By itself, failing to account for a declination of 1 degree, 14.2 minutes does not seem a serious problem. For a 1,000-meter (one kilometer) distance, however, being one degree off target will cause a soldier to deviate 17 meters to the left or right of his intended goal. Over a distance of five kilometers, he would be 85 meters off target—and probably lost.

Now add to this discrepancy the Army's built-in error tolerance. The Soldier's Manual of Common Tasks, Skill Level 1 (October 1985), Task 071-329-1003 (Determine a Magnetic Azimuth Using a Compass), allows a three-degree error for the compass-to-cheek method and a ten-degree error for the centerhold method. When a soldier starts to move, and assuming the error is in the same direction as the declination, the soldier who was 85 meters off target traveling 5 kilometers may now be as much as 340 meters away from the target (compass-to-cheek) or, even more catastrophic, 935 meters away from the target (centerhold). This error is magnified even more if the compass manufacturing tolerance of plus or minus two degrees is added (Stocker and Yale specifications). Thus, even staying within accepted Army standards, the soldier might be as far as 510 meters and 1,105 meters off target, respectively.

Task 071-329-1009 (Navigate From One Point on the Ground to Another Point, Dismounted) would result in similar errors. Luckily for the soldier, the error is not as consistent as the example portrays.

In short, soldiers are taught how to convert Grid North to Magnetic North and vice versa, and then they are told to ignore this when navigating in areas where the declination is perceived to be minimal (as it is at Fort Benning). Instructors need to be aware of the date on the maps they are using and, even more important, of the declination date. They also need to remember that declination does change and must be updated. They need to teach this to their students, and then the soldiers need to be allowed to practice converting and using the G-M angle.

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Mortar Fire Control

WARRANT OFFICER-2 P.C. HALL, BRITISH ARMY

Modern technology has come to the U.S. Army's mortarmen in the form of the MBC — the M23 Mortar Ballistic Computer. (See "Mortar Ballistic Computer," by Sergeant First Class John E. Foley, INFANTRY, September-October 1986, pages 40-42.) I wonder, though, whether the M16 plotting board is still needed as a back-up plotting system. After all, recent field tests by the U.S. Army Infantry Board with 12 MBCs resulted in the MBCs' obtaining a 98.5% availability rate with a maximum achieved availability rate of 99.5%.

Most FDC sections are authorized two MBCs (cavalry units have one per tube). Therefore, with four reliable MBCs in each platoon, there seems little need to have any back-up system at all; nevertheless, it is probably wise to have one to meet unexpected emergencies.

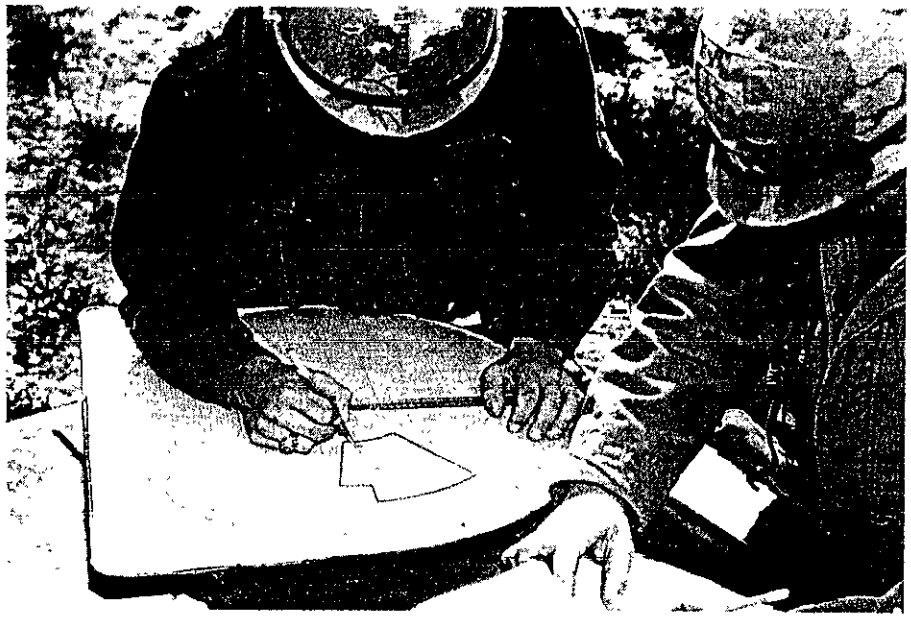
A simple back-up system is readily available. It consists of a map, a protractor, and a firing table — the same system we have been using for years as a back-up to our plotting board.

The map, protractor, and firing table method of acquiring firing data is easy to teach and learn. Although some special missions are difficult to accomplish using this method, with practice, there is no reason why these cannot be mastered as quickly as any other missions.

METHOD

Obtaining the data for a fire mission using this method is very basic: For example, the mortar location and the target are plotted; the distance between the plots is determined using the protractor; the corresponding charge and elevation are found from the firing table. Again, the protractor is used to determine the azimuth from the mortar to the target. The mortar is laid on the azimuth by use of the aiming circle or the M2 compass. Then, as is normal, the aiming posts are placed out on a referred deflection. Corrections from the forward observer (FO) are quickly and easily incorporated by drawing a straight line from the observer's location to the target. The roamer on the protractor is used to measure the correction in relation to the observer-target (OT) line and a new plot is made. Once the firing data to engage the target has been gathered, it is a simple task to convert the azimuth gained from the map to its corresponding deflection by using the LARS (left add, right subtract) rule.

It seems to me that it would be a waste of time to train the students in mortar



Given the availability rate of the mortar ballistic computer, the old M16 plotting board, shown in use here, may no longer be needed as a backup system.

courses to use both the MBC and the M16 plotting board it was designed to replace. In addition, the M16 plotting board is easily damaged through misuse or accident. Exposure to direct sunlight, for example, can warp the disc. The present cost of an M16 plotting board is $123. Doing away with this system would save us thousands of dollars, money that could be better spent on other military equipment. And, after all, the designated back-up system would be used only rarely.

For more than two years the British Army has had a computer system similar to the MBC in all of its Infantry battalions. It is called the Morzen Mortar Fire Data Computer (MFDC). When this system was introduced, similar questions arose concerning a back-up for it, but eventually the British Infantry School decided upon the map, protractor, and firing table.

The British plotter, L1A1, was, and still is, a very good one, and many old and tested infantrymen were reluctant to change to the new computers. The idea of accepting them and doing away with the plotter altogether and not even having it as a back-up was hard for these veterans to accept. But accept the computers they did, and today the L1A1 is a system of the past, fondly remembered only by those who had mastered it. The British system of mortaring has been a complete success.

Once the U.S. Army has fielded all of its authorized MBCs, I suggest it do away with the M16 plotting board and move forward with the available technology. Technology will then move forward even faster instead of waiting for some mortarmen to catch up.

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Directed Energy Warfare

CAPTAIN S.T. MISHKOFSKI

The United States infantryman faces a new threat to his well-being on today's battlefield — directed energy warfare (DEW) — a threat that he should begin getting acquainted with.

The Army defines DEW as "the use of electromagnetic waves or a stream of sub-atomic particles to perform military combat tasks." That definition is not as new and strange as it may sound; an infantry battalion today trains with lasers every time its soldiers use MILES (multiple integrated laser engagement system) equipment. In addition, Dragon and TOW gunners "shoot" their simulators at a directed energy source, while attached artillery fire support teams use laser designators to "paint" targets and guide smart munitions. Both the M60A3 and M1 tanks have laser rangefinders to determine range to target and to assist in fire control.

The DEW equipment the Army has today and expects to have tomorrow is designed for such tasks as detection, identification, illumination, ranging, jamming, disruption of communications, and destruction of hostile soldiers and their materiel resources. Our DEW equipment includes lasers, microwave