Combat Identification Technology

Outlook

- Combat Identification Technology program funding will be maintained well into the foreseeable future

- Non-cooperative ID subprojects Passive RF ID Environment (PRIDE), Hydra Vision/Air-to-Air, and Laser Vision will receive the most funding

- CID Database Development is the newest subproject; it began work in FY20

Funding Forecast 2024-2033

	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
US$M	22.30	25.86	26.44	26.96	26.89	27.04	27.31	27.54	27.75	28.00

Orientation

Description. The U.S. Air Force's Combat Identification (CID) Technology program analyzes, develops, and tests target identification technologies. Both cooperative and non-cooperative technologies are encompassed within the program, with the capability to positively identify in air-to-air, air-to-ground, and air-to-surface scenarios.

Sponsor

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Status. Ongoing research and development.

Application. The CID Technology program's activities are in service of U.S. Air Force platforms and installations.

Contractors

The Combat Identification Technology program includes numerous subcontractors, funded for their expertise in various sub-specialties in CID research and development. As of 2021, some of the contractors associated with the program include: BAE, Infoscitex, Integrated Applications Inc, Matrix Research, MITRE, Northrop Grumman, Systems and Technology Research, the University of Oklahoma, and Wright State Research.

Contractor(s) not selected or not disclosed.

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BAE Systems' APX-113, APX-125, and APX-126 are
examples of Cooperative IFF Identification systems.

Source: BAE Systems

Technical Data

For air forces, the need to effectively identify enemy, friendly, and neutral aircraft; battlefield equipment; and personnel is crucial. The U.S. Air Force's Combat Identification Technology program seeks to enhance identification capabilities through development, testing, and implementation of domestic and international standard CID techniques.

As the Combat Identification Technology program consists entirely of RDT&E efforts and has no directly associated equipment, technical data is not provided with this report.

Program Review

The following is an overview of the Combat Identification Technology program's current activities, which are organized under two projects: Project 642597, Non-Cooperative Identification Subsystems; and Project 642599, Cooperative Identification Techniques.

Project 642597: Non-Cooperative Identification Subsystems

The Non-Cooperative Identification Subsystems project analyzes and supports a number of sensing and signal processing techniques to identify air, ground, or surface platforms. This project's activities concern planning and execution for both current and future programs.

As of FY21, the Non-Cooperative Identification Subsystems project encompassed seven subprojects: Compact AiTR (Aided Target Recognition); Hydra Vision / Air to Air; Kill-Chain Weapon Integrated (KWIC); Laser Vision; Passive RF ID Environment (PRIDE); Radio ID (RID); and Studies. The largest three of these are examined more closely below.

1. Hydra Vision/Air to Air. Hydra Vision is a multisensor enhanced ID system, providing an

amalgamated product of sensor data from multiple sources for higher confidence of CID. The Non-Cooperative Identification Subsystems project includes both air-to-air and air-to-ground Hydra Vision subprojects, with the air-to-air component being the second-most expensive subproject.

In FY18, the Hydra Vision/Air to Air subproject investigated phenomenology such as IRST (infrared search and track) and laser radar, evaluated and selected technology suitable for Air Target ID inclusion, and investigated the potential for implementing Air-to-Air Hydra Vision techniques on ISR platforms. In FY19, Hydra Vision/Air to Air downselected from FY18's identified phenomenology, refined promising solutions, adapted algorithms, and generated models and databases.

In FY20, the subproject continued to generate models and update database information while examining flight demonstrations of technology development. FY21's plans included integrating "(M2L) 3DTO and VAMP" into a new, more capable package. FY22 plans will be implementing and demonstrating Joint Multi-sensor

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Advanced Combat Identification in an F-16 testbed aircraft and Integrated Combat Identification with Electronic Warfare.

2. Passive RF ID Environment (PRIDE). The PRIDE subproject develops passive RF target ID applications for CID in a denied access environment. The technique utilizes passive RF and EW information in combination with potential NT-ISR capabilities.

In FY20, PRIDE continued to develop techniques to assist in transitioning ISR capabilities. In FY21, the subproject would expand higher-offset-angle synthetic aperture radar bistatic mode efforts. In FY22, this effort will develop an identification capability useful in a denied access environment using passive Radio Frequency and Electronic Warfare (EW) information.

3. Laser Vision. Laser Vision is part of a family of EO systems designed to increase ID ranges. The subproject provides for demonstration and evaluation of data to support upcoming EO technologies in the service of CID. Laser Vision funding includes support for the Vibrometry Advanced Mode Processor (VAMP) program, which develops algorithms to process data provided by laser vibrometry sensors, powering pilot Aided Target Recognition (AiTR) software. The subproject also includes support for Multi-Mode Lidar Aided Target Recognition (M2LATR), which combines work from 3DTO and SIREN/VAMP to create longer-range, fused CID techniques.

In FY20, Laser Vision completed testing and evaluation. Plans for FY21 included integrating (M2L) 3DTO and VAMP into a new, more capable package. The effort will be completed by FY22, with FY22 onwards seeing no additional funding.

Project 642599: Cooperative Identification Techniques

The Cooperative Identification Techniques project concerns CID technologies that identify friendly platforms. There is only one principal subproject under the Cooperative Identification Techniques project: Air Traffic Control Radar Beacon System, Identification Friend or Foe, Mark XIIA System (AIMS) Program Office.

Air Traffic Control and Radar Beacon System, Identification Friend or Foe, Mark XIIA System (AIMS) Program Office. This subproject funds the AIMS Program Office for the implementation of activities related to Mark XIIA (Mode 5) identification friend or foe (IFF). This includes interoperability testing, system development, and integration, as well as activities regarding civil Mode S capability interoperability and FAA liaison support. These activities were funded in FY19 and continued into FY21.

In FY22, this program was to be transferred to PE#0207420F Combat Identification. As a result, all funding will be realigned to the combat identification program.

Project 643420: Combat ID Database Development

The Database Initiative (DBI) is designed to remove "hard-coded" static ID parameters from the host platform's sensor and replace them with dynamic, parameterized values. This is organized under four efforts: determining requisite ID parameters; designing and developing a CID parameter database; developing techniques to generate the requisite parameters; and providing CID parameters developed from measured or modeled data.

The Combat ID Database Development project started in FY20.

Database Development. The Database Development subproject was scheduled to begin in FY20 with the objectives of determining requisite CID features for HRR and NCTR; specifying requirements for initial database design; and collecting initial sample data to populate a CID database for developmental testing/debugging. In FY21, the subproject would determine requisite CID features for HRR and NCTR air-to-air radar modes, specify the requirement for the initial database design, and collect initial sample data.

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The MQ-9 Reaper is incorporating Hydra Vision technology developed under the CID Technology Program's Non-Cooperative Identification Subsystems subproject.

Source: U.S. Air Force, Senior Airman Cory D. Payne

Funding

U.S. FUNDING

	FY22 AMT	FY23 AMT	FY24 AMT	FY25 AMT	FY26 AMT	FY27 AMT	FY28 AMT	FY29 AMT
RDT&E (U.S. Air Force)								
PE#0603742F - Combat Identification Technology	*17.536*	*13.718*	*21.298*	*24.756*	*25.337*	*25.855*	*25.788*	*N/A*
Project 642597 – Non-Cooperative Identification Subsystems	14.880	11.574	18.565	21.918	22.468	22.927	22.867	N/A
Project 642599 – Cooperative Identification Techniques	0.000	0.070	0.076	0.120	0.084	0.086	0.086	N/A
Project 643420 – Combat ID Database Development	2.656	2.074	2.657	2.718	2.785	2.842	2.835	N/A

N/A = Not Available

All $ are in millions.

Source: U.S. Department of the Air Force, FY24 Budget Estimates, Air Force, Research, Development, Test & Evaluation, Vol. II, Budget Activity 4; U.S. Department of the Air Force, FY24 Budget Estimates, Air Force, Research, Development, Test & Evaluation, Vol. II, Budget Activity 4.

Worldwide Distribution/Inventories

Combat Identification Technology is a **U.S. Air Force** research, development, test, and evaluation program.

Forecast Rationale

The U.S. Air Force's Combat Identification Technology program analyzes, develops, and demonstrates identification technologies.

Under the program's current organization, RDT&E for CID technologies is funded under three projects: one for cooperative targets, one for non-cooperative targets (i.e., targets for which more aggressive identification methods must be used), and one to develop a CID database.

Whereas more aggressive identification methods for non-cooperative targets utilize a wide range of distinct technologies in order to provide an accurate result, cooperative methods utilize simpler systems that are typically codified across international fleets, civil and/or military. Because of this distinction, the more complex activities funded by the non-cooperative project will receive the majority of CID Technology program funding.

The CID Database Development project began in FY20 with the goal of developing a database of dynamic, parameterized CID information that could replace hard-coded, static ID parameters on host platform sensors. The project would create a standardized inventory of target descriptions that would increase compatibility between sensors while potentially increasing identification accuracy.

From 2023 through 2033, the U.S. Air Force's CID Technology program is forecast to receive just under $300 million, with steady funding stretching into the foreseeable future. The mission requirement of the CID Technology program is perennial, and funding will always be required to innovate and then implement the most effective means of providing identification services.

Ten-Year Outlook

ESTIMATED CALENDAR YEAR RDT&E FUNDING (in millions US$)											
Designation or Program		**High Confidence**				**Good Confidence**			**Speculative**			
	Thru 2023	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**Total**
MFR Varies												
Combat Identification Technology <> United States <> Air Force												
	485.10	22.30	25.86	26.44	26.96	26.89	27.04	27.31	27.54	27.75	28.00	266.07
Total	485.10	22.30	25.86	26.44	26.96	26.89	27.04	27.31	27.54	27.75	28.00	266.07