Transforming precision targeting on the modern battlefield: Instro Precision's Viper family

High precision Target Acquisition Systems (TAS), namely those capable of generating ten figure grid references within NATO CAT-I/II (under 6m and 15m circular error probable respectively), have been stalwarts in the arsenal of Forward Observers (FOs), Joint Terminal Attack Controllers (JTACs) and Tactical Air Control Parties (TACPs) since the advent of precision GPS/INS guided munitions. Put simply, precision GPS/INS guided munitions are only as "precise" as the co-ordinates provided to them; in most instances standard operating procedures will preclude their use unless a verified CAT-I/II grid (determining weapon type and delivered effect) has been generated.

Now, some 30 years on from the introduction of GPS/INS guided munitions, the need for high precision TAS systems for dismounted soldiers has never been greater. Whilst previous conflicts in Afghanistan and Iraq saw air assets enjoying the freedom to conduct most target acquisition activities organically, NATO and other forces globally are reconfiguring to a battlespace whereby air assets are forced to minimise their time on target and operate, where possible, beyond or beneath air defence threats. Combined with the introduction of surface-to-surface precision fires, the onus has shifted to the dismounted soldier to find and fix high value targets through handheld sensors integrated with a TAS capability.

VIPER-LW CAT-I/II Capable Target Acquisition System

Whilst the requirement for achieving consistent CAT-I/II capable performance remains as non-negotiable as it did in the past, end users are seeking to capitalise upon the benefits of modern technological advancement in the means to achieve it. Naturally, the pressing need to achieve the same performance in ever decreasing size, weight and power form factors is significant. Modern handheld target locators, ranging from pocket direct view optic laser range finders to more complex handheld thermal imagers offering 24/7 targeting capabilities have reduced significantly in size; their TAS componentry counterparts must therefore follow suit. Furthermore, operators utilising these target locators now face a far greater threat of detection. An increasingly "transparent" battle-space saturated with sensors alongside advanced capabilities such as laser warning systems require users to consider survivability as of equal importance to precision. The challenge has therefore been set: how can the modern dismounted soldier consistently achieve CAT-I/II co-ordinate generation in the lightest form-factor possible, under all conditions, whilst maximising operator survivability?

Introducing the Viper TAS Family

Leveraging over 30 years' experience in serving the dismounted TAS market, with hundreds of systems fielded globally, Instro Precision is proud to introduce its latest generation of precision targeting capabilities that address the challenges of the modern battlespace. These new offerings represent a step change in capability, but maintain Instro's core TAS design philosophy principles:

1. **Sensor Agnosticism -** The Viper family is sensor agnostic. Instro maintains close relationships with popular target locator manufacturers including FLIR, Thales, Newcon Optik, Safran and others; should preferred target locator devices exist in the end user's inventory, they can be integrated and utilised with all Viper configurations.
2. **Modularity -** No two missions are the same and not all user groups have identical requirements. The Viper Family therefore offers flexibility through modularity, allowing users to adapt to mission specific needs.
3. **Rugged and Repeatable Precision -** Instro's brand reputation is founded on uncompromising adherence to reliability in the field alongside unmatched, consistently achieved precision. The Viper family delivers both.

Viper LW (Light Weight)
Viper LW, as the name suggests, sets a new standard in TAS size weight and power, without compromising CAT-I/II performance. Achieving this stems from three key technological innovations: Digital Meerkat, iFires (TAS Software) and ERMOS NG (North-finding/Orientation).

Digital Meerkat
Digital Meerkat (DMK), serving as the system's combined tripod and positioner, sits at the heart of VIPER-LW. Through the incorporation of a miniaturised encoder into the widely fielded Meerkat Fine Adjust tripod, users can achieve angular measurement to within 0.1 milliradians in an all up weight of under 1.25kg. Compared to traditional peer capabilities, this represents a weight saving to the user of between 2-3kg.

iFires
iFires is Instro's TAS software, which has benefited from years of spiral development in line with evolving operator needs. Hosted on ruggedised end user devices of choice, iFires has the means to self-locate and precision orientate through known points, as well as celestial (sun, moon and stars) in GPS/GNSS denied conditions. Therefore, with nothing more than an in-service target locator, DMK and iFires (the baseline VIPER-LW configuration), users can achieve consistent CAT-I/II target generation in a system that weighs as little as 2.5kg. Generated targets can then be visualised and disseminated either on iFires integral mapping; its TAK interface or through the user's battle management system (BMS).

ERMOS NG
The VIPER-LW baseline configuration does have its limitations, noting that orientation through known points or celestial means is not always guaranteed. For operators that require an "anytime, anywhere" CAT-I/II targeting capability, a gyroscopic north-finder is required. Traditionally, such capabilities are significant weight and cost drivers of TAS. Through a highly innovative approach utilising non-traditional, high fidelity gyroscopic technology, Instro has developed the ERMOS NG orientation module, replacing its fibre-optic gyro ERMOS predecessor. Not only is ERMOS NG lighter, but it is significantly more affordable, thus lowering the cost barrier to those users desiring the ability to achieve precision target generation under all conditions.

VIPER-RC (Remote Controlled)
Recognising that operators of TAS capabilities often function in extremely high threat environments, Instro has developed VIPER-RC to complement its manual counterpart. In this configuration, the iFires TAS software and optional gyroscopic orientation module are integrated with Instro's latest innovation in the dismounted solider targeting space: the Meerkat-M. Combining a compact motorised head with integral carbon fibre tripod legs, Meerkat-M weighs a mere 2.5kg with a payload capacity of 6kg. The complete TAS capability can be operated remotely utilising wired cable, including fibre optic, or secure wireless RF communication

Digital Meerkat (DMK) with iFires hosted on a ruggedised tablet end user device

links. This flexible connectivity approach offers the user choice in defining their proximity to system, as well as the option to transmit live sensor feeds direct to Command & Fires Cells to inform overall situational awareness and enhance rapid decision making, targeting, and weapon to target matching, at all echelons.

Complementing Target Acquisition with Laser Terminal Guidance
Whilst a "drop on coordinate" approach to kinetic strike is one means of achieving precision guidance, the advent and proliferation of semi active laser (SAL) guided munitions offer enhanced capability, especially when engaging moving targets. Again, similar to their GPS/INS counterparts, traditional air delivery is now being complemented by surface-to-surface capabilities including SAL guided artillery shells and vehicle or tripod mounted 70mm (2.75in) rockets. For users employing such munitions, Instro offers a lightweight, bore-sightable dual interface compatible with all VIPER configurations, allowing users to co-mount their laser target designator (LTD) of choice alongside the target locator to deliver a complete targeting system. Successful integrations include Elbit's Rattler XR and Leonardo's Type 163 designators.

The Way Forward
These additions to VIPER TAS family are a direct result of listening to, and acting upon, end user feedback and lessons learned as to what modern targeting systems need to deliver to those operating them. Instro is now in the process of engaging with global user communities and target locator manufacturers to ensure this capability ends up in the hands of those who need it the most.

Where precision is demanded, Instro delivers. ■

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