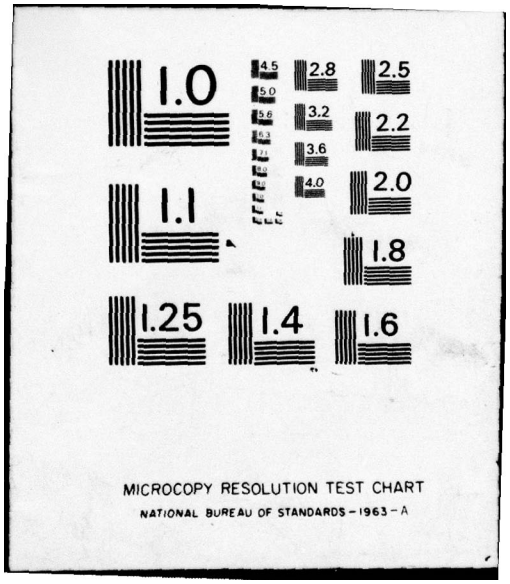
AD-A033 217 ARMY AVIATION TEST BOARD FORT RUCKER ALA F/G 17/7
EVALUATION OF REMOTE AREA TERMINAL SYSTEM (RATS).(U)
OCT 67

UNCLASSIFIED NL

1 OF 1
AD A033217

END
DATE FILMED
2-77


1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0
4.5
5.0
5.6
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS - 1963 - A

~~FOR OFFICIAL USE ONLY~~

DEPARTMENT OF THE ARMY
UNITED STATES ARMY AVIATION TEST BOARD
Fort Rucker, Alabama 36360

STEBG-TD

12 OCT 1967

SUBJECT: Report of Test, "Evaluation of Remote Area Terminal System (RATS)," USATECOM Project No. 4-7-3085-01

8 p.

THRU: Commanding General
US Army Test and Evaluation Command
ATTN: AMSTE-BG
Aberdeen Proving Ground, Maryland 21005

TO: Commanding General
US Army Materiel Command
ATTN: AMCRD-H
Washington, D.C. 20315

1. References.

a. Technical Development Plan, DA Task No. 1E1-41203-D-325-04, "Attended Area Let-Down System, Mark I," US Army Electronics Command, 1 July 1964.

b. Letter, CDCMR-E, Headquarters, US Army Combat Developments Command, 19 October 1965, subject: "Department of the Army (DA) Approved Small Development Requirement (SDR) for a Remote Area Approach and Landing System," with one inclosure (DA-Approved SDR).

c. "Handbook of Operation and Maintenance Instructions, UHF Ranging System," Sperry Phoenix Company, 3 January 1967.

d. "Army Evaluates Portable Beacon System," Aviation Week and Space Technology, 20 March 1967, page 98.

STEBG-TD
SUBJECT: Report of Test, "Evaluation of Remote Area Terminal System (RATS)," USATECOM Project No. 4-7-3085-01

e. Message, AMCRD-HA 68649, Commanding General, US Army Materiel Command, 21 June 1967, subject: "Sperry Phoenix Remote Area Terminal System (RATS)."

f. Letter, AMSTE-BG, Headquarters, US Army Test and Evaluation Command, 30 June 1967, subject: "Test Directive, Military Potential Test of Remote Area Terminal System (RATS), USATECOM Project No. 4-7-3085-01."

g. Memorandum for Record, STEBG-TP-V, US Army Aviation Test Board, 14 July 1967, subject: "Planning Conference, Evaluation of Remote Area Terminal System (RATS)."

h. Memorandum, STEBG-TP-V, US Army Aviation Test Board, 18 July 1967, subject: "Evaluation of Remote Area Terminal System (RATS)."

2. Background. The US Army Test and Evaluation Command (USATECOM) directed the US Army Aviation Test Board (USAAVNTBD) to conduct a military potential test of the Remote Area Terminal System (RATS) (reference 1f). The system was received on 25 July 1967 and installed in a UH-1B Helicopter. The installation was performed by personnel of the USAAVNTBD under direct supervision of manufacturer's representatives. Testing commenced on 4 August 1967.

3. Description of Materiel. The RATS is a UHF ranging system designed to give bearing, distance, omni-directional glide-slope information, and voice communications to rotary- or fixed-wing aircraft to identify landing areas, drop zones, and other tactical areas. The system consists of both ground and airborne equipment.

a. The airborne equipment is used in conjunction with the UHF-ADF which provides bearing information, and consists of the following:

(1) Interrogator and mount.

(2) Control panel.

(3) Range indicator.

(4) UHF/ADF auxiliary receiver.

STEBG-TD
SUBJECT: Report of Test, "Evaluation of Remote Area Terminal System (RATS)," USATECOM Project No. 4-7-3085-01

The additional equipment used with the airborne portion are the radio magnetic indicator (RMI) and omni indicator for presentation of azimuth and glide-slope information, and the marker beacon indicator light for station passage. The airborne equipment, excluding the UHF-ADF and the other standard equipment, weighs 21.9 pounds. Both 115-volt, 400-hertz a.c. and 28-volt d.c. power are required for operation.

b. The ground equipment weighs 8.4 pounds and consists of a transponder, barometric sensor, antenna, and rechargeable battery. The transponder, when interrogated by the airborne equipment, provides ranging information and voice communication to the aircraft. The barometric sensor provides information for the aircraft to be flown on a specific approach path to the ground. The approach path may be selected in the aircraft in 3-degree increments from 3 to 15 degrees.

END

4. Purpose. To determine the suitability of the test item's characteristics for operational evaluation (military potential test) in Southeast Asia.

5. Scope and Method. The RATS was operationally tested in the vicinity of Fort Rucker, Alabama, for 50 hours during the period 4 August to 22 September 1967. The airborne equipment was installed in a UH-1B Helicopter and flown in conjunction with the ground beacon located at selected tactical sites. Personnel from the US Army Aviation School and the US Army Combat Developments Command Aviation Agency participated in the evaluation. The helicopter was flown at various approach angles, headings, distances, and altitudes from the ground beacon during daylight and darkness and during marginal weather conditions. Approaches at glide angles of 3, 6, 9, 12, and 15 degrees were performed. Simulated instrument approaches were made using the ground beacon as the only terminal aid. The ground beacon was operated from selected sites simulating actual usage of the equipment during tactical operations. The following were determined:

a. Installation characteristics and requirements.

b. Maintenance requirements to determine special tools and test equipment and reliability of the test item during the test period.

STEBG-TD
SUBJECT: Report of Test, "Evaluation of Remote Area Terminal System (RATS)," USATECOM Project No. 4-7-3085-01

c. Requirements and procedures for site selection of the ground beacon and its preparation for operation.

d. Compliance of test item performance with the requirements of the SDR in the following areas:

(1) Performance characteristics as an instrument approach aid to designated landing sites.

(2) Maximum usable range.

(3) Safety aspects of system operation.

(4) System vulnerability to co-channel and adjacent channel interference.

(5) System accuracy and repeatability.

(6) Compatibility with test aircraft system.

(7) Multi-approach path capability.

(8) Satisfactoriness of ID signal from ground beacon.

(9) Satisfactoriness of glide-slope, azimuth, and range presentation.

(10) Satisfactoriness of the glide-slope ranges offered in the system design.

(11) Time and skill required for placing the ground beacon in operation.

e. Employment concepts where the beacon is the only terminal aid and when the beacon is augmented by another aid such as low-frequency nondirectional beacon (LF NDB).

f. Suitability of the system to define a holding fix.

STEBG-TD
SUBJECT: Report of Test, "Evaluation of Remote Area Terminal System (RATS)," USATECOM Project No. 4-7-3085-01

6. Results.

a. The installation of the airborne equipment in the UH-1B test bed helicopter was not standard. A standard installation would require a switching circuit to share the ID-998 azimuth indicator, ID-453 glide-slope indicator, and the marker beacon light indicator. The ground installation required the antenna to be operated in a vertical or near-vertical position so as to match transmitter and receiver antenna polarization.

b. Organizational, direct-support, and general-support maintenance requirements for the RATS were similar to those of like types of avionic equipment. An Avionic Navigational Equipment Repairman, MOS 35M20, could perform organizational maintenance without difficulty after approximately 20 hours of on-the-job training. Additional formal training would be required for direct- and general-support maintenance. No special tools or test equipment were required to perform maintenance on the system. One failure occurred during the test period.

c. There were no special requirements, preparation, or procedures for site selection for the ground beacon.

d. The system complied with the SDR in most areas of operational characteristics. Azimuth, range, and glide slope for 360 degrees around the ground beacon were provided. The glide-slope angle (selectable in the aircraft) was from 3 degrees to 15 degrees in 3-degree increments and complied with the essential portion of the SDR, but did not comply with the desired glide angle of 0 - 30 degrees. Pilots reported that approaches at glide angles of 9 degrees and above with no wind were out of the safe flight envelope of the helicopter.

(1) The maximum usable range of the system depended upon the altitude of the helicopter and the height of the beacon antenna above ground. The system exceeded the SDR criteria of 5 miles, 200 feet above level ground.

(2) Both the airborne and ground equipment were safe to operate. Indication of failure of either unit was presented to the ground

operator by an AGC/power meter and to the airborne operator by a light on the control head and a flag on the glide-slope indicator.

(3) The system was vulnerable to co-channel and adjacent channel interference. Any radio signal on the assigned or adjacent frequencies of the airborne unit would interfere.

(4) The range accuracy, computed from known ground points, was two-tenths of a mile at distances up to 30 miles.

(5) The system was compatible with the test bed helicopter and installed equipment except for radio frequency interference (paragraph 6d(3)).

(6) The system provided multiple-approach path capability for 360 degrees around the ground beacon. However, the system design prevented use of the approach path by more than one aircraft at a time.

(7) Identification of the ground beacon was provided by direct voice communication. The identification signal was satisfactory.

(8) The glide-slope, azimuth, and range presentations were satisfactory.

(9) The glide-slope ranges of the system were satisfactory.

(10) No special skills were required for placing the ground beacon into operation. Time required was approximately two minutes.

e. An assessment of the employment concept revealed that:

(1) With the ground beacon as the only terminal aid, only one aircraft at a time could utilize the beacon in its present configuration. The manufacturer stated, however, that multi-aircraft usage is under study and is possible. Tests conducted by project personnel revealed that if multi-aircraft usage was possible, as many as four aircraft at a time on a glide slope of 6 degrees could use the ground beacon for holding at the same altitude.

(2) Multi-aircraft usage of the ground beacon when augmented by a low-frequency non-directional beacon (LF NDB) was possible on a time-sharing basis. One aircraft could use the ground beacon for an approach while other aircraft used the LF NDB for holding until the approach of the single aircraft had been completed.

f. The capability of the system to define a holding fix was satisfactory.

7. Conclusions.

a. The Remote Area Terminal System in its present configuration is suitable for operational evaluation (military potential test) in Southeast Asia.

b. Further development of the system for simultaneous use by several aircraft would enhance its suitability.

8. Recommendation. It is recommended that, after successful completion of operational evaluation (military potential test), the system be service tested.

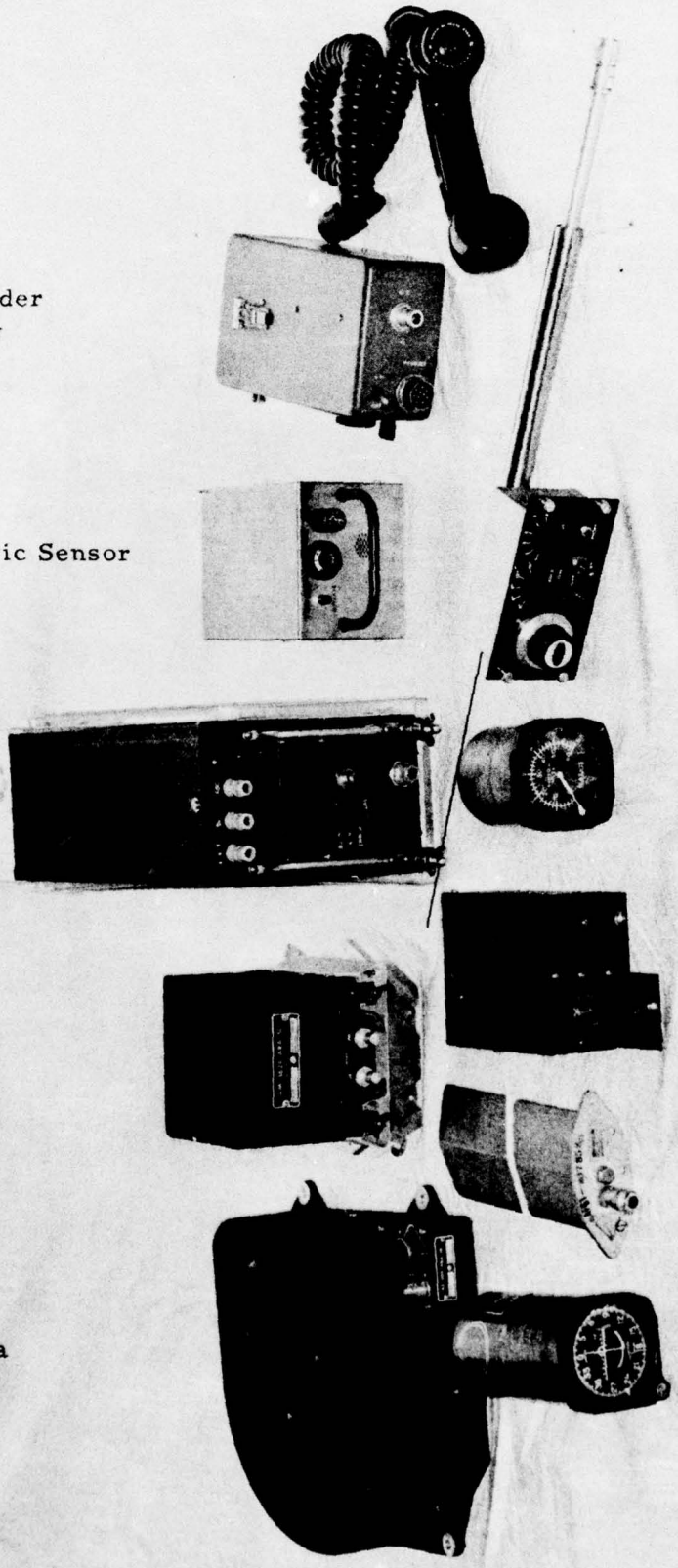
1 Incl
Photograph

DAVID M. KYLE
Colonel, Artillery
President

Copy furnished (to be effected by Headquarters, USATECOM):

Commanding General
US Continental Army Command
Fort Monroe, Virginia 23351

Commanding General
US Army Electronics Command
Fort Monmouth, New Jersey 07703


Handset
Ground Transponder and Power Supply
Ground Transponder Antenna
Ground Barometric Sensor
Control Head
Interrogator with Mount
Range Indicator
UHF/ADF Auxiliary Receiver
UHF/ADF Servo Amplifier
UHF Antenna
UHF/ADF Antenna
Course Indicator

INCLOSURE