APN-218 - Archived 12/96

Orientation

Description. Airborne Doppler velocity sensor.

Sponsor

US Air Force
Warner Robins Air Logistics Center
Robins AFB, Georgia (GA) 31098
USA
Tel: +1 912 468 1001

Contractors

Teledyne Industries Inc
Teledyne Ryan Electronics Co
8650 Balboa Ave
San Diego, California (CA) 92123
(Prime contractor)

Status. In service, ongoing logistics support.

Total Produced. An estimated total of 1,767 units have been produced.

Application. B-1B, B-52, C-130, FB-111, KC-135, and MC-130.

Price Range. Approximately US$60,000.

Technical Data

Dimensions	Metric	US
Weight (with GDSI):	33.4 kg	73.6 lb
Computer Display	3.9 kg	8.5 lb
Dimensions:		
GDSI	15 x 8 x 15 cm	6 x 3 x 6 in
CDU	15 x 15 x 17 cm	6 x 6 x 7 in
Sensor	71 x 65 x 17 cm	28 x 26 x 7 in
Characteristics		
Frequency:	13.3 Ghz	
Transmit power:	1.5 W	
Speed:	96 to 1,800 kts	
Altitude:	0 to 70,000 ft	
Accuracy:	0.14% RMS	
Beams:	4	
MTBF:	3000 hr (rated)	

Design Features. The APN-128 is the US Air Force's standard Doppler velocity sensor. It provides velocity data with an accuracy of better than 0.14 percent, at altitudes up to 70,000 feet and speeds up to 1,800 knots.

The APN-218 was designed for either an ARINC 575 or dual redundant MIL-STD-1553A data-bus interface, selectable by use of a programming connector externally mounted on the chassis. This makes it possible to use velocity information from the APN-218 as an input for other equipment, or in conjunction with a ground- speed and drift indicator or self-contained navigation system.

The velocity sensor has an integral radome with contours that match the aircraft skin shape. By using a minimum of electronic parts and employing a relatively simple mechanical design, the designers achieved a high system MTBF.

The Built-In Test (BIT) operation of the APN-218 has two modes: Continuous BIT, an automatic function operating

continuously while the system is under power; and command BIT which is initiated externally.

Operational Characteristics. Worldwide UTM or latitude/longitude coordinate systems can be selected. Up to 90 separate legs with ten checkpoints or destinations can be programmed into the APN-218.

The system uses two cockpit displays, a Ground-Speed/Drift Indicator (GSDI), and an optional Computer Display Unit (CDU), to complement the APN- 218. The GSDI uses an incandescent numerical readout to display ground speed and drift angle.

Land and sea navigation modes and a test push button (that activates a BIT routine of the system's radar) are available on the GSDI. The CDU combines with the APN-218 to form a complete navigation system, containing an alphanumeric incandescent display panel, and a keyboard for data entry and selection of navigational modes.

Variants/Upgrades

APN-230 The B-1B uses the APN-230 Doppler Velocity Sensor, which is essentially an APN-218 with an aircraft-unique radome.

APN-236 A variant modified for the FB-111 aircraft.

Program Review

Background. The APN-218 won a 1976 Air Force competition to produce a nuclear-hardened strategic Doppler system for fixed-wing aircraft. In 1978 Teledyne Ryan Electronics received APN-218 contract awards from the Air Force, with deliveries of the system beginning a year later.

The APN-218's design had its technological roots in the APN-200/213, which entered operation in 1971. (That system is carried by such diverse aircraft as the Navy's S-3A Anti-Submarine Warfare aircraft, the North Atlantic Treaty Organization's E-3A Airborne Warning and Control System aircraft, the National Oceanic and Atmospheric Administration's WP-3D Hurricane Hunters, and Central Inertial Guidance Test Facility [CIRIS] C-141 aircraft.)

The Air Force integrated the APN-218 into the Self-Contained Navigation System (SCNS), providing a Doppler velocity-sensor capability for the system where in-air alignment, system accuracy, and multiple navigation modes are essential. The complete SCNS system was developed for the service's C-130 fleet.

Funding

Current funding is from the individual aircraft O&M line.

Analysis. The APN-218 is a popular system; reliability and accuracy have been the system's strong points. The Air Force made the APN-218 its Common Strategic Doppler navigation-system velocity sensor, with the APN-230 used on the B-1B and the APN-236 carried by the FB-111. Both are direct modifications of the APN-218.

The change in Air Force emphasis from nuclear/strategic to conventional operations will not change this. The Persian Gulf experience validated the need for accurate navigation and pinpoint delivery of today's smart weapons. The Bottom-Up Review emphasized increased reliance on high-technology, smart weapons in future conflicts. In the future, combinations of systems such as these sensors and GPS will be common on weapons-delivery platforms.

Because of budget constraints, it is unlikely that there will be activities to develop a replacement for systems that are more than adequate. Improvements in inertial navigation systems and inclusion of Global Positioning System (GPS) receivers will make non-radiating navigation techniques standard in the next generation of aircraft, replacing systems such as the APN-218 and its variants.

Recent Contracts

No recent contracts have been recorded.

Timetable

1976	Competitive development began
1978	Production contract awarded
1979	USAF began accepted deliveries for use aboard B-52 and KC-135 aircraft
1982	Deliveries began for C-130 aircraft
1985	Selected as subsystem for SCNS

Worldwide Distribution

This is a **US**-only program.

Forecast Rationale

The largest planned buy of the APN-218 was the Air Force Self-Contained Navigation System program for its C-130s. The APN-218 is standard on MC-130E/Hs and became the preferred variant on the other C-130 aircraft in USAF inventory. It is not listed as equipment on the C-17 which carries a variety of newer, internal, non-radiating GPS/INS equipment for navigational support.

Ten-Year Outlook.

No further production is expected.