Imago Miss Distance
System Specification

Standard Configuration

The IMAGO Miss Distance System is a complete turnkey system; all the hardware and software required for a standard miss distance scenario are provided in this package. It consists of two IMAGO Video Target Trackers, a Miss Distance computer and digital recording and analysis tools.

This system measures the miss distance between a projectile such as a missile or a burst of gun rounds and a target vehicle such as a remotely piloted drone. The distance is determined by analysing the images of the encounter from the two trackers, and using triangulation to determine the relative trajectories of the projectile and target vehicle. The miss distance is defined as the minimum separation between the two bodies.

The IMAGO Miss Distance System is designed as a replacement for on-board miss distance indicators. Although it may initially cost more than an on-board system, the operating cost can be considerably less since no hardware is lost when the target is destroyed by a hit. The IMAGO system has the further advantages that it can provide information such as the relative trajectories of the target and missile, the position of the intercept, and video images of the intercept.

The trackers can be used to track either the projectile or the target vehicle; the other body will be seen in the image during the encounter, but will not actually be tracked.

The standard system can use the IMAGO Flight Analysis System to digitally record, playback and analyse the recorded images.

The miss distance calculation is done after the encounter (post-processing) and can be done either after each encounter or in batches after a number of encounters. The choice depends on the time available between encounters for analysis, and the need for immediate results

If the complete trajectory for both the target and the projectile are required, then the customer can use two Miss Distance Systems; one system to measure the trajectory of the target, and the second to measure the trajectory of the projectile. If two Miss Distance Systems are used then the miss distance can be calculated in real time and for scenarios where the target and projectile never appear in the same field of view.

Range to target (m)	Accuracy (m) 200m baseline	Range to target (m)	Accuracy (m) 2000m baseline
1000	0.2	**If the baseline is widened to 2000m, the miss distance accuracy at long range is improved.**	
2000	0.6		
3000	1.3	3000	0.3
4000	2.3	4000	0.4
5000	3.5	5000	0.5

Accuracy - The accuracy depends on the scenario, in particular:
- The accuracy increases with the separation of the trackers.
- The accuracy decreases as the angle between the target vehicle flight path and the tracker line-of-sight increases.

At a Navy gun trial on a fixed target at 1.2 km range where the tracker separation was 20 m, and 1 m lenses were used, a 57 mm projectile was tracked and its miss distance from the target was determined. The results were compared with measurements from a witness board, the accuracy was found to be about 0.1 m.

Technical Specifications

IMAGO XG Tracking Software
Please refer to the IMAGO XG Technical Specification.

Options

Cueing
Acquiring the target for tracking can be one of the most difficult parts of the miss distance operation. The IMAGO Binocular Cueing System, which consists of lightweight instrumented binoculars, can be used for this task. A spotter aims the binoculars at the tracking target; the tracker operator then slaves the tracker to the binoculars to acquire the target. A single binocular cueing system can be used for two trackers, provided that the acquisition range is sufficient to avoid parallax problems.

The system can also be cued from radar data or other position information if it is available. IMAGO can supply interfaces to radars and to telemetry from on-board position systems.

Wireless Data Link
For some scenarios it is necessary to have the two trackers separated by distances that cannot easily be bridged by cables. In this case a wireless link is required. IMAGO can configure the system to have video and a two-way data link between the sites. In this configuration the second tracker is run from the main site, no operators are required at the second site.

Infrared Imagers
To improve tracking performance or for night trials an IR imager is required.

Other Options
Other options that are available are:

1. Real-time miss distance system calculation.
2. Automated post process. The system will automatically step through the series of images, locating the projectile and target on each, and display the expected time of the frame

Hardware Required

The IMAGO Miss Distance System is complete turnkey system. IMAGO provides all the hardware required including:

- All tracking and analysis software.
- Flight Analysis System.
- Two Pan/tilt heads. Alternate Pan/tilts are also available.
- Three industrial grade rack mount computers with LCD monitors; Smaller laptop style PCs are also available.
- Two heavy-duty tripods.
- Four progressive scan video cameras equipped with appropriate lenses
- Cabling for up to 100m.
- Ruggedized Transport Cases, suitably equipped with rack mounts

PROPRIETARY NOTICE

IMAGO TRACKERS

ABOUT IMAGO

IMAGO has been building low-cost, high-performance video target tracking systems since 1987. IMAGO's video trackers are software based, can be easily updated, and are designed to use commercial-off-the-shelf hardware.

IMAGO's earlier sales were for standalone video trackers but as our technology advanced, IMAGO has been able to offer higher levels of sophistication. The addition of laser-rangefinders, multiple tracker triangulation systems and automatic cueing from other sensors has increased the level of accuracy and automation.

Our tracking systems are used both by private enterprise and defence groups around the world.

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