.* Move the slide so that the standard line again coincides with the hairline (Fig. 10).

*Step 10.* Set the hairline to 98% on the density scale, and read the net metro effect in yards on the M scale (Fig. 11). Actually there are five adjustments to be made, using five scales of the selected range section. The total metro effect in yards can be converted into correction in mils by changing its sign, then dividing by "yards per mil" at the particular range (from range table, in this case at 7,500 yards). *Example:* + 45 yards ÷ 29 = + 2m̄ *correction.*

*K* can be computed by dividing net metro effect in yards by range in thousands of yards (7.5). This *K* may then be set on the *K*-scale of the GFT.

A number of variables frequently result in a difference between a *K* computed from metro data and the *K* actually determined through registration. Moreover, the muzzle velocity of ammunition is not always standard. This difference, or *K*-change, is known as the velocity error. It has been included on the top scale of the range sections of the metro slide as "V.E. Correction in Feet Per Second." If known, it is to be applied in the same manner as, and in addition to, the five elements described in the illustrative problem and then converted into the corrected *K*.

DEFLECTION

To correct for deflection, two constants have been indicated on each range section of the metro slide: drift and cross-wind factor. For example:

1. Drift at 7,500 yards is right 7 mils (Fig. 1).
2. The cross-wind factor (Fig. 1) is to be multiplied by the cross-wind velocity to give deflection effect. Thus, at 7,500 yards and using the chart direction of 2900 from the illustrative problem: Left .29 × .48 × 35 = L 5m̄ (cross-wind deflection effect).

In the above example, since the drift is right 7 mils and the cross wind deflection is left 5 mils, the net deflection effect is right 2 mils. Therefore, the net *correction* to be made is left 2 mils.

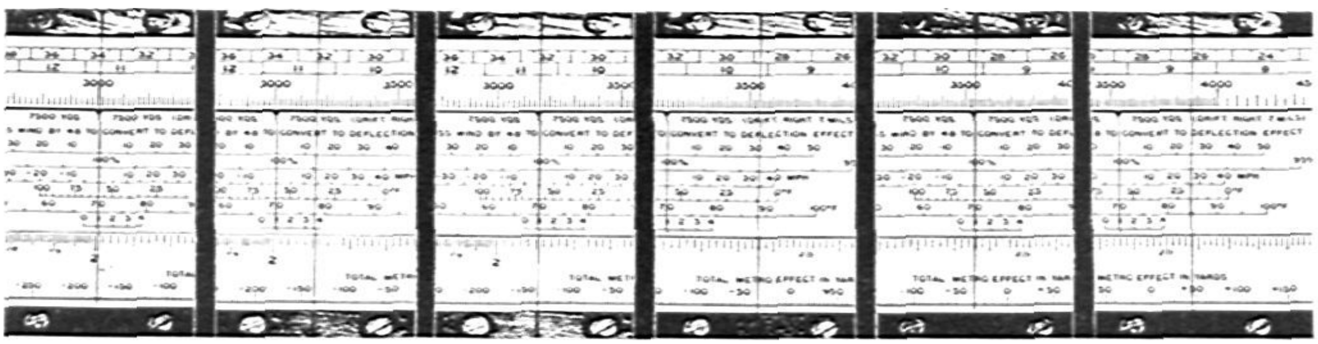

*Figure 5* *Figure 6* *Figure 7* *Figure 9* *Figure 10* *Figure 11*

# TARGET GETTING AND FIXING

By McKenzie Hill

Performance of American artillery in the current wars has been most commendable. The facility with which it has been able to mass and maneuver fires has greatly contributed to the success of our arms. This has been particularly outstanding during the time when our enemies had the initiative. Now that the initiative is ours, we should analyze our means and methods and see if they are appropriate to the task at hand.

There is never too much ammunition, either manufactured or delivered, at the critical point. It is up to us to make the best use of it. Consider the matter of targets.

Other things being equal, the artillery battalion that can find and fix on a chart the most targets for attack then or later will be the most effective.

Peace tends to develop technique without sufficient attention to target getting and fixing. War gradually develops the need and importance of target getting and fixing. Perfection in the technique of delivery of fire, as well as the technique of getting and fixing (locating) targets, is essential.

Is your target-getting machinery in order, not only for counter-battery targets but also for close support targets? Arrange for fixing them by exercising your command responsibilities in connection with planning for and procuring maps, photomaps, photographs, etc. Their supply is not automatic—*yours* is the responsibility.

Get the infantry to help line in on machine gun flashes. Work with and for them in getting targets.