Incoming

LETTERS TO THE EDITOR

Speak Out

The *Journal* welcomes and encourages letters from our readers. Of particular interest are opinions, ideas, and innovations pertinent to the betterment of the Field Artillery and the total force. Also welcomed are thoughts on how to improve the magazine.—*Ed*.

Wrong commander

This is to inform you of an error which appeared in the September-October 1982 *Field Artillery Journal*. The Commanders Update on page 36 lists LTC Morris J. Boyd as the commander of the 1st Battalion, 39th Field Artillery, but the commander of this battalion is actually LTC William D. Smith, Jr.

Edward D. Davis
CPT, FA
Adjutant
1st Bn, 39th FA
Fort Bragg, NC

You are correct, and I apologize for the error.—Ed.

Pershing brigade reorganization

Since my article "TACEVAL — Pershing's ARTEP," was published in the September-October 1982 *Journal,* the 56th Field Artillery Brigade (Pershing) and subordinate battalions have reorganized under new TOEs. Most significant was the activation of the 55th Maintenance Battalion. Beginning in August 1981 the service battery of each Pershing battalion became a forward support company (FSC) of the maintenance battalion. Additionally, the brigade headquarters aviation section and the 579th Ordnance Company were picked up on the TOE of the maintenance battalion, which has the mission of providing automotive, engineer, signal, and missile maintenance support plus most classes of supply support.

The headquarters and headquarters battery (HHB) of the Pershing battalions picked up the ammunition and security platoons from the old service batteries and is now designated the headquarters, headquarters and service battery (HHSB).

The 56th Field Artillery Brigade (Pershing) now has a headquarters battery, chemical detachment, and five subordinate battalions.

The Pershing brigade is a dynamic organization which will soon undergo another change to Pershing II. As time passes and classification allows, additional information on the conversion and fielding of Pershing II will be forwarded to the *Journal*.

Myron F. Curtis
LTC, FA
Commander
1st Bn, 41st FA
APO New York

Display materiel

In response to the "Hotline" request on page 7 of the September-October 1982 *Field Artillery Journal*, concerning sources of display materiel for armories and other organizations, the following information is submitted:

There are no artillery pieces or armored vehicles excess to the needs of the Army's museums. Neither is it likely that any will be available. Any such items which become excess to the needs of one Army museum are invariably required for use by another Army museum. It is possible that a military organization or armory may be able to obtain some sort of display item through some other organization (list available on request). These organizations might also be able to purchase something suitable for outside display, although large items suitable for outdoor display, whether originals or reproductions, are normally quite expensive.

Also, the information provided concerning the M1 155-mm guns is outdated, as the majority of these guns, which are located in Europe, have already been distributed. Those units in Europe seeking outside display pieces are advised to contact the Defense Property Disposal Region Office, Europe, at Lindsey Air Station, Germany; point of contact is Mr. Jahnke.

The Center of Military History will, upon request, provide a fact sheet and the list of military goods dealers discussed above. Point of contact is Dr. Norman Cary at AUTOVON 285-0311 or this address:

Dr. Norman M. Cary, Jr.
Curator, Museum Branch
Historical Services Division
US Army Center of Military History
Washington, DC 20314

Why not a FIST battery?

After three years of experience as a service battery commander and a maneuver battalion fire support officer, I have come to the conclusion that a direct support (DS) battalion of a separate infantry brigade (TOE 06-185H) needs a fire support team (FIST) battery in order to train more effectively and to combine the administrative functions of the headquarters and service batteries and the battalion S4 into a more reasonable organization of headquarters battery.

All fire support personnel, over 100 men, would be transferred from headquarters battery. The battalion motor officer would become the FIST battery commander, thus relieving any fire support officer of the command function. The service battery first sergeant and his battery mess, supply, and maintenance sections would comprise the headquarters section of the FIST battery.

The battalion S4 would become a pure coordinating staff officer responsible for battalion logistical operations. The battalion supply, maintenance, and ammunition sections would move to headquarters battery, forming supply and maintenance platoons. Under this scheme, no additional equipment or personnel would be required.

In peacetime, the FIST officers would focus their total attention on training their personnel and on developing a close working relationship with their respective maneuver units — all under the auspices of a battery administration which is responsive to their needs and is familiar with their training requirements. This responsiveness and familiarity is not always present in Reserve Component or Active Army units.

In combat, the fire support personnel would join their maneuver units. The FIST commander and his headquarters section would operate in either the battalion or brigade field trains, supporting organic battalion personnel located there. The commander would maintain personnel and property accountability through daily reports from the fire support coordinators.

With the headquarters and service batteries combined, all of the battalion's command, control and communication (C^3) elements would be in one unit. In the field, these units frequently

are collocated; so this change would not be a radical one. Under current doctrine, the unit's elements are divided between the field and combat trains locations. The battalion S1, S4, communications-electronics staff officer, executive officer, and maintenance officer would be available to supervise administrative/logistical operations, thus reducing the burden of the headquarters battery commander. With this unified organization, logistical functions should operate more smoothly.

Advantages of this proposal are:

•Requires no additional equipment or personnel.

•Permits more focused training of fire support personnel.

•Permits a net reduction in the size of the current headquarters battery, reducing the commander's span of control problems.

•Simplifies the functions of the battalion S4, making him a pure coordinating staff officer.

•Places all C^3 elements of the battalion in one battery.

Disadvantages are:

•Switches the responsibilities of command from the S4 to the motor officer. True, but it seems a fair tradeoff, especially in a Reserve Component unit.

•In combat, it would be difficult to maintain personnel and property accountability from the trains area. True, but no more difficult than for the headquarters battery commander under the existing TOE.

This reorganization would markedly improve the effectiveness of the fire support training conducted in a direct support battalion. Also, it would streamline an oversized headquarters battery and simplify the battalion's administrative/logistical operations.

Thomas M. Green
CPT, FA
2d Bn, 110th FA (MDARNG)
Pikesville, MD

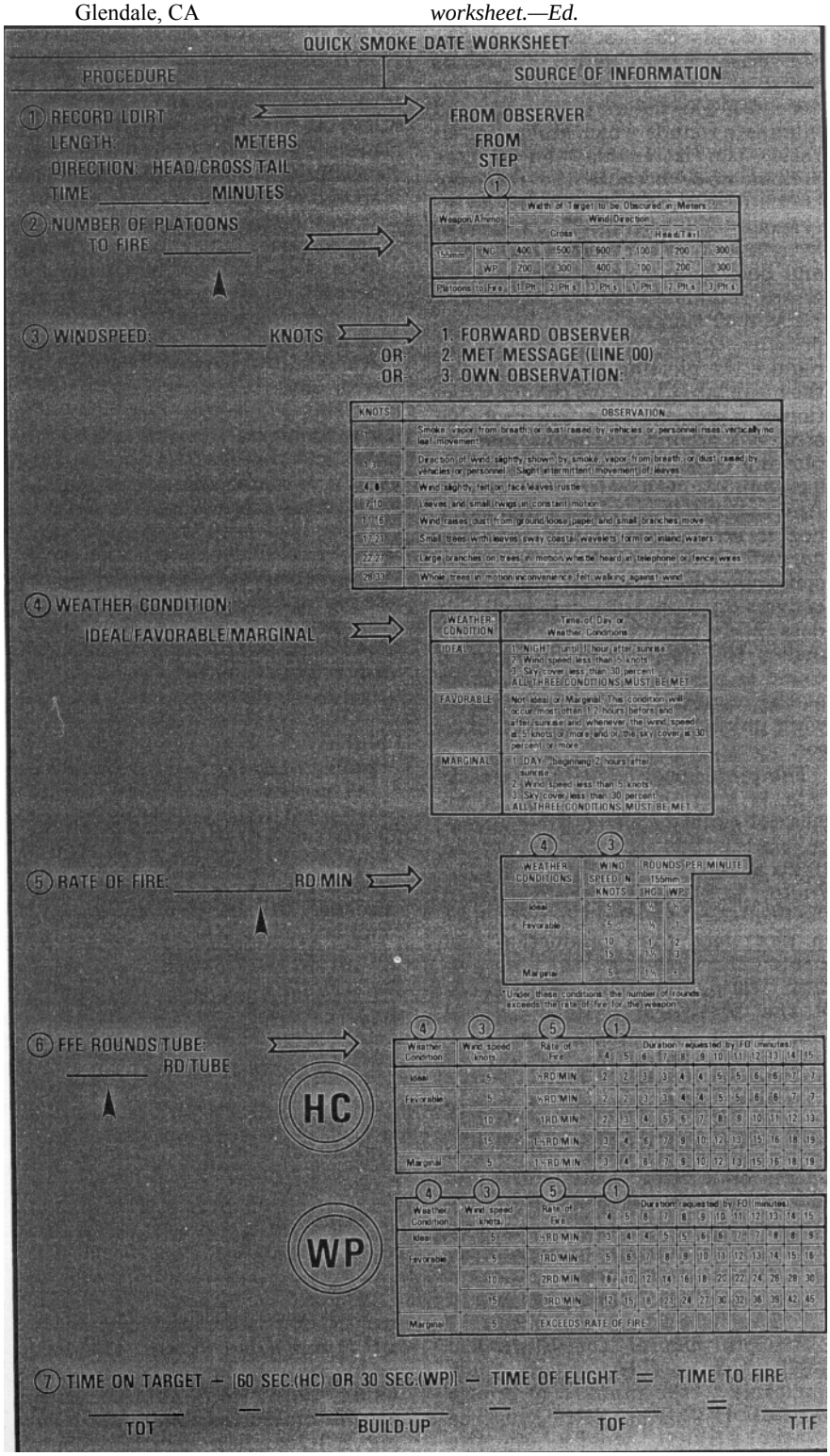
The continuing debate over how best to organize and train fire support teams (FISTs) is a reflection of our community's deep concern with providing quality fire support to supported maneuver units. In the July-August 1980 ***Journal,*** *MAJ Kenneth Owen proposed establishing a Fire Support Battery — he, like you, wanted to consolidate the headquarters and headquarters battery and the service battery to enhance administrative functions and to make room for a more effective peacetime fire support organization. Your recommendations are another useful view from the field.—Ed.*

Quick Smoke Data Worksheet

I am confident that the worksheet shown below can be particularly useful in Guard and Reserve units where training time is limited and turnover is high.

Neil D. Ferguson
2LT, FA
Glendale, CA

No doubt about it. The worksheet brings together all the required tables and orders them in a logical procedure for quick smoke. In addition to National Guard and Reserve unit FDCs, inexperienced Active Army FDCs could benefit from the worksheet.—Ed.



A quick test for erratic rounds

One of the major sources of error in high burst (HB)/mean point of impact (MPI) registrations is data from erratic rounds. Two types of errors are possible when one is dealing with erratic rounds: the first type of error is the wasteful elimination of rounds which are not truly erratic, and the second is the failure to identify and eliminate rounds which are in fact erratic. The latter may be a more serious error because the resulting contaminated data may cause an erroneous GFT setting. There is, however, a way to eliminate both errors and quickly and accurately identify erratic rounds.

FM 6-40 suggests a number of approaches to the problem; but they all require the plotting or calculation of the mean burst location, the construction of a plus-or-minus four probable error box around that point, and the plotting or calculation of the did-hit location of each suspected round. Any round falling outside that error box is erratic and should be disregarded. These procedures are time-consuming because they require the conversion of observer data to did-hit data. More often than not, the FDO makes the decision to disregard a round as erratic after merely looking at the numbers; and, this approach, while quicker, carries a high risk of error.

The problem of identifying erratic data is routinely addressed in industrial quality control. The pioneering work in this area was done in the 1920s at the Bell Laboratories by Dr. Walter A. Shewhart, who developed the Statistical Quality Control Chart to plot data from production and identify those readings which were erratic. During World War II, the use of the Statistical Quality Control Chart became very popular, especially by defense industries, but declined sharply after the war. In the mid-1950s, the Japanese industry used American consultants to implement Statistical Quality Control Charts on a wide basis; and these charts are still one of the key elements of the much-vaunted Japanese Quality Control System today. Since the mid-1970s the use of Control Charts has again been on the rise in American industry.

The principle of the Statistical Quality Control Chart is very much applicable to the problem of erratic rounds in HB/MPI registrations. The Control Chart works on the statistical concept of the standard deviation — virtually 99.73 percent of the observations of a given process can be expected to fall within plus or minus three standard deviations of the average (mean). Thus, these three standard deviations equate to the four probable errors of field artillery terminology. Probable errors for range, deflection, or height-of-burst are a function of quadrant elevation and are listed in table G of the appropriate firing table. But one can easily calculate a three-standard deviation spread of a group of observed rounds from the azimuths from either observation post (OP) or the vertical angle from O1, thereby eliminating the necessity of having to convert observer data into did-hit data for each suspected round in order to evaluate it against the four probable error box.

Using the control chart technique, one compares a suspected round to the ±3 standard deviation control limits of the remaining rounds. These statistical control limits strike the optimum balance between the probabilities associated with both types of error: unnecessary rejection or failure to reject. Three pieces of information are needed:

•The mean (average) of the remaining rounds — either azimuth or vertical angle (VA).

•The total spread between the highest reading and the lowest reading of the remaining rounds.

•The control chart factor, known in statistical tables as E2. The E2 factor (table 1) is a function of the number of remaining useable rounds. In most normal six round registrations, this number will be five; however, the number could be smaller in abbreviated registrations.

Table 1. E2 factor.

Number of remaining usable rounds	E2
2	2.660
3	1.772
4	1.457
5	1.290
6	1.184
7	1.109
8	1.054
9	1.010

One can test a suspect round by using data from the remaining useable rounds to compute the following ±3 standard deviation control limits: mean (average of) remaining useable rounds plus or minus the spread in remaining rounds times E2. If the suspected round falls outside the computed control limits, it is erratic and should be discarded.

The following three examples demonstrate the technique.

Example 1:

O1 AZ	VA	O2 AZ
625	+13	6381
627	+13	6380
624	+11	6382
623	+12	6380
634	+11	6379
626	+13	6378

Round number five may be erratic because of the azimuth from O1. The average O1 azimuth of the five remaining useable rounds is 625. The highest azimuth of the remaining useable rounds is 627 and the lowest azimuth is 623, yielding a spread of 4. The E2 factor for five rounds is 1.290. The control limits would be computed as follow:

$$625 \pm 4 \times 1.290 = 625 \pm 5.16$$

(5 rounded to the nearest whole mil)

Therefore, the high control limit would be 630 mils and the low control limit 620 mils. Since the O1 azimuth of round number five is 634, it falls outside these limits, is probably erratic, and should be discarded.

Example 2:

O1 AZ	VA	O2 AZ
538	+6	6186
539	+8	6181
542	+7	6186
544	+6	6189
540	+8	6188
543	+7	6192

Round number 2 may be erratic because of the azimuth from O2. The average azimuth from O2 of the five remaining useable rounds is 6188.2 mils. The spread between the high and low azimuths of the five remaining useable rounds is 6 mils.

$$6188.2 \pm (6 \times 1.290) = 6188.2 \pm 7.74$$

(8 rounded to the nearest whole mil)

Therefore, the high control limit would be 6196 and the low control limit 6180. Since the O2 azimuth of round number two is 6181 and falls within the computed control limits, it is not erratic and should not be discarded.

Example 3:

O1 AZ	VA	O2 AZ
6020	+4	4372
6019	–2	4376
6025	+1	4369
6023	–1	4373
6022	–2	4375
6023	–1	4371

Round number one may be erratic because of the vertical angle. The average VA of the five remaining useable rounds is –1. The remaining highest VA is +1 and the lowest VA is –2; so the total spread in the vertical angles of the five remaining useable rounds in 3 mils. The control limits are as follows:

$$-1 \pm (3 \times 1.290) = -1 \pm 3.87$$

(4 rounded to the nearest whole mil)

Therefore, the high control limit would be +3 mils and the low control limit –5 mils. Since the vertical angle of round number one is +4 mils, it falls outside the computed control limits, is probably erratic, and should be discarded.

The significant strengths of this technique are that it is based on the actual lot of ammunition and actual conditions of firing, that the technique is quick and easy to use, that it eliminates the risks of guessing, and that it provides the same level of probability pretection as plus or minus four probable errors. It is a fine instance of the applicability of industrial technique to a field artillery seeking to refine its flexibility and responsiveness.

David T. Zabecki
CPT, FA, (ARNG)
HHB, 2d Bn 123d FA
Rock Island, IL

Reserve Components commanders update

I would like to add my voice to those who have commented about the desirability of Reserve Components commanders being included in the periodic "Commanders Update" published in the *Journal*.

During visits to Fort Sill, we are told that the Reserve Component comprise more than 50 percent of the US Army Field Artillery and also a large percentage of the Field Artillery Association; yet, our commanders are not indicated in your publication, which is the recognized voice of the Field Artillery. Reserve Components commanders generally serve longer in their positions than those of the Active Component, therefore requiring less updating.

In addition, photographs of Active Component commanders are prominently displayed in Snow Hall. Would it not be possible to include the Reserve Components commanders there? With some minor space reorganization, the Reserve Components commanders (at least at the 0-6 level) could be recognized at the Field Artillery Center. This would not only recognize the individuals involved, but would also further demonstrate the "total force" concept.

Anthony P. Vozzella
LTC, FA (MAARNG)
Executive Officer
26th (Yankee) Infantry
Division Artillery
Rehoboth, MA

Your points are well taken, and many before you have expressed the same opinion. Fortunately, I can report some real progress. Plans for a Snow Hall display of the photographs of Reserve Components field artillery commanders are well under way, and the target date for completion of the project is 1 February 1983. I am also pleased to announce that commencing with this issue, a yearly listing of these commanders will appear in the January-February ***Journal****.—Ed.*

Gun, not howitzer

Because I am a history oriented reader, I was pleased to see CPT Donald Klinger's historical article on the Field Artillery Board in the September-October 1982 issue of the *FA Journal*. I would like to make a correction to the picture on the top right-hand side of page 15. The self-propelled gun illustrated is a T93 gun motor carriage mounting an 8-inch gun M1. It is not an 8-inch howitzer. Two T93s were built in early 1945 utilizing a heavily modified M26 heavy tank chassis. At the same time five T92 howitzer motor carriages also using the same chassis were built mounting a 240-mm howitzer M1. It was found that the guns overloaded the chassis and that there was not sufficient interest in the projects; so further development was stopped at the end of World War II. The complete story may be found in R.P. Hunnicutt's book, *Pershing — A History of the Medium Tank T-20*.

Peter A. Franden
Silver Springs, MD

Filling white phosphorus projectiles

As a Canadian master gunner, I am presently employed as a trials officer in a Canadian Defense Research Establishment. Due to my background and training, I am often asked questions by field gunners about equipment and ammunition problems. One of the most frequent questions asked is how are white phosphorus projectiles filled.

I am aware that this was once conducted in a water-dominated environment which excluded the presence of oxygen. Surely, methods have changed and are more modern, safe, and efficient.

Within the bounds of prevailing security classifications, could you help me with the required information?

W. Fairbanks
MWO (Mr Gnr)
Armaments Division
Defence Research
Establishment Valcartier
Courcelette, Quebec

The School's Weapons Department advises that the information you require concerning filling of white phosphorus rounds can be obtained by writing:

Commander/Director
Chemical Systems Labs
ATTN: DRDAR-CLN-SE
Mr. Charles Ferrett or
Mr. Jim McKivrigan
Aberdeen Proving Ground,
MD 21010

These people are the experts in this field and should be able to answer your question.—Ed.

Reunions

8th Infantry Division Artillery, Germany — 17-19 June 1983 in Nashville, TN. Contact J. W. Burwell, 104 E. Navajo, W. Lafayette, IN 47906.

278th Field Artillery Battalion Association — 5-8 May 1983 at the Quality Inn, Carlisle, PA. All former members of the battalion are welcome. For more information contact William N. Widmer, Lake Shore Drive, Pennsburg M.R. #1, PA 18073.

More on the missing charge 5WB sticks

On page 5 of the September-October 1982 *Field Artillery Journal,* 1LT Alma and 2LT Peaslee of the 1-27th FA discussed the problems caused by the lack of charge White Bag (WB) Graphical Firing Tables (GFTs).

I first became aware of these problems a few months after I was assigned as the battalion fire direction officer for the 2-35th Field Artillery. The absence of charge 5WB GFTs, which was never addressed in my Field Artillery Officer Basic and Advanced Courses and was never a problem in my M102 howitzer battalion, had me spending nearly a day trying to find NSN numbers to order them. There were no officers in my current M109 battalion who were comfortable with using a charge 5 Green Bag (GB) GFT to fire charge 5WB, but two battery chief computers taught me how to apply a cold-stick charge 5WB GFT setting using the tabular firing table (TFT) and the charge 5GB GFT setting obtained from a registration or meteorological plus velocity error (VE) computation. The Gunnery Department at Fort Sill informed me that this procedure was acceptable.

In the next battalion field training exercise (FTX), I registered with 5WB and transferred the GFT settings. Since the FADAC was not operational, the battery fire direction centers (FDCs) updated GFT settings with a met plus VE. While comparing the old and new GFT settings for all three batteries, I noticed large discrepancies between the elevation and time gagelines, and discovered that the common error was in the determination of the adjusted elevation.

FM 6-40, *Field Artillery Cannon Gunnery,* paragraph 6-12(1)3, instructs the computer to add the total range correction to the chart range and then set the GFT manufacturer's hairline (MHL) over this range to determine an adjusted elevation. When working with 5WB data on a 5GB GFT, however, the computer must enter the charge 5WB section of the TFT, table F, with the sum of the chart range plus total range correction and interpolate to find the correct adjusted elevation and corresponding time. This crucial step does not appear in FM 6-40; and if it is not followed, large errors result. At a range of 7,000 meters, discrepancy in adjusted elevation is 22 mils and the error is 320 meters. The range errors for 8-inch howitzers are even greater, approaching 600 meters when the range to targets is around 10,000 meters.

The editor's reply to Almay and Peaslee did not completely explain the lack of charge 5WB sticks. Perhaps the Gunnery Department believes that artillery units rarely fire charge 5WB; but, if a higher WB charge cannot be used, charge 5GB is a more logical choice. Perhaps they also feel that there would be great confusion if both charge 5GB and 5WB sticks were available. There is also a popular misconception that few FDCs compute firing data manually in a world of FADAC, TACFIRE, and hand-held calculators, and that the handful of instances where charge 5WB would be manually computed do not justify the production costs of charge 5WB GFTs. However, my experience indicates that the computation of charge 5WB firing data is a common occurrence during peacetime in the Active and National Guard units in Georgia.

At Fort Stewart, for example, all the firing points approved for charges 6 and 7 are west of a Georgia State Highway over which local regulations preclude firing time or variable time fuzes. When I recently took my firing battery to the field, I was issued a preponderance of WB propellants and time fuzes and thus was forced to fire charge 5WB. My battalion's ammunition allocation last year was 3,300 WB and only 1,100 GB, an imbalance resulting in many instances when charge 5WB was the only choice. This past summer, I helped evaluate three National Guard battalions which had to fire charge 5WB manually. Most FDCs obtained their data straight out of the TFT, although three or four were able to transfer a cold stick GFT setting from the TFT to the charge 5GB stick and one was able to apply a GFT setting derived from a registration. None of the battery or battalion FDCs could properly compute the subsequent met data for the charge 5WB.

Numerous charge 5WB rounds may be going downrange with 300 to 600 meter errors since the crucial alteration to FM 6-40 manual computation procedures is not well known. The best solution would be to produce WB GFTs for charges 3, 4, and 5. If this is not feasible, officer and enlisted training courses at Fort Sill should address the proper procedures for using a charge 5GB GFT for a charge 5WB. Additions to FM 6-40 and exposure in the *Field Artillery Journal* would help spread the word on this problem and its short term solution.

Daniel P. Doede
CPT, FA
A Btry, 2d Bn, 35th FA
Fort Stewart, GA

Your solution for the determination of adjusted elevation is a correct one. The white bag TFT must be used to determine this value during any subsequent met GFT setting update. The lack of GFTs for the lower zones of white bag has prompted the discussion of the use of green bag GFTs for the lower white bag charges in the revised FM 6-40 (this revision should appear in fourth quarter of FY83). Additionally, the Field Artillery Officers Advanced Course now teaches the proper gunnery procedures for this situation. The Gunnery Department's position is that green bag GFTs can ***only*** *be used to fire white bag data when a valid white bag GFT setting has been correctly applied for the appropriate charge. The GFT setting must be determined by firing a registration with that charge and then updating the GFT setting using the appropriate data for the white bag charge from the TFT or derived from a computer solution (FADAC, TACFIRE, or BCS). Until the solution to the subsequent met problem in FM 6-40 is updated, the Gunnery Department strongly suggests following the sample met plus VE problems in the introduction section of the TFT when determining adjusted elevation and adjusted fuze setting.—Ed.*

Accurate Artillery

We in the 7th Infantry Division Artillery have a saying that "we do it right the first time." Your September- October 1982 issue carried two bits of information about the 1-79th Field Artillery, and you got it right neither time! On page 36, the commander of the 1-79th FA should be LTC Morris J. Boyd. On page 47, the author of the "Historical MILPERCEN Site" article, CPT Peter C. Eisen, is assigned to the 1-79th FA, not the 1-97th FA. Let's do it right the next time!!!

Accurate Artillery,
The Officers and Soldiers
of the 1st Battalion,
79th Field Artillery

The Accurate Artillerymen of the 1-79th FA have eyes as sharp as a laser beam — except for page numbers. CPT Eisen's assignment appears on page 45, not page 47. Oh well, to err is human.—Ed.