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SIGHT CHOICE ON THE MK19 40 mm AGL

The key input to a sight choice for this powerful weapon is its muzzle velocity which is sub-sonic. So it needs considerable elevation (525 mils at 2000 metres) and has a long time of flight (18 seconds at 2000 metres).

At the longer ranges the angle of descent is considerable (at 2000 metres it is nearly 900 mils or 45°) so an error in range means that the fall of shot misses a target even if it has height.

Also the effect of wind is considerable. A ten kilometre per hour crosswind (often experienced) will blow the fall of shot off by 25 metres at 2000 range outside the effective burst radius of the grenade.

The cumulative efect of these two (let alone other contributions to the error budget) menas that a sighting system must either predict the correct elevation and line or must make it easy for the gunner to correct the fall of shot by observation (or preferably both).

In modern war the sighting system must be usable by night as well as by day. So some form of image intensification must be included.

And the overall conduct of an engagement (and a cycle of engagements) must be considered. Target acquisition, recognition, range determination and decision to engage all have to be done before actually firing. Decision is also needed on the type and number of rounds to be fired. All this ends up with an order to fire being given to the gunner. The overall engagement cycle must be considered if a number of targets are to be engaged in quick succession.

So far in this note it has been a ssumed that direct fire will be used. There is no reason why indirect fire should not be employed to engage targets behind a crest. So this should be taken into account when choosing a sighting system.

Open sights are clearly out of the question; they fail at burst on target correction of fire and on night use.

Computer sights provide, if the inputs are correct, excellent elevation and line for hitting the target. But, if the inputs are wrong or change during the time of flight, the target will be missed. And to do burst on target to correct the strike the sight's computation must be interrupted. To get it going again may take time which means that engagement of the next target is delayed. It is worth determining how long a computer sight takes to move from one target to another. Such sights ordinarily use a ring or cross aiming mark with the elevation set (maybe automatically by laser rangefinder). If the sight has magnification of any magnitude, the field of view will be reduced (anything over about x3 cannot have enough field of view to have 525 mils in it). A conventional telescopic or image intensification sight has an exit pupil to suit the eye – say 7 mm. This is too small to use with Night Vision Goggles which have an entrance pupil of some 22 mm. So an alternative image intensification system

must be added or substituted and searching for, and acquiring, the target must be done by moving the weapon.

Unit power sights like Ring Sight WC-30 can be designed to have a range graticule (which also incorporates drift) out to 2000 metres, the maximum worthwhile range. The gunner chooses an aim point to suit the range, the wind and the target movement. He fires a burst (or even one round) and uses burst on target to correct fire. He should hit with the next burst (if he didn't with the first). He can engage a series of targets quickly, whatever their ranges, using his observations to improve the starting aim points.

The graticule has lines to help with laying off for lead on moving targets.

At night he puts on NVG; the aperture of the WC-30 is larger than that of the NVG so no trouble. He can search for, and acquire, a target with the NVG independently of the weapon. The WC-30 has stadia lines to help with range estimation at shorter ranges if a laser rangefinder is not available. But if one is, it is best used by the launcher commander who will search for, acquire and recognise targets deciding which are to be engaged. He also measures the range with a laser rangefinder (this may need skill to use since a good reflection may not always be available from a target). He then gives a fire order to the gunner including the range. Engagement of a series of targets will be speeded up by this.

In due course of time thermal goggles will become available. Ring Sight WC-30 can then be fitted with an external thermal graticule providing the same elevation scale as the present sight and zeroed to it.

Robustness in use should be considered. Optical systems filled with dry nitrogen need regular maintenance or they mist up or grow fungus. The WC-30, being solid glass, needs none of this. Computer sights need power to work so need a back up (Ring Sight LC-15-90 can provide this). The WC-30 needs no power to work by day; if its night illumination fails, a hand torch can be used instead to light the graticule. The WC-30 has no moving parts which adds to its reliability.

Finally the costs must be considered. Ring Sight WC-30 is about one tenth of the initial cost of a computer sight, needs little maintenance and is likely to achieve a shorter time for engagement of a series of targets by day and night. And, if indirect fire is required, there are proposals to provide this with the WC-30.

A last thought; a computer sight does it all itself – the gunner has no choice. The Ring Sight enables the gunner to do it himself improving his performance by observation and correction of fire.