

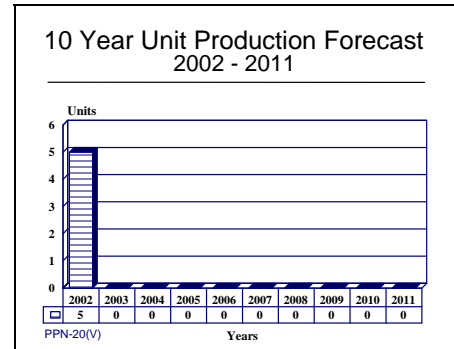
# ARCHIVED REPORT

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## PPN-19(V)/20(V) - Archived 09/2003

### Outlook

- PPN-19(V) in service
- PPN-20(V) fielded with Special Operations units
- GPS and other internal navigation techniques to support SOF missions, impacting usage and procurement
- Logistics support continues



### Orientation

**Description.** This is a Multi-Band Ground Locator Transponder set.

#### Sponsor

US Army

Army Communications-Electronics Command  
(CECOM)

Ft. Monmouth, New Jersey (NJ) 07703-5000  
USA

Tel: +1 201 532 2534

Web site: <http://www.monmouth.army.mil>

US Marine Corps

Systems Command

2033 Barnett Ave Suite 315

Quantico, Virginia (VA) 22134-5010

USA

Tel: +1 703 784 5822

Web site: <http://www.marcorsyscom.usmc.mil>

#### Contractors

Motorola Inc

Government and Systems Technology Group  
8201 East McDowell Road

Scottsdale, Arizona (AZ) 85252-1417  
USA

Tel: +1 602 441 3905

Fax: +1 602 441 2806

Web site: <http://www.motorola.com>

(Prime, PPN-19(V); Prototype, PPN-20(V))

**Status.** PPN-19(V): in service, ongoing support.  
PPN-20(V): initial production.

**Total Produced.** Through 2001, an estimated 171 PPN-19(V) and 248 PPN-20(V) units were produced.

**Application.** The transponder serves as an en route marker beacon, drop-zone locator, and air strip marker.

**Price Range.** Estimated PPN-19(V) unit cost is US\$45,500. Estimated PPN-20(V) unit cost is US\$48,000 (including PPM-4).

Price is estimated based on an analysis of contracting data and other available cost information, and a comparison with equivalent items. It represents the best-guess price of a typical system. Individual acquisitions may vary, depending on program factors.

## Technical Data

<b>Characteristics</b>	<b><u>Metric</u></b>	<b><u>US</u></b>
Weight		
PPN-19(V)	9.1 kg	20 lb
PPN-20(V)	4.1 kg	9 lb
<u>PPN-19(V)/20</u>		
Power	200 W (min)	
Frequency Range	8 to 20 GHz 20 to 40 GHz	
PRF	Up to 5,000 pps	
Pulse Width	0.35 $\mu$ sec $\pm$ 0.05 $\mu$ sec	
Range	To 50 nm	
Power Supply	PRC-70 battery pack or external supply	

**Design Features.** The PPN-19(V) is a portable, self-contained beacon that responds to aircraft or shipboard radar interrogations to provide drop-zone location, en route navigation, and offset bombing. It can also transmit digitized target data operating on a selectable operating band to allow for operation with a mix of support aircraft.

The omnidirectional antennas can be removed and stowed in the transponder case. Built-in directional antennas are also available for use in extended-range operations.

By inserting a Ground Middle Layer (GML) between the upper and lower halves of its transponder, the PPN-19(V) can be converted to a TDC (Target Data Communicator)-capable transponder. The GML transmits uplink data in response to radar interrogations and receives downlink data from a TDC-equipped aircraft.

The airborne portion of the TDC system consists of an Airborne Data Terminal (ADT) interfaced to the radar in the aircraft. The operator views uplink mission data, and enters and transmits downlink data using the ADT. The demonstrated communication range of the TDC system is in excess of 130 nautical miles.

The PPN-20(V) functions as a beacon by transmitting microwave pulses as coded replies to a wide variety of interrogating radars on aircraft and ships. Designed to be a self-contained, lightweight and portable trans-

ponder, it is approximately one-third the size of the PPN-19(V). The PPN-20(V) was developed to support Special Operations Forces.

The PPN-20(V) responds in the 8-12 GHz and 12-18 GHz (X- and Ku-bands) at a minimum operational range of 50 miles. It was built within a specified maximum weight of 9 pounds, including battery. The PPM-4 designated test set will be used to check out the PPN-20(V) before it is used.

**Operational Characteristics.** These systems can be used to provide data to guide attack aircraft to selected targets. It is typically used to identify the position of friendly ground forces and for target marking. Ground forces can carry the system to provide homing signals for air drop and/or recovery operations. The PPN-19(V) can also be set up to mark runways at forward and unimproved airfields as well as to identify hazards to aircraft and direct naval gunfire to shore targets.

The TDC allows for accurate high-speed data transmission between controlling ground forces and attacking aircraft. It is controlled by the hand-held Ground Remote Terminal (GRT). This data entry, display and control unit interfaces with the PPN-19(V) via a field wire link. The GRT allows the operator to enter, edit and transmit uplink (ground-to-air) mission data, view and store downlink (air-to-ground) data, and monitor status indicators such as "battery low" and "two-wire link operation."

## Variants/Upgrades

PPN-19(V)1 and PPN-19(V)2. These variants are capability enhancements of the basic system.

PPN-20(V). The PPN-20(V) replaces the PPN-19(V) for drop-zone location, en route navigation, and

ordnance delivery. This self-contained, man-portable unit can be ground-emplaced. It is about one-third the size and weight of the PPN-19(V) and includes a dedicated test set.

## Program Review

**Background.** The PPN-19(V) gave ground forces the ability to provide location and target information to aircraft. It replaced the PPN-18(V), GAR-1(V) and UPN-34(V), and was used to guide strike aircraft to designated targets, identifying the location of friendly forces and specifying drop or recovery zones. The system could also be used to identify hazards and direct naval gunfire.

The Marine Corps funded various upgrades to the Radar Beacon Forward Air Control Tactical Data Communications Central (RABFAC-TDCC) in support of battlefield data communications operations. The object of this effort was to “provide enhanced operational capability of two-way data link communications between aircraft and forward air controllers to conduct all-weather close air support in a hostile electronic warfare environment.”

Efforts to enhance the PPN-19(V) were begun in 1989. In FY90, the Marines continued to develop a capability for aviation and assault support – particularly gunfire support – without having to rely on voice communications. The needed modification kits were procured in FY91. But in 1992, the funds were reprogrammed because the aircraft modification program was canceled.

In December 1990, US Army CECOM published a notice that it intended to replace the PPN-19(V) with the PPN-20(V). A contractor would be selected to design, develop, fabricate, assemble, test and deliver two prototype models of the PPN-20(V) transponder set and one prototype model of the PPN-4(V) test set. Efforts under the contract were to be completed in 18 months: three months for design, 12 for fabrication, and three for testing.

The prototypes would have to meet all the requirements of CECOM Development Specification A3162259, with limited technical testing by the contractor. The PPM-4(V) prototype test set would have to meet all the performance requirements of the published specification, but would be fabricated to good commercial standards and would need to be tested only by the contractor. The government said that it intended to award up to two development contracts through full and open competition. Upon delivery, the government would conduct an operational evaluation of the prototypes.

An October 1991 *Commerce Business Daily* announcement disclosed that the Army had awarded Motorola a US\$1.9 million contract for the PPN-20(V) prototype on August 22, 1991.

## Funding

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Funding is from O&M accounts.

## Recent Contracts

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No contracts over US\$5 million were recorded.

## Timetable

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<u>Month</u>	<u>Year</u>	<u>Major Development</u>
Sep	1979	Letter Requirement
	1983	DT/OT II
Jun	1984	Milestone III IPR
Sep	1984	Initial production (160 units for US Army)
Sep	1985	Production Option Award (112 for USMC, 8 for USN, 4 for USAF)
Jun	1986	Production Option Award (184 for USMC, 6 for USN)
Nov	1986	First Article Test completed
Jun	1987	First production delivery
Feb	1988	IOC
Sep	1989	Follow-on production contract to United Telecontrol Electronics for 106 units (101 for US Army and 5 units for USN)

<u>Month</u>	<u>Year</u>	<u>Major Development</u>
	1989	Modification kit procurement
Nov	1990	PPN-20(V) ROC
Jan	1991	PPN-20(V) Milestone I
Sep	1991	Option quantity awarded for 60 PPN-19(V) units
	1991	Solicitation for replacement
Aug	1991	PPN-20(V) Prototype development contract
1Q	FY92	PPN-19(V) First Article test and report accepted
May	1993	PPN-19(V) First Unit Equipped
Aug	1993	PPN-20(V) contractor development technical testing
Sep	1993	PPN-20(V) government operational tests
4Q	FY93	Milestone II IPR
3Q	FY94	LRIP start
3Q	FY96	LRIP finish
	2002	Estimated end of procurement

## Worldwide Distribution

This is reportedly a US-only program.

## Forecast Rationale

Newer navigation features can be and are used by aircraft (GPS, very accurate INS), but drop-zone markers and localized navigation and marking systems are still needed to pinpoint some locations and exchange data and messages.

The PPN-19(V) and PPN-20(V) meet this need and fill the gap when sophisticated battlefield location systems using GPS satellites and other techniques are not available or not called for. They can be backup for locator missions should satellite techniques become

unreliable. It is not always possible or advisable to have individual ground controllers performing this function with radio equipment or physical markers as in the past. The effectiveness of aircraft navigation systems for air drops was highlighted by the air drops in Bosnia-Herzegovina.

Self-contained navigational support of delivery and attack missions has become the norm, but some ground beacons will always be needed.

## Ten-Year Outlook

### ESTIMATED CALENDAR YEAR PRODUCTION

Designation	Application	High Confidence Level				Good Confidence Level				Speculative			Total 02-11	
		Thru 01	02	03	04	05	06	07	08	09	10	11		
PPN-19	Prior Prod'n:	171	0	0	0	0	0	0	0	0	0	0	0	0
PPN-20	LOCATOR TRANSPONDER (US ARMY & MARINE CORPS)	248	5	0	0	0	0	0	0	0	0	0	0	5
Total Production		419	5	0	0	0	0	0	0	0	0	0	0	5