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to Capt. Harkithorn
10/29/44*

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HEADQUARTERS
303RD TANK DESTROYER BATTALION
APO 230

WES/jgd

27 October 1944.

SUBJECT: Tank Destroyer M-36.

TO: : Artillery Officer, First United States Army,
APO 230.
(Attention: Tank Destroyer Liaison Officer.)

1. During the month of October, this battalion received the M-36 with its 90mm gun--first, 18 vehicles, then 14, and finally the remaining 4. Since it is believed that other T.D. Bns will receive this vehicle, our experiences to date are submitted for their benefit. Unfortunately, we have not as yet fired at any tanks with the 90mm. The only direct fire done to date was done against a stone house and a suspected pill box. Results are unknown as yet.

2. Due to a plentiful ammunition allowance, this unit has been firing the 90mm gun on the secondary mission for the past month.

In preparation for firing indirect, no problems, other than those allied to the M-10, were anticipated. However, from the initial laying of the pieces to observation of the rounds, new problems have developed. Solutions to these problems for the most part have been mastered, and with addition of the Panoramic Telescope M2A4, to the fire control equipment, of the gun--a more satisfactory efficient weapon would result.

3. The fire control equipment issued with the M-36 are M-76D or M-76F or M-70P with instrument light M-35; Elevation quadrant M-9 with light; Gunner quadrant, M-1; Azimuth Indicator, with light; and two aiming stakes with lights. All three telescopic sights are suitable.

4. Mechanical abilities of the gun and mount are: Elevation to twenty-five (25) degrees and depression to ten (10) degrees, with the hull at level. This elevation expressed in range equals, 16,500 yards w/Shell HE M71 w/fuze BD M48. The maximum range of this combination of gun and shell is 19,000 yards at a quadrant elevation of forty-three (43) degrees. To fully exploit the range of the gun it becomes necessary to "elevate the hull" eighteen (18) degrees.

To attain the required hull elevation, we chose positions for the guns at the foot of a hill with approximately the required slope, thus making easier work for the crews in preparation of the position. In positions where the terrain is level, the vehicle can be dug in with the required slope.

The cant correction, must be applied for all targets to ensure greater accuracy, this is especially true of unobserved missions.

5. As with the 3" Gun, the flat trajectory of this weapon creates problems to observation. More often than not, the minimum range line, is at quite a great distance from the OP. Since there is no smoke shell, and the burst is difficult to observe at increased ranges, it is often necessary to employ time fire for initial registration, or at least for orientation until the deflection is approximately correct from estimation.

The 90mm shell, HE, M-71, is issued with fuze, time, mechanical, M-43A3. This fuze has graduations from zero to 30 seconds with .2 second graduations. A thirty-second time of flight expressed in range, equals 13,000 yards. The base point range should not exceed 13,000 yards, therefore, to attain good results with this method. The observer calls for BP registration with air salvo. The guns fire at base point range, with corresponding time of flight set on fuze, but with a five mil increase in quadrant elevation. These air bursts are easily observed and sensings are given to correct deflection differences and to move the burst to the ground. As the burst nears the ground the observer calls for impact, assured of knowing where these rounds will hit on the ground.

In addition to the M-43A3 time fuze, there are available two other models. The M-54 time fuze with a twenty-five (25) second time of flight is well known to most 3" crews. Both the M43A3 and the M-54 are satisfactory for the 90mm shell M-71 and there is no appreciable change in ballistics from the M-48 PD fuze. The other fuze is the M-67 with a seventy-five (75) second delay. This model is believed to be inaccurate, with faulty time element and unsatisfactory for our purposes.

After registration on BP, various check points must be registered on to exploit all possibilities of accuracy on the limits of range and deflection shifts.

At present the terrain does not provide close up OP's but when weather is favorable observers at 6 - 8,000 yards will allow good registration with time fire and the telescope M49.

We have tried registration by Air OP's with little success. These tests were not exhaustive and it is believed that air OP's will be satisfactory in many situations. Time fire was not exploited in air OP's and smoke shell is not available for this gun.

6. There are no communication problems, other than those normally experienced. Wire requires constant patrolling and maintenance teams constantly employed.

Wire nets run from Bn switchboard down to Co PDC's and from there to the guns. They run up to Div Arty by direct line and in addition we have communication with Div Arty, through subordinate switchboards.

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In addition there is wire from the OP to a radio with which there is contact to all Co FDC's on Bn Command Channel. Observed missions are normally adjusted by radio. We have a 510 Series radio on Div Arty Net in the S-3 vehicle. This set is utilized on all air OP's and when the wire communication is temporarily out. When the 510 is used, messages must be relayed to BDC's by 610 sets, also located in the same vehicle.

In order to provide rapid communication from Div Arty to FDC's the lines were simplexed through the Bn switchboard.

7. Company FDC is employed with no changes from the former routine. 90mm Graphical Firing Tables are available for converting the computers slide-rule.

Fire control is established at Bn CP. All interdictory and harassing missions are received from Div Arty and pro-rated to the various platoons. Counterbattery and T.O.T. targets are called direct to the Co FDC who report all such missions fired during the twelve hour period ending at 0600 and 1800.

8. Ammunition capacity was originally rated at 47 rounds on the vehicle, but removing the rounds from their fiber containers enables us to put 12 rounds in each of 4 sponsons, and 11 rounds in the counterweight compartment, totalling 59 rounds. We plan 60 rounds actually, the extra round to go in the chamber with the breechlock obstructed to keep it from closing, or to go in one of the 4 sponsons. 16 rounds per gun on the Bn Ammo trucks totals 76 rounds per gun as our combat load, 50% HE and 50% APCM82.

All APC ammo is BDF as well. This is the ammo that has greater penetrating qualities, two inches more at all ranges than the regular AP shot. Although our vehicles came originally with the AP and no APC, we traded all the AP for APC. 90mm HVAP is being currently tested in the U.S., but it is doubtful if it will be available in this theater for this war.

9. Tube life of this gun is rated at 900 rounds of HE. For this reason the total number of rounds fired from any given gun has been limited to 500 maximum for the time being.

10. Two modifications are desirable in the carriage. The first is to cut the .50 cal mount from the rear of the counterweight and weld it on the left front corner of the turret. This modification is near completion in this unit at the present time. The other is to replace the azimuth indicator by the panoramic telescope M-12A4. This would eliminate all cant errors and make the gun more suitable for accurate long range missions.

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11.2 Recommend a WP smoke shell be made available. This shell would save a countless number of "lost" rounds and greatly reduce the problems of air observation.

1. Recommend that a time fuze with at least sixty (60) seconds delay be developed that would retain the accuracy and ballistic characteristics of the m-43A3 fuze.

W. E. Showalter
W. E. SHOWALTER,
Lt Col, 703rd TD Bn,
Commanding.

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