

APPENDIX C

FIELD-EXPEDIENT SURVEY TECHNIQUES

Surveyed locations may be provided by the artillery survey personnel. Normally, a map spot location to six-digit or eight-digit grid coordinates is estimated by the platoon supervisor that is the most qualified. With the "roving mortars" concept, new methods of position location are needed. Two such methods are described in this appendix. The mortar position should be constantly improved to include more accurate platoon center location.

C-1. GRAPHIC RESECTION

A graphic resection can be used to establish the coordinates of a point or to check the accuracy of a map spot. If the resection cannot be performed from platoon center, the platoon center coordinates can be estimated on the basis of the coordinates of the nearby resected point. The platoon may be required to locate its own roving gun (split section); and primary, alternate, or supplementary position as accurately as possible. Often, the location of those positions can be determined by a simple map spot location. Whenever possible, a more accurate method of location should be used. Graphic resection is a simple method using the aiming circle, tracing paper, and a map.

- a. Identify three distant points that also appear on a map (Figure C-1).
- b. With an aiming circle, measure the azimuth to those points. Preferably, the angles between the points should be greater than 400 mils.
- c. On tracing paper, place a dot representing the aiming circle location.

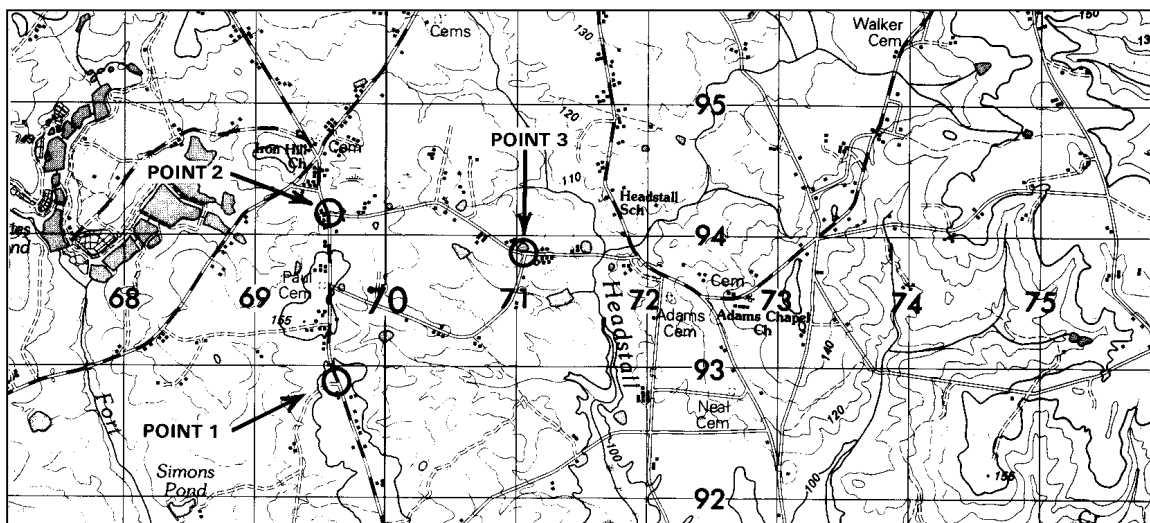


Figure C-1. Three distant points.

- d. Draw a line from this dot in any direction (Figure C-2).

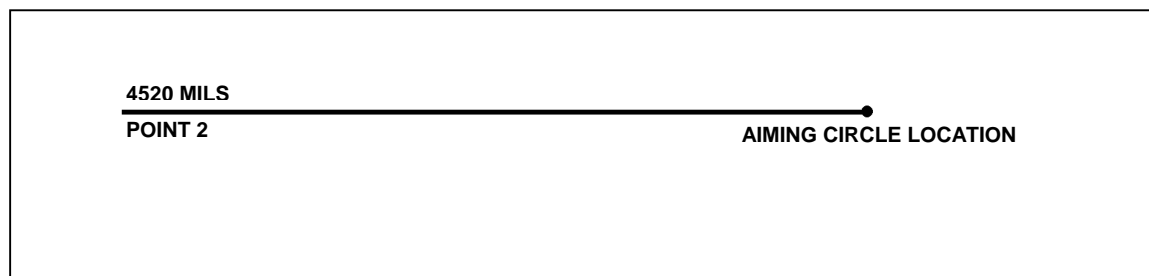


Figure C-2. Line drawn in any direction.

- e. With a protractor aligned with the correct azimuth on the line (Figure C-3), draw two lines from the dot on the measured azimuths (Figure C-4).

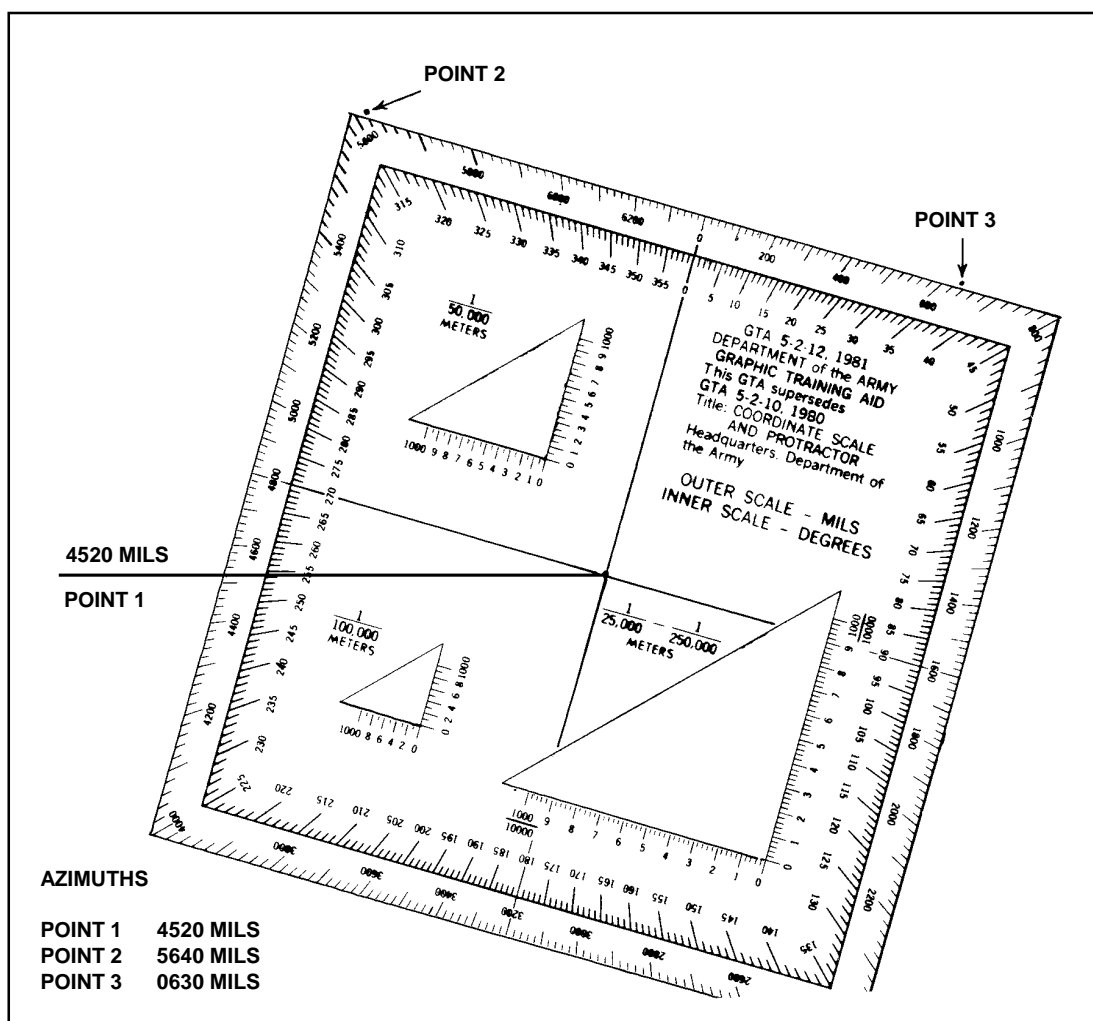


Figure C-3. Protractor aligned with correct azimuth.

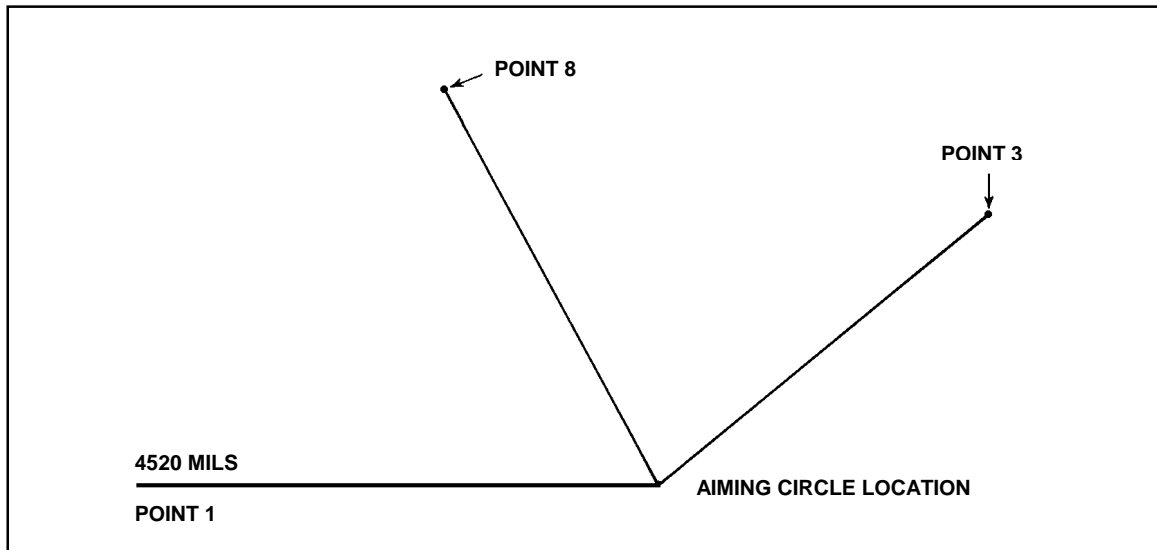


Figure C-4. Two more lines drawn from dot.

f. Place the tracing paper over the map of the area and slide it around until it is positioned so that the three lines pass through their respective distant points (Figure C-5). The dot on the tracing paper represents the location of the aiming circle (mortar position) on the map.

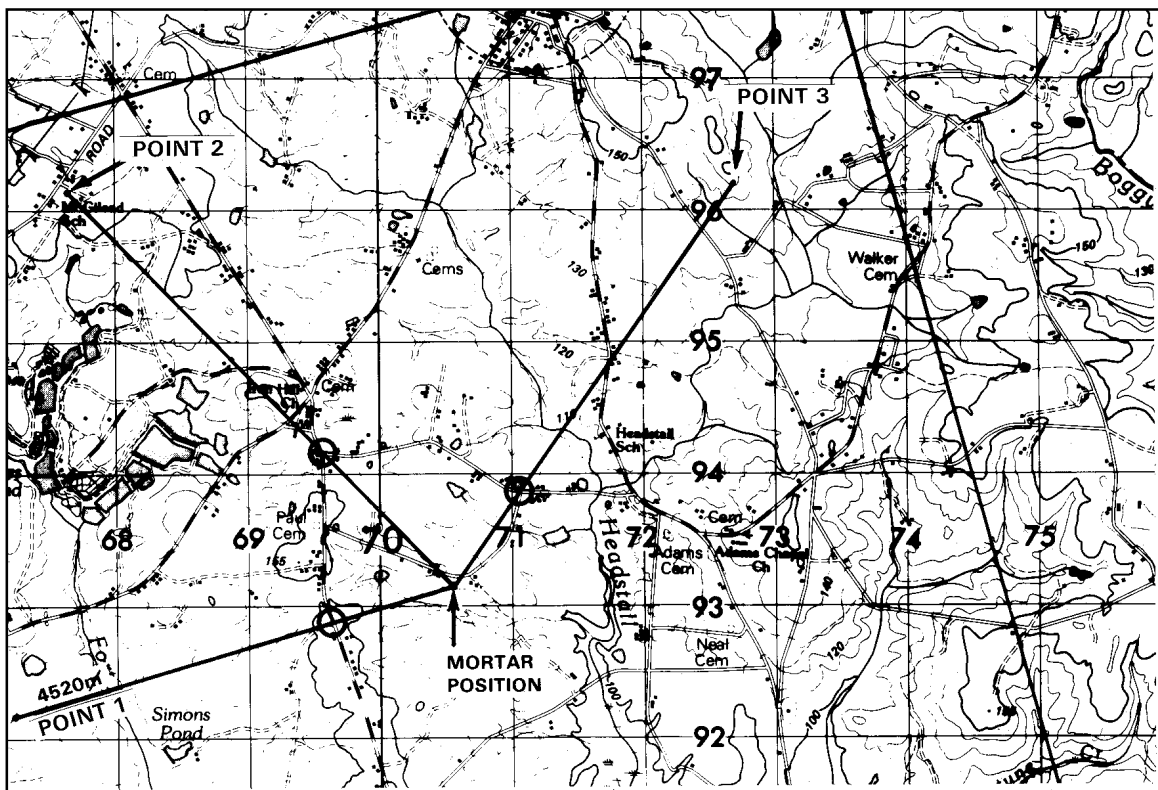


Figure C-5. Positioning of tracing paper.

g. If the angles are plotted with a standard protractor (accurate to about 10 mils) and oriented over a 1:50,000 scale map, the resection should be accurate within 100 meters.

C-2. HASTY SURVEY

A terrain feature or man-made object is needed close to the desired mortar position for a hasty survey. This identifies the mortar position on a map by eight-digit grid coordinates. The hasty survey begins at that point, using the pivot point of the M16 plotting board to represent that selected known position (Figure C-6).

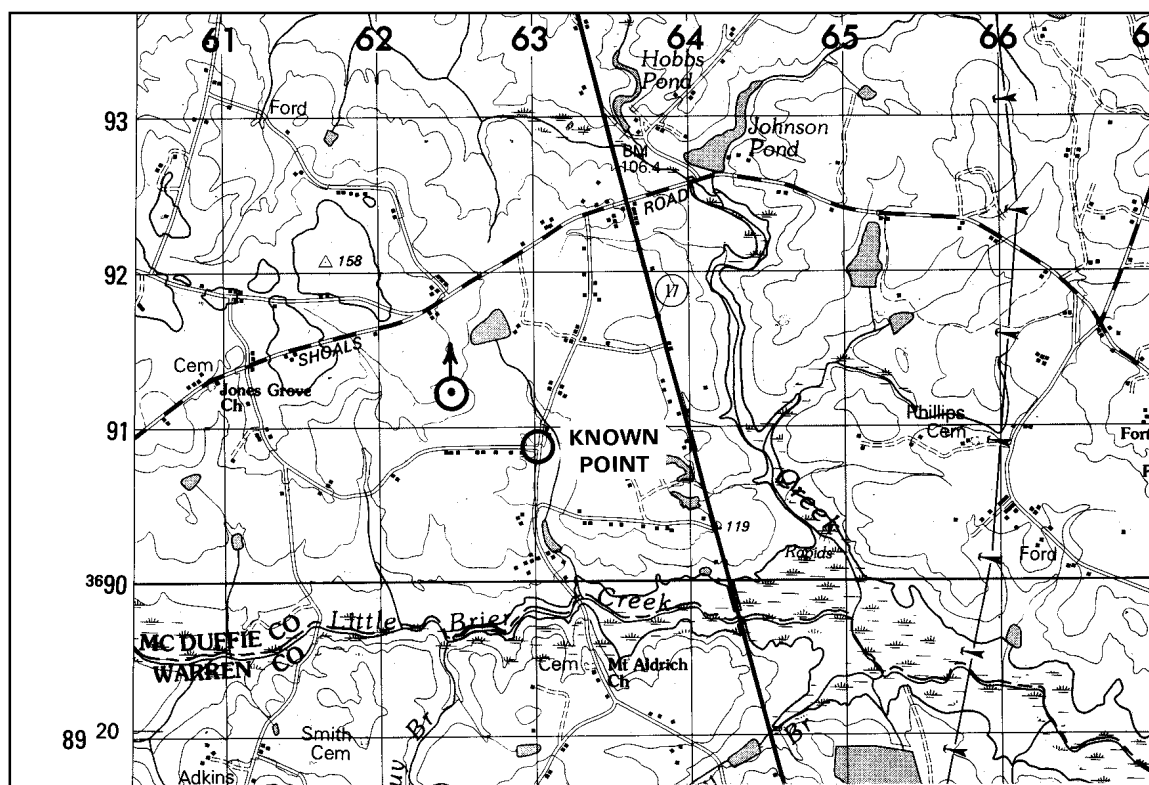


Figure C-6. Hasty survey.

- a. To begin the hasty survey, set the M2 aiming circle over the known point, level it, index the declination constant using the azimuth micrometer knob, and, with the nonrecording (lower) motion, orient the magnetic needle toward north. Now the grid azimuth can be measured.

b. While the "circle" man is measuring the grids azimuth, an assistant (the "post" man) moves toward the desired mortar position with the two aiming posts. (Before moving, the "post" man will have joined the post together and placed reflective or black tape strips exactly 2 meters apart on each post.) The post thus becomes a subtense bar (Figure C-7).

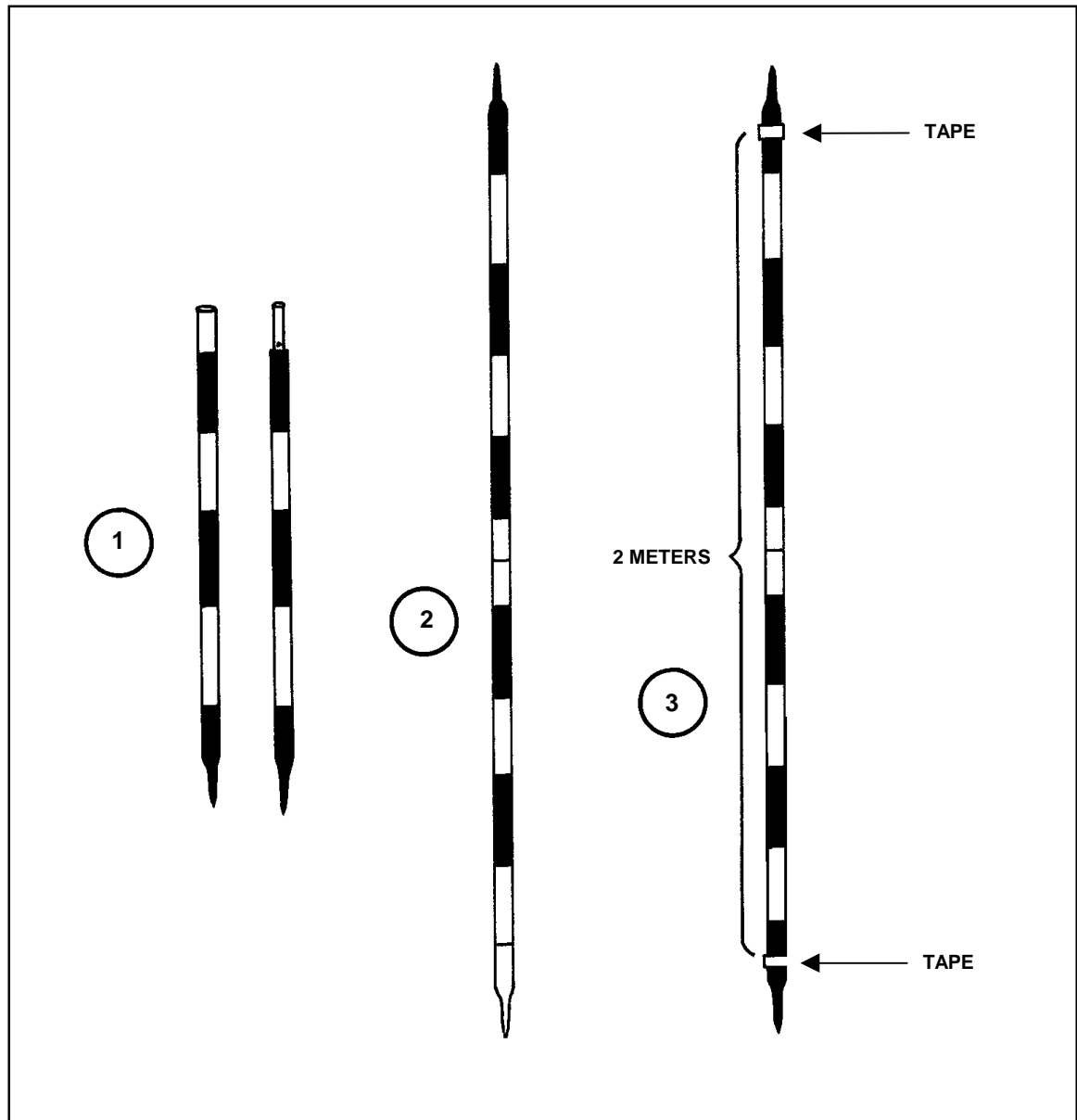


Figure C-7. Subtense bar.

c. At this point, the first leg of the hasty survey can be done. The "circle" man directs the "post" man to move toward the desired mortar position until he is within 290 meters and to place the post into the ground. This point on the ground becomes traverse station 1 (TS-1).

d. The "circle" man then rotates the azimuth motion (upper motion) until the vertical crossline in the telescope is on the center of the post. He records the azimuth to the post and labels it traverse leg 1 (TL-1) (Figure C-8).

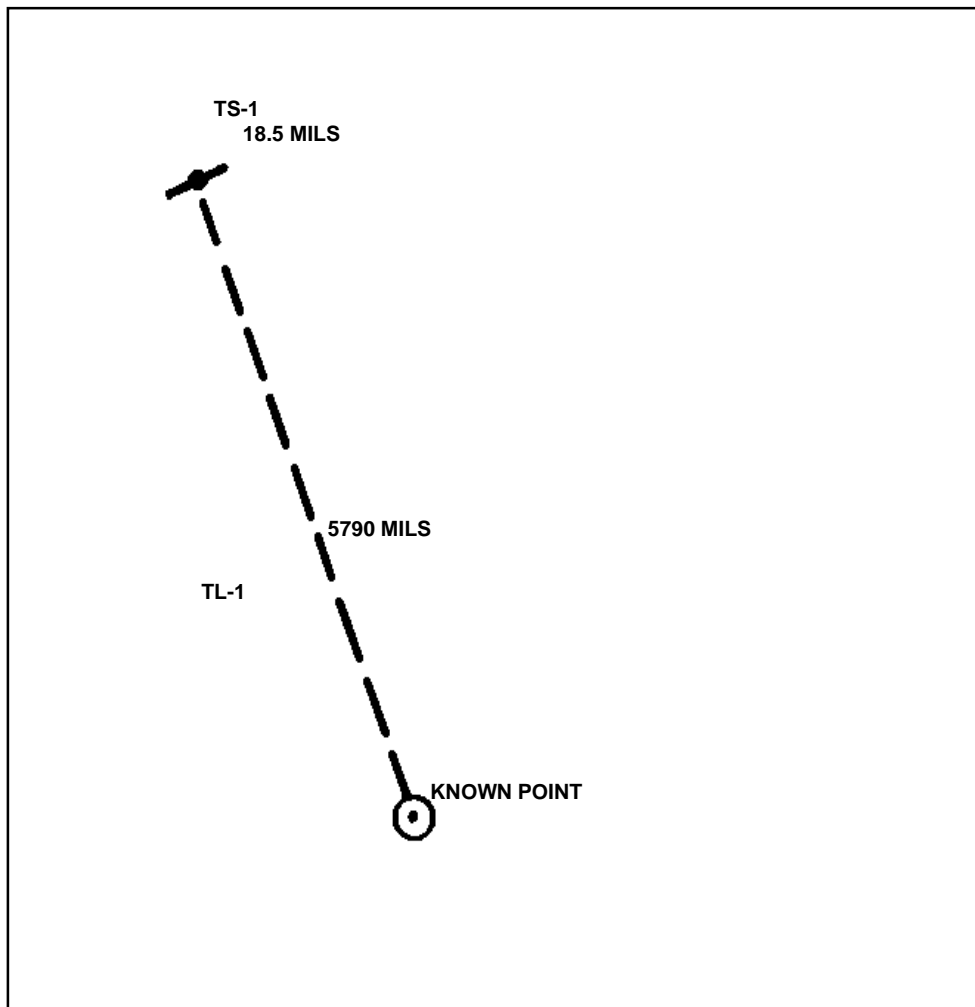


Figure C-8. Traverse leg 1.

e. Next, the "post" man removes the post and holds it parallel to the ground, facing the aiming circle.

f. The "circle" man measures the mil angle between the two strips of tape on the post (subtense bar) and records the mil reading along with the azimuth to TS-1 (Figure C-8).

g. The post is then replaced into the ground and the "circle" man moves forward to this point and sets up the aiming circle directly over this point. This completes the first traverse leg.

h. This procedure is repeated until the desired mortar position is reached. Either the information obtained may be written down as an azimuth, a mil angle and a traverse station, or a diagram may be constructed (Figure C-9). (To avoid confusing others working with a hasty survey, any diagram should reflect the route of the various traverse legs and should be close to scale.)

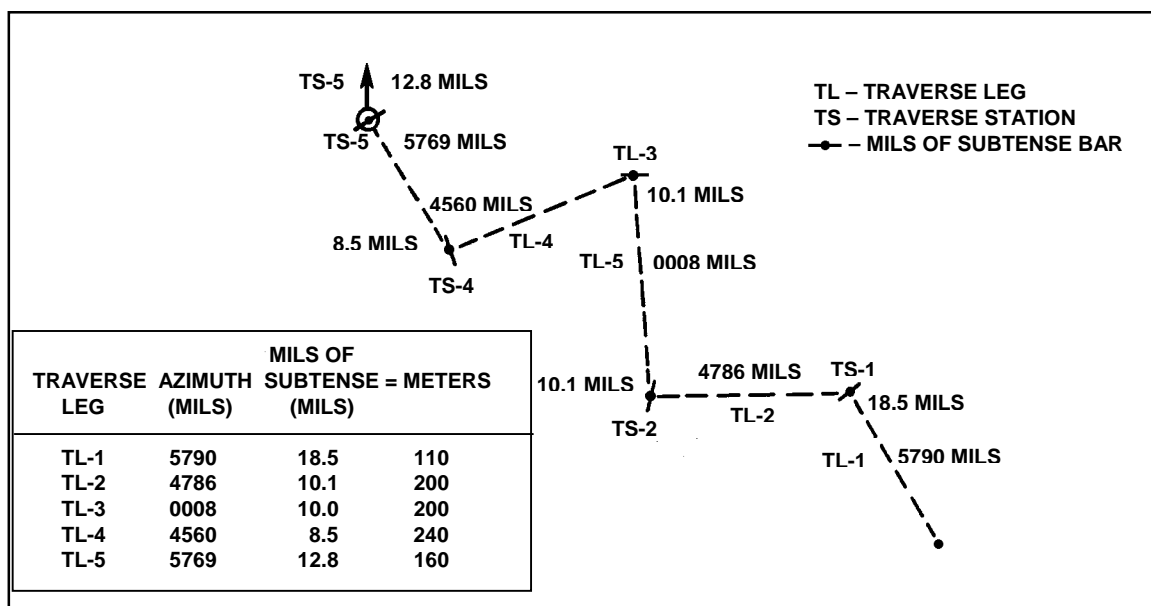


Figure C-9. Construction of a diagram.

(1) The information recorded by the "circle" man goes to the FDC either as the traverse legs are made or after all the legs have been completed. The beginning known point is represented by the pivot point of the M16 plotting board.

(2) Starting at the pivot point, the data are applied on the board for each leg of the hasty survey—for example:

- (a) The azimuth on the first traverse leg was 5790 mils.
- (b) Index that information on the M16 plotting board.
- (c) The distance between the two strips of tape on the aiming posts was 18.5 mils.
- (d) Refer to the distance tables (Table C-1, page C-8) for the 2-meter subtense bar width; a mil angle of 18.5 mils is equal to a distance of 110 meters. (For the hasty survey, make one square on the plotting board equal to 25 meters.)
- (e) From the pivot point on the direction of 5790 mils, move 110 meters (4 2/5 squares) along the index line, place a dot, and circle it. This point, marked as TS-1, completes traverse leg 1.
- (f) The azimuth for the second traverse leg was 4786 mils.
- (g) Again, index this information on the plotting board.
- (h) At TS-2, the mil angle measured for the 2-meter subtense bar width was 10.1 mils.
- (i) Refer to the distance table for the 2-meter subtense bar width; 10.1 mils equals a distance of 200 meters.

Angle (mils)	Distance (meters)	Angle (mils)	Distance (meters)	Angle (mils)	Distance (meters)	Angle (mils)	Distance (meters)	Angle (mils)	Distance (meters)	Angle (mils)	Distance (meters)
7.0	291.03	14.0	145.51	21.0	97.01	28.0	72.75	35.0	58.20	42.0	48.50
.2	280.99	.2	142.96	.2	95.86	.2	72.11	.2	57.97	.2	48.21
.5	271.62	.5	140.49	.5	94.75	.5	71.48	.5	57.38	.5	47.93
.8	262.86	.8	137.65	.8	93.66	.8	70.85	.8	56.98	.8	47.65
8.0	254.65	15.0	135.81	22.0	92.60	29.0	70.24	36.0	56.58	43.0	47.37
.2	246.93	.2	133.58	.2	91.56	.2	69.64	.2	56.19	.2	47.10
.5	239.67	.5	131.42	.5	90.54	.5	69.05	.5	55.81	.5	46.82
.8	231.80	.8	129.34	.8	89.54	.8	68.47	.8	55.43	.8	46.56

Table C-1. Distance table for a 2-meter subtense rod.

(j) With 4786 mils indexed on the plotting board, move up 200 meters from TS-1 along or parallel to a vertical line (eight squares), place a dot, and circle it.

(k) This point, marked TS-2, completes traverse leg 2. Repeat the same procedure for traverse legs 3, 4, and 5.

(l) Rotate the M16 plotting board until TS-5 (mortar position) is directly over the vertical centerline.

(m) Read the azimuth from the top of the plotting board; this is the direction from the known starting point to the base mortar squad's position.

(n) Count the number of squares along the index line between the pivot point and TS-5 (remember: each square equals 25 meters). This is the straight-line distance from the known starting point to the base mortar squad's position.

(o) If given data were properly applied in the example, a known starting point-base mortar squad azimuth should have been obtained of 5961 mils, and a known starting point-based mortar squad distance of 690 meters (+/-5 mils and 10 meters).

(p) Apply these data to the map. From the known starting point along the direction of 5961 mils, move 690 meters. The new point is the eight-digit grid coordinate for the base mortar squad's position.

(p) The FDC now establishes a modified-observed firing chart or, if the FO can find an eight-digit location in the target area, establish a surveyed firing chart.