capable, allowing access to the precise positioning service. It can be held in one hand, weighing 2.8 pounds (with battery).

The current specification for PLGR accuracy is 10 meters circular error probable (CEP) horizontally and 10 meters probable error (PE) vertically. This means the PLGR will be more consistent and have better positioning and navigation solutions than the SLGR. The specifications call for enough precision for the PLGR to work with PADS' new Version 4 software GPS procedure and other inertial systems.

With this accuracy, the PLGR, along with a gyroscope for azimuth, will be able to provide position data and update points for most artillery systems, including our howitzers and the multiple-launch rocket system (MLRS). In many cases, we'll continue to need inertial systems for position accuracy when the PLGR is masked by terrain or has satellite outages. Additionally, the integrated PLGR will enhance the capabilities of future inertial systems by providing constant update data that may eliminate the need for zero-velocity stops.

The "first buy" of PLGRs for the Army is 11,000 systems; the 25th Infantry Division (Light) in Schofield Barracks, Hawaii, will test the PLGRs and fielding to other units is anticipated to be through FY 94. Priority will go to Force Package 1 (forward-deployed and contingency units) for the first buy. Depending on funding, the Army tentatively plans to buy 33,000 more PLGRs for fielding through FY 97.

As you can see, the transition from SLGR to PLGR will take some time, and until the PLGR is fully fielded, some units may have only SLGRs or a mix of systems. As long as the user understands each system's functions and capabilities, position and navigation errors will be avoided.

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Firefinder Initialization with Limited Map or Survey Data

Two problems encountered by Firefinder radar sections during Operations Desert Shield and Storm were a shortage of maps and limited or nonexistent survey. Maps available were, more often than not, the wrong size or type. In many instances, survey was either incomplete or unavailable. In future deployments, radar sections may face the same problems.

Initialization with Limited or No Maps. A quick fix for this problem is to place firing chart paper on the map drum of the weapons location unit (WLU). To do this, first determine from your headquarters the primary search azimuth and enter it during initialization. Then place the radar location on the bottom center of the chart paper, leaving enough room to cover the area of interest and to be able to plot friendly artillery and maneuver units. This is now the starting point for labeling the north-south and east-west grid lines, basing them on the plotted radar location grid coordinates.

The map size may be designated from the options available in the initialization program. You also may want to extract marginal data from maps located at the tactical operations center (TOC). This will provide data such as the high and low datum plane, contour interval, grid zone designator, etc.

After the chart is mounted on the map drum and labeled, altitude data, if available, may be entered. One way to do this is to trace and label major contour data from a map on an overlay and mount it over the chart paper. If a map of the area is available but is the wrong size or type to use on the map drum, simply plot the grid location of a round that you've tracked on the map and manually "height correct" the location. A quicker but less accurate method is to label each grid square with an average altitude. More than one altitude may be needed per grid square in severe terrain. Finally, the quickest and most efficient method for determining altitude is to use a digital map of the area, if one is available.

Limited Survey Data. The following paragraphs describe methods to either establish or extend preliminary survey data for Firefinder radars when accurate maps are available. For more in-depth discussions of survey and hasty survey techniques, refer to *FM 6-2 Field Artillery Survey* and *FM 6-50 Field Artillery Cannon Battery*.

•No Survey Assets Available**.** Map spot the radar position for coordinates. Then set up an aiming circle with the azimuth scale set to the declination constant and float the magnetic needle to north to determine azimuth.

If time permits, map spot for general location and identify three prominent terrain features that can be identified on the ground and map. Set up the aiming circle, set the azimuth scales to the declination constant and float the magnetic needle to north. Measure grid azimuths to all three points. Then measure the vertical angle of the point to be used as the orienting point (far stake). Convert the azimuth to a back azimuth and plot it on the map. Where the three azimuth lines cross is the position of the aiming circle. Read the coordinates from the map using a coordinates scale. Use the azimuth and vertical angle to determine far-stake data. You can then determine far-stake distance from the map.

•Extending Survey Using Hasty Techniques. The radar site may be located within view of a survey control point, firing point, observation post or another surveyed point. If it's within 250 meters of the surveyed point, set up the aiming circle on the surveyed point. Then set the known azimuth from the survey point to the end of orienting line (EOL) on the aiming circle scale and, with the non-recording knob, place the aiming circle cross hairs on the EOL. Using the recording knob, turn to the near stake (radar site) and record the azimuth. This is the azimuth from the survey point to the near stake (radar site).

You can determine distance using the subtense chart in FM 6-50. Hold a two-meter bar horizontally over the radar site stake. Set the aiming circle scale to "0" mils and, using the non-recording knob, sight on the left end of the two-meter bar. Using the recording knob, turn a horizontal angle from the left end to the right end of the two-meter bar. Apply the subtense angle to the subtense chart in FM 6-50 and read the distance from the surveyed point to the radar site. Plot the azimuth and distance from the surveyed point to the radar site on the map and determine the coordinates using a coordinate scale.

There are other methods that work. However, experience has shown these methods will solve the problem of not having maps or survey data available.

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