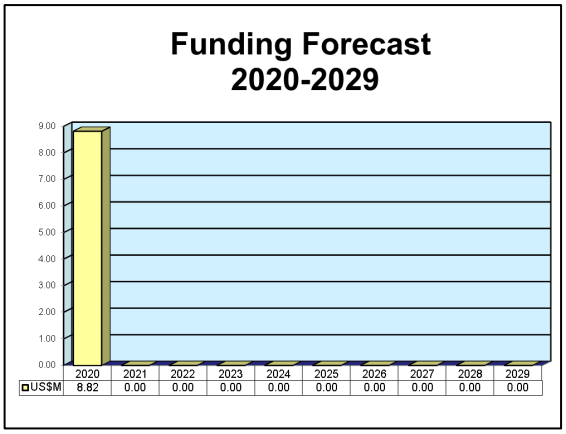
ASN-128

Outlook

- U.S. Army RDT&E and O&M funding expected to conclude in 2020
- The ASN-128 flies on older, non-bussed interface rotorcraft, while more modern rotorcraft include integrated options that supersede this system
- If the U.S. does not resume funding of its ASN-128 upgrade programs, this report will be archived in 2021



Orientation

Description. Lightweight Doppler and GPS navigation system.

Sponsor
U.S. Army
Communications & Electronics Command
Ft. Monmouth, NJ
USA

Status. In service.

Total Produced. As of May 2019, BAE Systems reported that the ASN-128 system was installed on more than 15,000 helicopters in 35 nations.

Application. The ASN-128 system is installed on helicopters. Platforms include the AH-1, AH-64, CH-47, HH-60A/L, PAH-1, UH-1, and UH-60A/L rotorcraft.

Price Range. Forecast International believes that the ASN-128 ranges in price between $20,000 and $70,000, depending on variant chosen and quantity purchased. (Based on a 1992 contract, the cost of an ASN-128B would be approximately $21,000.) U.S. Army procurement documentation for May 2009 shows ASN-128 B-kits costing $12.6 million in FY09 for a quantity of 235 ($53,617 each), while 252 ASN-128 B-kits were shown to cost $16.8 million in FY10, which equates to a unit price of $66,667.

Contractors

Prime

BAE Systems Inc, Electronic Systems	http://www.baesystems.com, 150 Parish Dr, Wayne, NJ 07470-0932 United States, Tel: + 1 (973) 633-6000, Prime
Mitsubishi Precision Co Ltd	http://www.mpcnet.co.jp, TOC Ariake, East Tower 13F, 5-7 Ariake 3-Chome, Koto-ku, Tokyo, Japan, Tel: + 81 3 5531 8060, Fax: + 81 3 5531 8142, Licensee

ASN-128

Subcontractor

Mayflower Communications	http://www.mayflowercom.com, 11 Oak Park Drive, Bedford, MA 01730 United States, Tel: + 1 (781) 359-9500, Fax: + 1 (871) 359-9744, Email: info@mayflowercom.com (Anti-Jam Antenna)

Contractors are invited to submit updated information to Editor, International Contractors, Forecast International, 22 Commerce Road, Newtown, CT 06470, USA; rich.pettibone@forecast1.com

Technical Data

ASN-128

	Metric	U.S.
Dimensions		
CV-3338A Signal Data Converter	24.4 cm x 19.3 cm x 19.8 cm	9.6 in x 7.6 in x 7.8 in
CP-1252C Computer Display Unit	16.5 cm x 14.61 cm x 15.2 cm	6.5 in x 5.75 in x 6.0 in
RT-1193 Receiver/Transmitter/Antenna	37.1 cm x 34.3 cm x 5.0 cm	14.6 in x 13.5 in x 1.95 in
Weight		
CV-3338A Signal Data Converter	6.1 kg	13.5 lb
CP-1252C Computer Display Unit	3.2 kg	7.0 lb
RT-1193 Receiver/Transmitter/Antenna	4.8 kg	10.5 lb

Design Specifications. The ASN-128 is composed of three units: receiver/transmitter/antenna, signal data converter, and computer display unit. Use of a single microprocessor chip for computer functions makes the ASN-128 a lightweight, compact navigation unit that is particularly suitable for helicopters.

The system contains a digital display panel, a keyboard for data entry, and controls for selection of operational modes. The unit's velocity sensor has a mean time between failures (MTBF) of 4,400 hours, with a complete system MTBF of 2,000 hours. A steering hover indicator is optional. The ASN-128 also features 10 destination inputs, 10 checkpoint inputs, and magnetic variation and deviation correction. It displays current latitude and longitude position, bearing and range to checkpoints, course and distance off course, track and ground speed, estimated time en route, and wind speed direction. The system can provide navigation data to 10,000 feet and is completely self-contained.

Operational Characteristics. The ASN-128 determines the three orthogonal components of aircraft velocity from measurements of the Doppler frequency shift. It then computes current position, bearing, and time and distance to selected destinations.

ASN-128

ASN-128B/C Doppler Navigational Set

Source: BAE Systems

Variants/Upgrades

ASN-128. The original ASN-128 was a Doppler Navigation System only and did not include GPS capability.

ASN-128B. Originally called the ASN-128/G, this modification incorporated a GPS receiver module, which works in synergy with Doppler navigation. The GPS (with P/Y code) accurately initializes and automatically updates Doppler position, enabling the system to provide continuous velocity, position, and steering information to the pilot. The receiver/transmitter/antenna remains unmodified and is not removed when the kit is installed.

ASN-128B/C. This variant features a Trimble one-card GPS receiver embedded into the signal data converter (SDC) unit to minimize system installation and aircraft modifications. The ASN-128 includes GPS capability.

ASN-128D. Allows use in a combined Doppler/GPS navigation mode to position data at the rate of Doppler radar and with the accuracy of GPS. If Doppler or GPS data are not available, the system automatically operates with the available data and then automatically reverts to combined operation when both become available.

ASN-128G. See ASN-128B.

ASN-128J. The Japanese version licensed to Mitsubishi Precision Company. Technical information has not been made public.

Steering Hover Indicator Unit (optional). The SHIU has two modes of operation. In navigation mode, the SHIU provides the pilot with a display of ground speed, distance-to-go to the destination selected on the computer display unit (CDU), and left/right steering information. In the hover mode, the three pointers indicate the values of three orthogonal components of aircraft ground velocity (along heading, across heading, and vertical). By flying the aircraft to maintain these displayed values at zero, the pilot can hover the helicopter without visual reference to the ground.

ASN-128

Program Review

The ASN-128 is the standard U.S. Army lightweight airborne Doppler navigator. The system was designed specifically to replace the aging ASN-64A. In the competition held to solicit the development of a replacement system, Singer Kearfott and Teledyne Ryan Electronics were selected to build 10 engineering development models (EDMs) of the ASN-128 in 1974. Singer emerged as the winner of the initial production contract.

First Contract Win

In September 1992, GEC-Marconi Electronic Systems (now BAE Systems) won a contract to supply 125 CP-1252B, 125 CV-3338, and 234 RT-1193A components of the ASN-128 to the U.S. Army and Air Force as well as to Egypt, Israel, Saudi Arabia, and South Korea under the Foreign Military Sales (FMS) program. This suggested the production of about 250 full system sets, which were completed in April 1994.

GEC-Marconi Electronic Systems was contracted in July 1993 to deliver three prototype systems incorporating a GPS capability. First called the ASN-128/G, the ASN-128B was ordered by the U.S. Army in July 1995 for installation in UH-60A and UH-60L Black Hawk and CH-47D Chinook helicopters. This retrofit contract was completed in 2001.

System Improvement Funding

In the first half of the 2000s, U.S. Army procurement documentation showed the start of Preplanned Product Improvement (P3I) of the ASN-128B Doppler GPS Navigation System (DGNS).

Under the program, the ASN-128 was enhanced with the addition of the CJCS (Chairman of the Joint Chiefs of Staff)-directed Selective Availability Anti-Spoofing Module (SAASM), and GPS IFR (Instrument Flight Rules) navigation and enhanced anti-jam capabilities. With the enhancements, the ASN-128D DGNS could also meet the regulatory requirements for civil airspace for UH-60A/L Black Hawks and CH-47D Chinooks.

The low-rate initial production (LRIP) contract for B-Kits was awarded in July 2004, and the full-rate production (FRP) contract was awarded in August 2005. Funding for change orders, systems engineering, and training efforts was allocated through FY13.

Beginning in FY13, a new start line was funded: the ASN-128D CDU/Software Upgrade ECP. The new funding line provides for the implementation of a program to modify the ASN-128's Computer Display Unit and upgrade its software, allowing for a reduction in pilot workload and fatigue through a "user-friendly" interface. The modification will also provide maps and charts to augment tactical and Instrument Flight Rules navigational operations. The ASN-128D CDU / Software Upgrade ECP line was split into two lines, allowing for separation of A-Kit and B-Kit procurement and installation efforts for the FY18 budget.

Through RDT&E funding, by the late 2010s, several other ASN-128 enhancements were underway. Among these were the design and implementation of a new anti-jam antenna as well as a review and overhaul of the system's Assured-Position Navigation and Timing (A-PNT) operations. Mayflower Communications of Bedford, Massachusetts, and BAE Systems in Wayne, New Jersey, were selected for the anti-jam antenna and A-PNT efforts, respectively.

Funding

U.S. FUNDING

	Prior AMT	FY19 AMT	FY20 AMT	FY21 AMT	FY22 AMT	FY23 AMT	FY24 AMT	FY25 AMT
RDT&E (Army)								
PE#0604201A – Aircraft Avionics								
C97 – ACFT Avionics	N/A	16.114	4.937	1.925	6.358	2.226	1.263	0.000
DGNS / A-PNT Assessment	N/A	1.849	0.965	0.000	N/A	N/A	N/A	N/A

	Prior QTY	Prior AMT	FY19 QTY	FY19 AMT	FY20 QTY	FY20 AMT	FY21 QTY	FY21 AMT
Procurement (Army)								
LI#8659AA0723 – Comms, Nav, Surveillance								
Mod AA0723 – Communications, Navigation, and Surveillance								
Mod 1 - DGNS (AN/ASN-128D) P3I	46	21.742	0	0.000	0	0.000	0	0.000
Installation Mod 1	46	0.296	0	0.000	0	0.000	0	0.000
Mod 2 - DGNS (AN/ASN-128D) CDU/SW Upgrade ECP B-Kit	250	48.604	200	14.611	0	4.590	0	0.000
Installation Mod 2	0	0.000	250	2.250	200	1.820	0	0.000
Mod 3 - DGNS (AN/ASN-128D) CDU/SW Upgrade ECP A-Kit	0	3.637	235	11.473	0	0.000	0	0.000
Installation Mod 3	0	0.000	0	0.000	235	1.260	0	0.000

	FY22 QTY	FY22 AMT	FY23 QTY	FY23 AMT	FY24 QTY	FY24 AMT	FY25 QTY	FY25 AMT
LI#8659AA0723 – Comms, Nav, Surveillance								
Mod AA0723 – Communications, Navigation, and Surveillance								
Mod 1 - DGNS (AN/ASN-128D) P3I	0	0.000	0	0.000	0	0.000	0	0.000
Installation Mod 1	0	0.000	0	0.000	0	0.000	0	0.000
Mod 2 - DGNS (AN/ASN-128D) CDU/SW Upgrade ECP B-Kit	0	0.000	0	0.000	0	0.000	0	0.000
Installation Mod 2	0	0.000	0	0.000	0	0.000	0	0.000
Mod 3 - DGNS (AN/ASN-128D) CDU/SW Upgrade ECP A-Kit	0	0.000	0	0.000	0	0.000	0	0.000
Installation Mod 3	0	0.000	0	0.000	0	0.000	0	0.000

N/A = Not Available

All $ are in millions.

Source: Department of the U.S. Army, FY21 Budget Estimate, Research, Development, Test, and Evaluation, Army, Budget Activity 5A, February 2020;
Department of the U.S. Army, FY21 Budget Estimate, Aircraft Procurement, Army, Budget Activity 2, February 2020

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Timetable

Month	Year	Major Development
	1974	Singer and Teledyne selected to build 10 ASN-128 EDMs
	1992	GEC-Marconi wins contract to supply 125 components of the ASN-128
Jul	1993	GEC-Marconi selected to build and deliver three ASN-128B prototypes
Jul	1995	GEC-Marconi awarded production contract for ASN-128B mod kits
	1999	GEC-Marconi and British Aerospace merge to form BAE Systems
	FY01	Preplanned Product Improvement of ASN-128B
Jul	2004	LRIP contract for B-kits awarded
Aug	2005	FRP contract for B-kits awarded
	FY10	DGNS integrated onto U.S. Army Black Hawks
	2020	U.S. funding may end

Worldwide Distribution/Inventories

Confirmed users of the ASN-128 include **Australia**, **Austria**, **Bahrain**, **Brunei**, **China (People's Republic of)**, **Denmark**, **Dubai**, **Egypt**, **Germany**, **Greece**, **Israel**, **Japan**, **Jordan**, the **Netherlands**, **Pakistan**, **Saudi Arabia**, **Singapore**, **South Korea**, **Spain**, **Thailand**, **Turkey**, and the **United States**.

Forecast Rationale

Although the ASN-128 has not seen a procurement effort for some time, the U.S. Army is currently completing interface and software upgrades to its units.

Under the recent Preplanned Product Improvement (P3I) Doppler GPS Navigation System (DGNS) program, ASN-128 units on board Black Hawk and Chinook helicopters were upgraded to the ASN-128D standard. Following the P3I effort, ASN-128-equipped rotorcraft across the U.S. Army's fleet received CDU unit, SDC unit, and software upgrades.

The ASN-128D updates, which are required for the Army's Battlefield Digitization program, allow non-bussed rotorcraft to meet Selective Availability Anti-Spoofing Module (SAASM) security requirements and to provide box-level Instrument Flight Rules (IFR) navigation.

A limited quantity of existing U.S. Army system will receive implementations of a new anti-jam antenna as well as Assured-Navigation Position and Timing enhancements. These improvements will keep the ASN-128 functional within evolving operational environments. However, as of the Army's FY21 budget, this program's funding has been eliminated for future years.

The ASN-128 is an aging system. Aircraft that fly with the system possess older, non-bussed interfaces at a time when the configuration has largely been surpassed by bussed, fully-digital interfaces. Freshly designed navigation units have replaced the system on new-build helicopters, and aircraft currently flying with the ASN-128 are aging out of service.

ASN-128 funding is expected to cease in 2020, although the Army may resume funding for the anti-jam antenna in the future. As of now, the forecast includes no allowances for future funding.

Ten-Year Outlook

ESTIMATED CALENDAR YEAR O&M FUNDING (in millions US$)												
Designation or Program		High Confidence				Good Confidence			Speculative			
	Thru 2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	Total
BAE Systems Inc												
ASN-128 D <> United States <> Army <> P3I, CDU/Software, and SDC Upgrade Programs - Non-Bussed Helicopters												
	290.14	7.85	.00	.00	.00	.00	.00	.00	.00	.00	.00	7.85
Total	290.14	7.85	.00	.00	.00	.00	.00	.00	.00	.00	.00	7.85

ESTIMATED CALENDAR YEAR RDT&E FUNDING (in US$)												
Designation or Program		High Confidence				Good Confidence			Speculative			
	Thru 2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	Total
MFR Varies												
ASN-128 RDT&E <> United States <> Army												
	9,316,000	965000	0	0	0	0	0	0	0	0	0	965,000
Total	9,316,000	965000	0	0	0	0	0	0	0	0	0	965,000