

## Full length graphic #1

### Airborne Radio Direction Finding (ARDF) Locating the enemy radio transmitters for tactical advantage...

**THE ARDF MISSION**

ARDF is the process of locating enemy radio transmitters in order to determine their location and direction. This is done by using a special type of radio receiver that can detect the direction of the signal. The ARDF mission is a critical part of the intelligence gathering process, and it is essential for the success of many military operations.

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"Limitations of short range Army aircraft and lack of all weather capability of aircraft and crews point up the need for USAF to enter this special area of aerial reconnaissance as a proper role for USAF."

Major Joseph M. Moore, 24th Air Division Commander  
December 1946

10-11

*LtGen Joseph H. Moore, 2d Air Division Commander,  
December 1965*



U.S. Army RU-8 ARDF



ASA Emblem

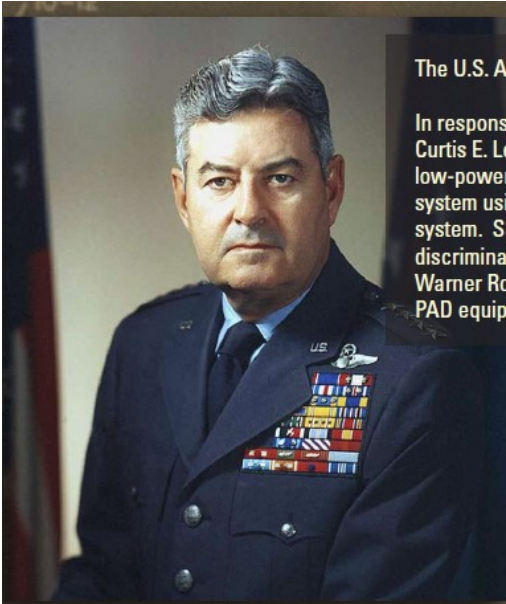


U.S. Army U-6 ARDF

The Army Security Agency (ASA) fielded the first tactical ARDF systems in Vietnam with the U-6 Beaver and RU-8 Seminole aircraft using an airborne "aural null" technique for homing in on enemy radio transmitters

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## The U.S. Air Force and ARDF

In response to the increased tasking for Army ARDF coverage, Air Force Chief of Staff General Curtis E. LeMay was determined to get the USAF involved in this airborne mission to locate enemy low-powered tactical radio transmitters. In April 1962, LeMay ordered development of an ARDF system using the electronic principles of the VHF omni directional radio range (VOR) air navigation system. Sanders Associates of Nashua, New Hampshire, was selected to design a "phase angle discrimination" (PAD) high frequency direction finder for the C-47 aircraft. On September 26, 1962, Warner Robbins Air Material Area began modifying a C-47D, tail number 45-0925, with the Sanders PAD equipment. This was named project HAWKEYE.





the Y operator  
radios the fix  
ation to ground  
is via the KY-8  
secure voice  
system.

il

nd



Y or Z2 Console  
Two G-133 HF  
Receivers

38 VHF Capable  
-18 mhz)

7Q Model



ARDF fix information was often the sole-source of intelligence about enemy forces...and the combatant commanders continually wanted more daily hours of ARDF support. The Army and Air Force raced to meet these requirements with more aircraft, but competition for funding was fierce. To establish the EC-47 effectiveness compared to the Army program, a "fly-off" competition was staged at Ramey AFB, Puerto Rico, in January 1967. The Army RU-8 and Air Force C-47 aircraft systems worked ARDF coverage of "enemy" communications generated by the U.S. Army 7th Special Forces using jeep and backpack mounted tactical radios. Test results verified that the HAWKEYE system produced the most ARDF fixes more quickly than the Seminole. History records indicate that the Air Force did not wait for these "fly off" results and had vigorously pushed forward with the EC-47 production ARDF systems under the project name PHYLLIS ANN.



**Line of Position (LOP):**  
Bearing of the target signal  
relative to the heading of  
the aircraft.

The aircraft's precise  
position at the time the LOP  
is taken is determined by a  
Doppler navigation system.



The navigator plots the  
target location and  
passes the data to the

The Y operator  
radios the fix  
location to ground  
units via the KY-8  
secure voice  
system.

X operator  
locks on  
target. Pilot  
rolls level.  
LOP #1

Navigator calls for  
heading change as  
required.  
LOP #2

Y operator,  
Continued  
heading changes  
if required.  
LOP #3

Additional  
heading  
changes and  
LOPs as  
required.

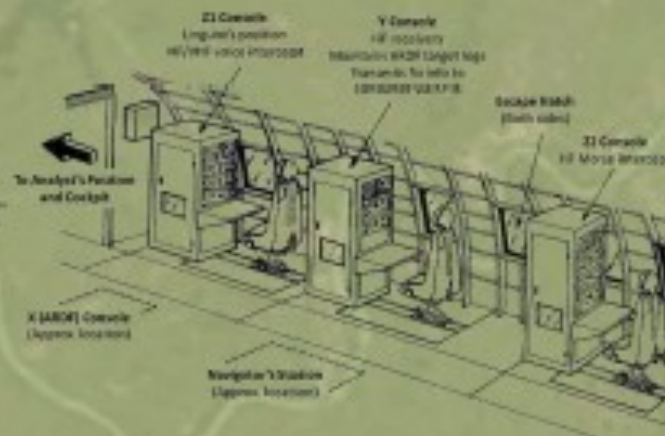
(Below)  
X Console ARDF  
Controls



(Above)  
G-175 (VHF/UHF) and  
G-133 (HF) Receivers on Z1

EC-47N/P  
Models

Typical Antenna Arrays,  
AN/ALR 34 or 35



AN/ALR-38 VHF Capable  
(2-18 mhz)



EC-47Q Model



AN/ALR-38 VHF Capable  
(2-18 mhz)



During early testing in Vietnam in 1964, the HAWKEYE prototype ARDF equipment was operated by Morse systems operators on temporary duty from other USAFSS state-side and oversea squadrons. Following the first 120-day testing, the HAWKEYE aircraft returned to the CONUS for further AN/ALR-34 equipment upgrades. It returned for additional testing in October 1964 and the results were so good that MACV and 7AF extended the test period into full operational tasking. More aircraft would follow in 1966 under project PHYLIS ANN.





## The Production Model: PHYLLIS ANN

General John P. McConnell, CSAF, fully supported a "crash program" to meet the increased MACV requirements by further improving the HAWKEYE prototype with an initial fleet of 35 C-47s under the nickname PHYLLIS ANN. These aircraft, designated as RC-47s, were to be deployed to RVN by December 1966. This next generation PHYLLIS ANN aircraft was equipped with a new side-angle calibration which made it possible to fix enemy transmitters in any direction without turning the aircraft. In May 1967, these aircraft were redesignated as EC-47s and production was increased to 47 aircraft.



This painting of "Phyllis Ann" may have been considered as possible nose art, but this practice (nose art) was quickly negated by one of the senior commanders.



6994th crewmembers with one of the first PHYLLIS ANN aircraft at Nha Trang AB, RVN

The PHYLLIS ANN program changed to COMPASS DART in 1967. It changed again to COMBAT COUGAR, and then to COMBAT CROSS in 1968. SENTINEL EAGLE was the nickname for the additional 10 EC-47Q models with VHF DF capability that were fielded in September 1968. COMMANDO FORGE was the nickname for the program in Thailand. A total of sixty-eight EC-47 ARDF aircraft were deployed to Southeast Asia. The 6994th Security Squadron personnel, flying as the back-end crews with the outstanding 7th Air Force Tactical Electronic Warfare front-enders, produced thousands of actionable fixes and unprecedented sole-source signals intelligence (SIGINT) in direct tactical support to the U.S. and allied ground forces fighting throughout the Indo-China war area.

**"Limitations of short range Army aircraft and lack of all weather capability of aircraft and crews point up the need for USAF to enter this special area of aerial reconnaissance as a proper role for USAF."**

*LtGen Joseph H. Moore, 2d Air Division Commander,  
December 1965.*