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ARC-220(V) - Archived 2/2009

Outlook

- U.S. Navy LCAC ship upgrade program completed
- U.S. Army Joint Tactical Radio System (JTRS) Alternative Communications suite for helicopters has negatively impacted ARC-220 sales
- There are no published reports indicating foreign interest in the ARC-220
- Barring further information, this report will be archived in February 2009

Orientation

Description. The ARC-220 is a high-frequency communications system mainly designed for aircraft flying nap-of-the-earth profiles.

Sponsor

U.S. Army
Communications and Electronics Command
Fort Monmouth, NJ 07703
USA
Tel: +1 (732) 532-4511

Status. In service.

Total Produced. As of January 2008, an estimated 3,385 radios were produced.

Application. The ARC-220 provides rotary-wing aircraft, such as the AH-64 Apache, CH-47 Chinook, UH-60 Black Hawk, and OH-58 Kiowa, with advanced voice and data capabilities for short- and long-distance communications. The U.S. Navy is installing the ARC-220 on 38 of its LCAC boats, and the ground variant, the VRC-100, is installed in U.S. Army vehicles.

Price Range. According to FY05 U.S. Army budget documentation, the ARC-220 costs approximately \$30,000 per unit. According to GSA (General Services Administration) Advantage, one ARC-220 ground variant, the VRC-100, costs \$53,967 to \$54,670.

Contractors

Prime

Rockwell Collins Inc

<http://www.rockwellcollins.com>, 400 Collins Rd NE, Cedar Rapids, IA 52498-0001 United States, Tel: +1 (319) 295-1000, Fax: +1 (319) 295-5429, Email: collins@rockwellcollins.com, Prime

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

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Technical Data

Specifications	<u>Metric</u>	<u>U.S.</u>
<u>Receiver Transmitter (RT-1749A/URC)</u>		
Length	35.56 cm	14.0 in
Width	10.54 cm	4.15 in
Height	19.43 cm	7.65 in
Weight	5.9 kg	13.0 lb
<u>Power Amplifier/Coupler (AM-7531/URC)</u>		
Length	42.80 cm	16.85 in
Width	16.03 cm	6.31 in
Height	18.49 cm	7.28 in
Weight	8.5 kg	18.75 lb
<u>Control Display Unit (C-12436/URC)</u>		
Length	20.37 cm	8.02 in
Width	14.61 cm	5.75 in
Height	11.43 cm	4.50 in
Weight	2.27 kg	5.00 lb
Frequency Range	2.000 to 29.999 MHz	
Preset Channels	20	
Programmable ALE Nets	20	
Channel Spacing	100 Hz	
Tune Time	1 sec nominal, 2 sec max	
Power	175 w pep; 100 w avg	
Modes	USB/LSB/AME/CW	
Message Buffers	10 receive, 10 transmit; up to 500 characters each	
MTBF	1,000 hr	

Design Features. The ARC-220(V) supports the U.S. Army's battlefield digitization plan by providing non-line-of-sight digital and voice communications capability that is reliable, secure, and easy to operate. It incorporates automatic link establishment (ALE), a MIL-STD-188-110A data modem, and an electronic counter-countermeasures (ECCM) frequency-hopping capability. A classified Army-enhanced ECCM feature may exist.

The ARC-220 covers the 2 to 30 MHz frequency range in 100 Hz steps, by utilizing near-vertical-incidence skywav, which permits long-range communications between aircraft up to 300 miles apart. It uses digital message capability and digital noise reduction, and supports MIL-STD-1553 databus operation to achieve compatibility with the Army's multifunction display. It meets military standards for compatibility with night vision equipment and shipboard operations.

The ARC-220(V) supports both standard secure and non-secure audio voice, as well as the Advanced Narrowband Digital Voice Terminal. An audio data port supports interface with the Automatic Target Hand-off System (ATHS). Digital interfaces compatible with MIL-STD-188-144A permit transmission and reception

of data from the Improved Data Modem (IDM). Maximum data length is 500 characters per message. Time and position interfaces with Global Positioning System (GPS) equipment allow for efficient position reporting and accurate ECCM initialization.

The ARC-220(V)1 system replaces the ARC-199 HF radio. It has three line-replaceable units (LRUs): a control display, a power amplifier/coupler, and a receiver/transmitter. The control display unit uses all single-function controls and uncluttered screens with large (0.2") characters, but can be omitted when the system is controlled by a MIL-STD-1553 databus (see **Variants/Upgrades** section below). A spare card slot is provided in the receiver/transmitter for embedding platform-specific applications and to allow for growth.

Operational Characteristics. The ARC-220 operates in a half-duplex mode (transmitting on one frequency and receiving on another) or simplex mode (transmitting and receiving frequency at the same), with up to 20 pre-programmable channels. Tune time is no more than two seconds. Up to 20 ALE nets can also be pre-programmed. The ARC-220 can operate in upper sideband (USB), lower sideband (LSB), amplitude equivalent (AME), or continuous wave (CW) modes.

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This radio provides communications for helicopters flying at low nap-of-the-earth altitudes, where obstacles on the ground interfere with the propagation of VHF/UHF transmissions. This is accomplished using near-vertical-incidence skywave technology. According to Rockwell, the ARC-220 permits 65 percent of the mission-critical tasks to be performed in one "heads-up, eyes-off" operation.

With interoperability a major concern, the ARC-220's capability to interface with virtually all ancillary equipment is an important asset. It can efficiently tune a variety of aircraft antennas, making it suitable for tactical airborne applications. In addition, reliance on strategic satellite channels is eliminated.

Variants/Upgrades

ARC-220(V)2. This version consists of only two line-replaceable units, omitting the control display unit.

ARC-220 Export Version. The ARC-220 offered for export does not possess the ECCM and National Security Agency (NSA) link protection features.

VRC-100(V). The Rockwell Collins VRC-100(V) ground radio is an easy-to-operate, HF communications system intended for use at a Tactical Operations Center and in air traffic control and vehicular applications (such as the HMMWV). It is intended to replace the

VRC-86(V). The system's single metallic case houses the three ARC-220 LRUs in unmodified form – receiver/transmitter, control display, and power amplifier/coupler – along with a power supply and audio interface. The VRC-100 provides the same electrical interfaces as the ARC-220. Three versions are available: the (V)1, with full non-1553 capabilities; the (V)2, in which the ECCM and NSA link protection are removed for exportability; and the (V)3, which adds the AS-3791/G broadband antenna to the (V)1 for Echelons Above Corps.

Program Review

Background. In October 1992, the U.S. Army sought sources for the ARC-220 airborne radio, specifying that it possess such HF features as automatic link establishment (ALE), operation to MIL-STD-188-110A and NATO interoperability standards, Advanced Narrowband Digital Voice Terminal (ANDVT) compatibility, and anti-jam backward compatibility with the ARC-199 radio. Later, two ARC-220 radios would be evaluated aboard an AH-64 Apache helicopter.

Teams consisting of Lockheed Sanders Surveillance Systems/AlliedSignal General Aviation, and Rockwell Collins/Harris RF Communications submitted bids in March 1994. At that time, the Army had allocated an estimated \$233 million for high-frequency communications as part of the battlefield digitization initiative, and the schedule for ARC-220 procurement called for a contract award in September 1994, followed by 30 months of testing on an additional 37 radios.

Rockwell Collins Awarded Initial Contract

In August 1994 (ahead of schedule), Rockwell was awarded the initial \$11.7 million contract; four subsequent options would increase the total value to \$144.9 million, and would entail the delivery of 4,700 production ARC-220s between fiscal years 1997 and 2000. The first contract increment was valued at \$2.8 million and called for 28 units through February 1996.

The award of the first production option followed in October 1996. The second option was scheduled for the fourth quarter of FY97, but slipped to the first quarter of FY98. Initial fielding was also moved to early FY98.

The field testing, the results of which were never publicly released, was assumed successful. In May 1999, the U.S. Army awarded Rockwell Collins a \$15 million contract for 100 VRC-100 and 506 ARC-220 systems. Initial assessment points toward installation of the ARC-220 in the CH-47D Chinook and UH-60 Black Hawk helicopters. A contract was awarded to Rockwell Collins in November 2003 for production of 301 ARC-220 and 32 VRC-100 radios. Deliveries were completed in the first quarter of 2005.

Older Helicopters Get the ARC-220 Radio

In addition to new-build helicopters, the U.S. Army is modernizing existing AH-64 helicopters with the ARC-220. The McDonnell Douglas Helicopter Co (now part of Boeing) received a \$13.69 million contract in May 2004 for 116 ARC-220 retrofit installation kits for the AH-64D Longbow. Work under this contract was to be completed in May 2006. According to Rockwell Collins, the U.S. Army continues to issue production buys for ongoing replenishments, and in late 2005, it received a \$4.1 million contract for production of additional receivers, power amplifiers, and panel indicators.

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Funding

U.S. FUNDING, NAVY								
	PRIOR QTY	PRIOR AMT	FY06 QTY	FY06 AMT	FY07 QTY	FY07 AMT	FY08 QTY	FY08 AMT
PROCUREMENT								
(U.S. Navy)								
NAVY/BA-1 Ships								
Support Equipment								
LCAC Equipment	10	15.3 ^(a)	8	8.4	0	-	0	-
	FY09 QTY	FY09 AMT	FY10 QTY	FY10 AMT	FY11 QTY	FY11 AMT	To Complete	Total
LCAC Equipment	0	0	0	0	0	0	0	18

All \$ are in millions.

Source: U.S. Navy FY2008/2009 Budget Estimates, February 2007, Other Procurement, Budget Activity 1

^(a) In this program, selected electronic components are replaced with an LC001 set consisting of one ARC-210 radio, one ARC-220 radio, and one P80 radar unit. This cost includes these three components.

Contracts/Orders & Options

Contractor	Award (\$ millions)	Date/Description
Rockwell Collins	5.4	Jan 2002 – Contract for 230 ARC-220 radios for installation in AH-64D Apache helicopters.
Rockwell Collins	6.6	Feb 2003 – Contract for 209 ARC-220 and 42 VRC-100 radios for installation in AH-64D Apache helicopters and HMMWVs.
Rockwell Collins	10.5	Nov 2003 – Contract for 301 ARC-220 and 32 VRC-100 radios for installation in AH-64D Apache helicopters and HMMWVs.
McDonnell Douglas Helicopter Co	13.7	May 2004 – Contract for 116 ARC-220 retrofit installation kits for AH-64D aircraft. Work was completed by May 30, 2006. The U.S. Army Aviation and Missile Command is the contracting agency. (DAAH23-01-G-0024)
Rockwell Collins	4.1	Nov 2005 – U.S. Army (CECOM) contract for additional receivers, power amplifiers, and panel indicators.
L-3 Unidyne	39.4	Sep 2006 – Two contracts for a Service Life Extension Program (SLEP) for five Landing Craft Air Cushion (LCAC) ships. Contract includes a clause for six option craft. (<i>This award did not mention the ARC-220; however, U.S. Navy budget documentation indicates the ARC-220 is part of this program.</i>)

Timetable

Month	Year	Major Development
Oct	1992	Sources sought for U.S. Army procurement of nap-of-the-earth radio
Mar	1994	Bids submitted by two competing teams
Aug	1994	EMD/production contract awarded to Rockwell
Oct	1996	First production option awarded
1Q	FY98	Second production option scheduled to be awarded; fielding to begin

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<u>Month</u>	<u>Year</u>	<u>Major Development</u>
May	1999	Contract for 506 ARC-220 systems
2Q	2000	First units from May 1999 contract delivered
	2003	U.S. Navy begins modernization of LCAC boats; ARC-220 included in upgrade package
May	2004	Contract for 116 ARC-220 retrofit installation kits awarded
Nov	2005	Contract for additional receivers, power amplifiers, and panel indicators
Sep	2006	Contract to L-3 Unidyne for LCAC upgrades; ARC-220 not mentioned, but is believed to be included

Worldwide Distribution/Inventories

The **U.S. Army** is the main known customer of ARC-220 radios for AH-64, CH-47, UH-1, UH-60, and OH-58 helicopters. The service also purchases VRC-100 radios for HMMWVs. The **U.S. Navy** is currently retrofitting the ARC-220 on its Landing Craft Air Cushion (LCAC) ships.

Forecast Rationale

LCAC Program Completed

The U.S. Navy is equipping several of its Landing Craft Air Cushion (LCAC) ships with the ARC-220, among other equipment. Radios were purchased for 18 of the U.S. Navy's 91 LCACs, as part of the upgrade program, which finished in 2007. L-3 Unidyne won two contracts in September 2006 to upgrade five craft. This award did not mention the ARC-220; however, U.S. Navy budget documentation indicates the ARC-220 is included. The L-3 contract also has an option for six additional aircraft, though there haven't been any reports that the Navy authorized additional quantities. Orders may continue in small quantities such as this for a few more years.

No News of Foreign Interest

BAE Systems announced in February 2004 that it had been selected by Poland to be the avionics systems integrator for two NATO-interoperable Mi-24 Hind helicopter prototypes. BAE Systems had earlier introduced an upgrade package for the Russian-built Mi-24 Hind helicopter that reportedly included the ARC-220, though there is no information about Mi-24 helicopters on the Rockwell Collins Web site. Poland currently has 43 Mi-24 helicopters in inventory. BAE Systems is also marketing this modernization package to the Czech Republic (31 helicopters), Slovakia (19),

and Hungary (32). Israel's Elbit Systems and France's Sagem also offer Mi-24 upgrade programs.

Rockwell Collins has selected RAPAC of Israel as a representative distributor and systems integrator for its products. The Rockwell Collins ARC-220 and VRC-100 radios are displayed on the RAPAC Web site. It remains to be seen if this marketing effort will lead to more sales.

JTRS Alternative Communications Ends ARC-220 Production

The last contract for a large buy of ARC-220/VRC-100 radios was awarded in May 2004. The introduction of the Joint Tactical Radio System (JTRS), intended to standardize radio communications throughout all branches of the U.S. military, will curtail the production of most current radios. However, there have been technical difficulties with the JTRS and the program is under intense review. In November 2005, Army Aviation initiated an Alternative Communications effort consisting of two ITT SINCGARS units and two Raytheon ARC-231 radios as a result of the delayed delivery of the JTRS. In light of this Alternative Communications configuration, it is unlikely there will be much demand for systems such as the ARC-220 for the U.S. armed forces and their allies.

Ten-Year Outlook

With no **Unit Production Forecast** and the archiving of this report in February 2009, Forecast International has omitted the **Ten-Year Outlook** chart.

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