UNITED STATES ARMY AVIATION BOARD
Fort Rucker, Alabama

25 APR 1960

ATBG-DT-AVN 3060

SUBJECT: Evaluation of the ARC Type R-34A Digital-Tuned VOR Radio Receiver with C-81A Control Unit.

TO: Commanding General
United States Continental Army Command
Fort Monroe, Virginia
ATTN: ATDEV

I. AUTHORITY. Paragraph 5M, Materiel Developments Program, FY 60, Headquarters, USCONARC, dated 1 July 1959.

II. PURPOSE. To conduct an evaluation of the ARC Type R-34A Digital-Tuned VOR Radio Receiver with C-81A control unit to determine the suitability of this type of equipment for Army use.

III. SCOPE. Two R-34A VOR radio receivers were installed in each of two L-23D Airplanes assigned to the US Army Aviation Board and to the US Army Aviation Center, respectively, and were utilized during normal operations. A comparison was made between digital-type tuning and the standard manual-type equipment presently used in Army aircraft. The degree of maintenance required was evaluated by United States Army Signal Aviation Test and Support Activity using AR 750-6 as a guide.

IV. GENERAL INFORMATION.

1. Background. In October of 1959, the Aviation Board obtained, from Aircraft Radio Corporation, models of their digitally-tuned VOR receivers designed as a replacement for the receiver component of the AN/ARN-30A VOR set. Information available to this Board indicates that future procurement of VOR receivers will include digital tuning; therefore, it was deemed advisable to evaluate digital tuning prior to any type-classification action.

2. Description of Materiel.

a. The ARC Type R-34A Receiver is an airborne navigation-communication receiver which operates in the frequency range of 108.00 to 126.90 megacycles. A total of 190 channels spaced 100 kilocycles

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apart is available. Remote tuning is accomplished electrically, and is crystal controlled. Maximum channeling time is four seconds. The ARC Type R-34A receiver is directly interchangeable with the receiver component of the AN/ARN-30A with no resulting increase in weight, size, or power requirements. Power requirement is 1.8 amperes at 27.5 volts d.c.

b. The ARC Type C-81A control unit has an edge-lighted plastic panel and is designed for use in aircraft equipped with console mounting facilities. Available controls are an on-off switch, a volume control, a channel-selector switch assembly, and a squelch control. The channel selector switch assembly contains a megacycle channel selector switch (with frequencies from 108 to 126 mc. available in 1.0 mc. steps) and a fractional megacycle channel selector switch (with frequencies from 0.00 mc. to 0.90 mc. in 0.10 mc. steps). From 108.00 mc. through 111.90 mc., automatic switching between VOR and VAR/Localizer operation is controlled by setting of the fractional megacycle selector switch; on even-tenth-megacycle settings the equipment is set for VOR operation and on odd-tenth-megacycle settings the equipment is set for VAR/Localizer operation.

V. TESTS.

1. Suitability of Digital Tuning. A comparison was made between the standard AN/ARN-30A and the AN/ARN-30A modified by the addition of the test item. Pilot opinion was substantially as follows:

a. Digital-type tuning was preferred to manual-type tuning.

b. The ARC Type R-34A receivers operated satisfactorily.

c. The controls on the C-81A control unit were arranged satisfactorily for easy manipulation.

d. The automatic selection of VAR/Localizer or VOR mode offered by the ARC Type R-34A provided a greater margin of safety by relieving the pilot of the necessity of manually selecting the proper mode.

e. The combination of easier, more rapid and positive tuning of the ARC Type R-34A resulted in an increase in safety, especially during instrument flights.

2. Maintenance. Only routine maintenance was required during the period of this evaluation, and only normal inspections and operational checks were performed. A copy of USASATSA's report is attached as inclosure 1.

VI. CONCLUSIONS.

1. Digital tuning of the type used in the ARC Type R-34A receiver with C-81A control unit is superior to manual tuning of the type used in the receiver component of the AN/ARN-30A VOR set.

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2. Automatic VAR/Localizer selection is a desirable feature.

VII. RECOMMENDATIONS. It is recommended that:

(1) Digital tuning plus automatic VAR/Localizer selection be standard features of all future VOR receivers.

(2) The feasibility of modifying existing Army VOR receivers to include these features be investigated.

(3) The Caribou, Mohawk, and any new production aircraft be equipped with digitally-tuned VOR radio receivers.

VIII. REFERENCES.

END ABSTRACT

1. Instruction Book, Aircraft Radio Corporation, June 1959, subject: "Preliminary Instructions for ARC Type R-34A Receiver."

2. Message, ATBG-DG 1-35, US Army Aviation Board, 24 November 1959.

3. Letter, SIGAU, US Army Signal Aviation Test and Support Activity, 17 March 1960, subject: "Letter Report, USASATSA, Project Nr. 1-60, Maintenance Support Evaluation of USAAB Evaluation of ARC Type R-34A VOR with C-81A Control Unit."

Jack L Marinelli

JACK L. MARINELLI
Colonel, Artillery
President

1 Incl
Ltr, SIGAU, USASATSA,
17 Mar 60, subj:
"Letter Report, USASATSA,
Proj Nr. 1-60, Maintenance
Support Evaluation of USAAB
Evaluation of ARC Type R-34A
VOR with C-81A Control Unit"

SIGAU 17 March 1960

SUBJECT: Letter Report, USASATSA Project Nr. 1-60, Maintenance Support of USAAB Evaluation of ARC Type R-34A VOR with C-81A Control Unit

TO: President
United States Army Aviation Board
Fort Rucker, Alabama

The following information is furnished for incorporation in the Maintenance Portion of your Report of Test:

a. Only routine maintenance was required during the period of this evaluation, and only normal inspections and operational checks were performed.

b. When the Glide Slope Receiver, R-746 or ARC Type R-31A, is used in conjunction with the R-34A Omni Receiver, the C-81A Control Unit must be replaced with the C-88A Control Unit. However, ARC Type 16210 Connector on the C-88A Control Unit is an eight pin connector and twelve pins are required for Glide Slope operation. Four of the glide slope wires must go through ARC Type 16115 Connector, part of the C-88A. Since the omni wires must go directly into the connector from an enclosed mechanical linkage, it is necessary to cut a hole into the side of ARC Type 16115 Connector to install the remaining four glide slope wires. It is recommended that the C-88A Control Unit be modified by replacing ARC Type 16210 Connector with a connector which has a minimum of twelve pins.

STEPHEN S. DOHERTY
Lt. Colonel, Signal Corps
Commanding

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