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1st Part of Report No. AAE/879/1. 7

MINISTRY OF SUPPLY

**AEROPLANE AND ARMAMENT
EXPERIMENTAL ESTABLISHMENT**

BOSCOMBE DOWN

CLASSIFICATION CHANGED

TO CONFIDENTIAL

AUTH *84. Order 10501*

BY *R.C. Sutton*

DATE MAY 12 1954

DRAGONFLY MK.3 WG.666

RADIO ACCEPTANCE TRIALS

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1st Part of Report No. AAE/879/1.

AEROPLANE AND ARMAMENT EXPERIMENTAL ESTABLISHMENT
BOSCOMBE DOWN

-2. DEC. 1953

Dragonfly Mk.3 WG.666

Radio Acceptance Trials

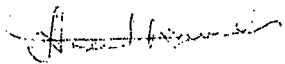
A. & A.E.E. Ref: AAE/411/68/Radio
M. O. S. Ref: 44th Joint Radio Meeting, M.O.S., A. & A.E.E.
Period of Trials: 28th June, 1953 to 17th September, 1953.

Summary

Radio Acceptance Trials have been carried out on Dragonfly Mk. 3 WG.666 prior to C.S.(A) release. The aircraft was fitted with TR.1520, Z.B.X., AN/APX-1 and S.C.R.718A.

As a result of these trials the installations are considered acceptable for Service use providing the undesirable features detailed under para. 8 are cleared wherever possible.

This report is issued with the authority of


Air Commodore,
Commanding A. & A.E.E.

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/Introduction.....

1. Introduction

1.1. Radio Acceptance Trials were required on a Dragonfly Mk. 3 aircraft equipped with:-

A.R.I. 5272 - T.R.1520
A.R.I. 5679 - AN/ANEX-1
A.R.I. 5307 - Z.B.X.
A.R.I. 5393 - S.C.R.718A.

The trials were carried out on Dragonfly Mk. 3 WG.666.

2. Object of Trials

2.1. To test the radio installations prior to C.S.(A) clearance being given.

2.2. To make recommendations for modifications, either to the installation or equipments as considered necessary.

3. Reports Issued

3.1. Reports Issued:- Nil.

3.2. Included in this Report:- A.R.I. 5272, A.R.I. 5679,
A.R.I. 5307 and A.R.I. 5393.

3.3. Reports to follow:- Nil.

4. A.R.I. 5272

4.1. Installation Details

4.1.1. The transmitter -receiver T.R.1520 was mounted in the rear compartment of the fuselage (Fig. 1), and was satisfactory for operation and maintenance.

4.1.2. The control unit was mounted on the port side of the fuselage (Fig. 2). This position was satisfactory for operation and maintenance.

4.1.3. The "press to transmit" switch mounted on the control column was not ideally situated for quick and easy operation (Fig. 2). The normal method employed was to drop the wrist onto the switch and hold it depressed by wrist pressure. It was found that when the force required on the control column was of any magnitude, the wrist tended to slip off the switch and release it. A position nearer, or on, the ribbed grip would enable positive pressure by the fingers to be applied to the press-to-transmit switch and would avoid accidental release during transmissions.

4.1.4. The aerial type 226 was mounted on the boom (Fig. 3).

4.2. Procedure for Trials

4.2.1. Polar Diagrams. The aircraft was flown on courses at intervals of 10° through 360° over a predetermined pinpoint, 20 nautical miles distant, at an altitude of 2,000 feet. Measurements were made as the aircraft passed over the centre of the pinpoint, flying straight and level, with its transmitter radiating.

4.2.2. Range Runs. The aircraft was flown on a steady course from base, at an altitude of 2,000 feet, and visual pinpoints were obtained when communication was lost on the tail aspect. The aircraft continued on course for a further ten miles and was then turned on to a reciprocal course. When communication was re-established another pinpoint was obtained.

/4.3....

4.3. Results

4.3.1. Polar Diagram. The results of the polar diagram runs are given in Fig. 8 and are satisfactory.

4.3.2. Range Tests. The maximum range obtained on the tail aspect was 63 nautical miles and on the head aspect 60 nautical miles.

4.3.3. Intercommunication. This was satisfactory. The A.1134A which is to "Special Order Only" together with Modifications numbered 8 and 39 were not fitted to this aircraft. There does not appear to be any reason to doubt the satisfactory performance of these items when required to be fitted.

5. A.R.I.5307 (Z.B.X.)

5.1. Installation Details

5.1.1. The receiver was mounted on the starboard side of the cockpit, to the rear of the entrance door (Fig. 4). This position was satisfactory for maintenance.

5.1.2. The control unit was mounted on the port side, on a panel (Fig. 2). This position was satisfactory for operation.

5.1.3. The aerial was mounted on the underside of the cabin (Fig. 5)

5.2. Procedure for Trials

5.2.1. The aircraft was flown on a steady course from base, at an altitude of 2,000 feet, and a visual pinpoint obtained when the beacon was no longer of use for navigational purposes. The aircraft continued on course for a further five miles and was then turned on to a reciprocal course. When the signal was again useable for navigation purposes another fix was taken.

5.3. Results

5.3.1. The maximum range obtained on both head and tail aspects was 35 nautical miles at 2,000 feet.

6. AN/APX-1 (A.R.I.5679)

6.1. Installation Details

6.1.1. The transmitter-receiver type AN/APX-1 and its associated controller C55/APX-1, were mounted on the right hand side of the compartment at the rear of the fuselage (Fig. 6). Both positions were satisfactory for servicing, but the coding unit could not be operated by any member of the crew.

6.1.2. Controller type C53/APX-1 was fitted into a switch panel mounted on the port side of the pilot's cockpit (Fig. 2) and was within easy reach of the pilot.

6.1.3. The I.F.F. Aerial was mounted on the forward part of the boom very close to the main fuselage (Fig. 3), resulting in severe screening of the aerial on the head aspect.

6.2. Procedure for Trials

6.2.1. To obtain the polar diagram of the I.F.F. aerial, the aircraft carried out a series of straight and level runs every 10° through 360°, over a selected pinpoint, 20 nautical miles from base, at an altitude of 2,000 feet.

6.2.2. To check the maximum range of the installation, the aircraft was flown on a straight course from base at an altitude of 2,000 feet, observations of the I.F.F. responses being made on a standard ground interrogator system operating on a frequency of 176 Mc/s.

/6.3.....

6.3. Results

6.3.1. Polar Diagram. The results are shown in Fig. 9, and are not satisfactory due to screening by the fuselage on the forward aspects.

6.3.2. 'A' Band Range Test. When interrogated by a standard ground equipment, with the aircraft flying at 2,000 feet, the maximum range on the tail aspect was 45 nautical miles, and on the head aspect 30 nautical miles, signal-to-noise ratio curves are shown in Fig. 10.

6.3.3. 'Rooster' Range Test. When using a standard ground interrogator tuned to a frequency of 176 mc/s, and the aircraft flying at 2,000 feet, the maximum range on the tail aspect was 43 nautical miles, and on the head aspect 25 nautical miles. The results are shown in Fig. 10.

7. S.C.R. 718A (A.R.I. 5393)

7.1. Installation Details

7.1.1. The transmitter-receiver was mounted on the floor of the compartment at the rear of the fuselage (Fig. 7) in a satisfactory position for servicing.

7.1.2. Due to this installation being fitted to "Special order Only" no provision had been made in the aircraft tested for mounting the indicator. For the purpose of the trials, however, a temporary mount was made and fitted on top of the Z.B.X. receiver (Fig. 4), the final position not being known, no installation comments are made.

7.1.3. The receiving aerial was mounted on the aft end of the boom (Fig. 3) and the transmitting aerial under the pilot's cabin (Fig. 5), both positions were satisfactory for operational requirements.

7.2. Procedure for Trial

7.2.1. To determine any errors in the altimeter readings due to aircraft installation or interference from other aircraft equipments, a calibrated barometric altimeter was fitted alongside the S.C.R. 718A indicator, and spot readings were taken off both instruments at a number of different heights up to the maximum ceiling of this particular aircraft. All other electrical services were switched on during the period of the trial.

7.3. Results

7.3.1. The tests were carried out over Southampton water and readings were taken at a constant cruising speed of 45 knots.

7.3.2. Two sets of readings were taken (a) aircraft ascending (b) Aircraft descending, the numerical results being as follows:-

	(b) <u>S.C.R. 718</u>	(a)
<u>Barometric Alt.</u>	<u>Ascending</u>	<u>Descending</u>
100	100	100
200	225	200
300	325	300
400	450	400
500	500	500
600	600	600
700	700	700
800	825	800
900	900	900
1,000	1,000	1,000
2,000	2,050	2,000
3,000	3,025	3,000
4,000	4,050	4,050
5,000	5,000	5,000
6,000	6,050	6,050
7,000	7,050	7,050
8,000	8,050	8,050
9,000	9,100	9,100

/A graph...

A graph showing percentage error for the average of ascent and descent readings is given in Fig. 11.

7.3.3. The accuracy with which the Barometric altimeter could be read was ± 10 feet.

7.3.4. The S.C.R. 718 could be read with an accuracy of ± 25 feet.

7.3.5. The aircraft attitude appeared to make very little, if any difference to the accuracy of the readings.

7.3.6. It is essential that a visor be fitted to the Indicator to prevent direct sunlight from rendering the display useless.

8. Inter Equipment interference

No inter-equipment interference was observed.

9. Conclusions

9.1. T.R.1520. It is suggested that a more suitable position be found for the "press to transmit" switch, so that the normal "wrist down" technique can be employed successfully, otherwise the installation is satisfactory.

9.2. Z.B.X. This installation is satisfactory for both operation and maintenance.

9.3. AN/APX-1

- (a) The coding switch cannot be reached by the operator under flight conditions.
- (b) The Aerial position is unsatisfactory due to screening by the fuselage on forward aspects, and needs re-positioning.

9.4. S.C.R. 718A

- (a) This installation is satisfactory, but due to the absence of an Indicator or mounting in the aircraft tested, no criticism could be made of its position.
- (b) It is essential that a visor be fitted to the Indicator C.R.T. when installed.

Circulation List

D.L.R.D.A./A.L.10	2 copies, 1 for Action
A.D.R.D.L.1.	1 copy
T.P.A.3/T.I.B.1c.	75 copies
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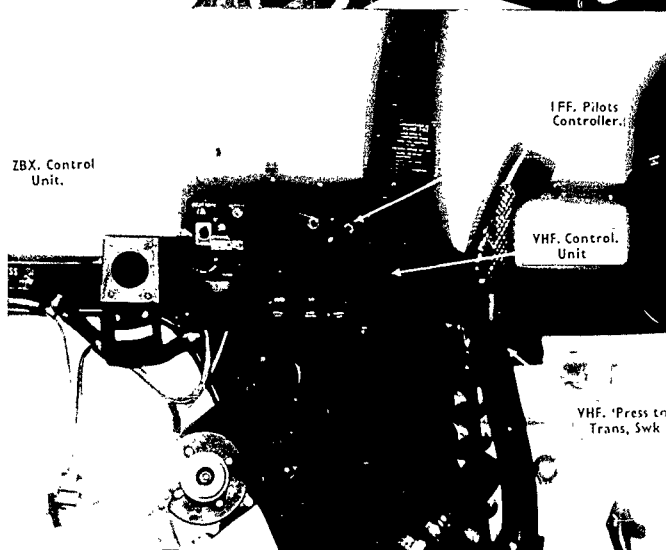
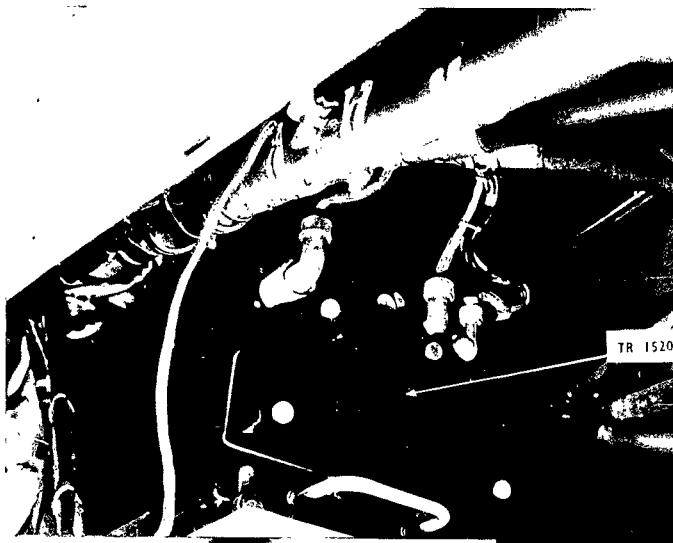


FIG 4

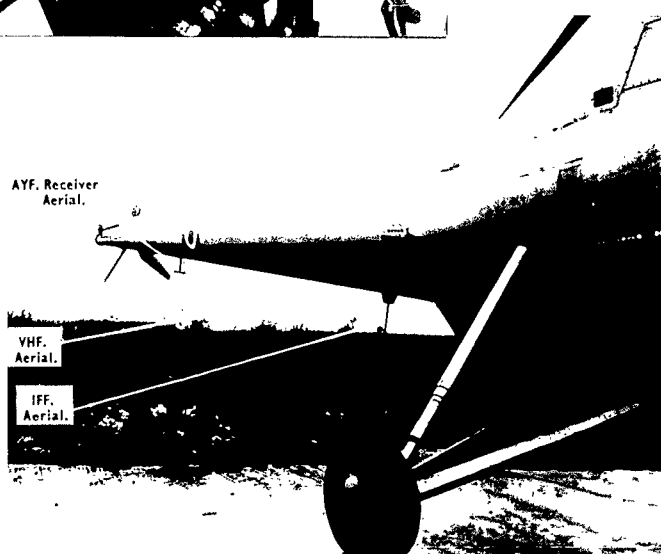


FIG 5 A N A I E R E N

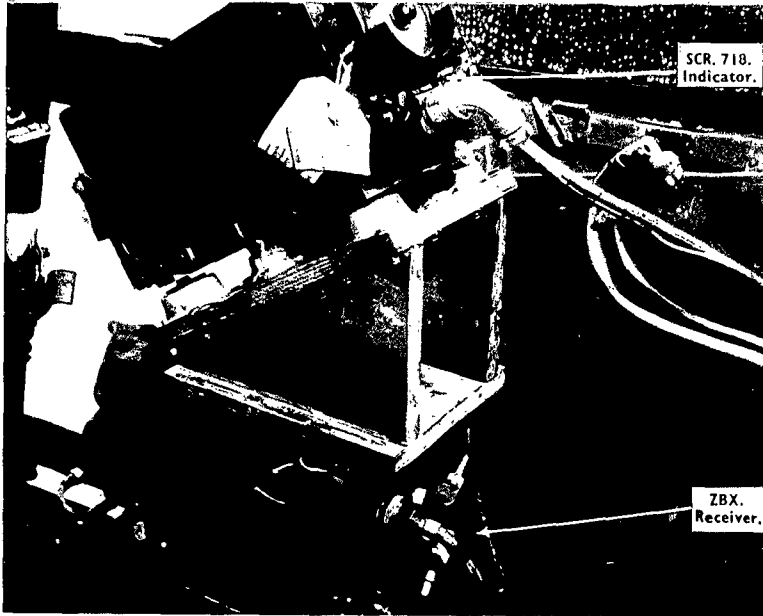


FIG 4.



FIG.5.



FIG.6.



FIG.7.

DRAGONFLY MK.3 WGS 666 TR. 7.2 CH. J. SIMPSON APP. K. 111 for 50 ft 12. 11. 66

FREQUENCY 142.74 M³/s
DISTANCE FROM BASE: 80 NAUTICAL MILES
HEIGHT ABOVE MEAN SEA LEVEL: 2000 FT.

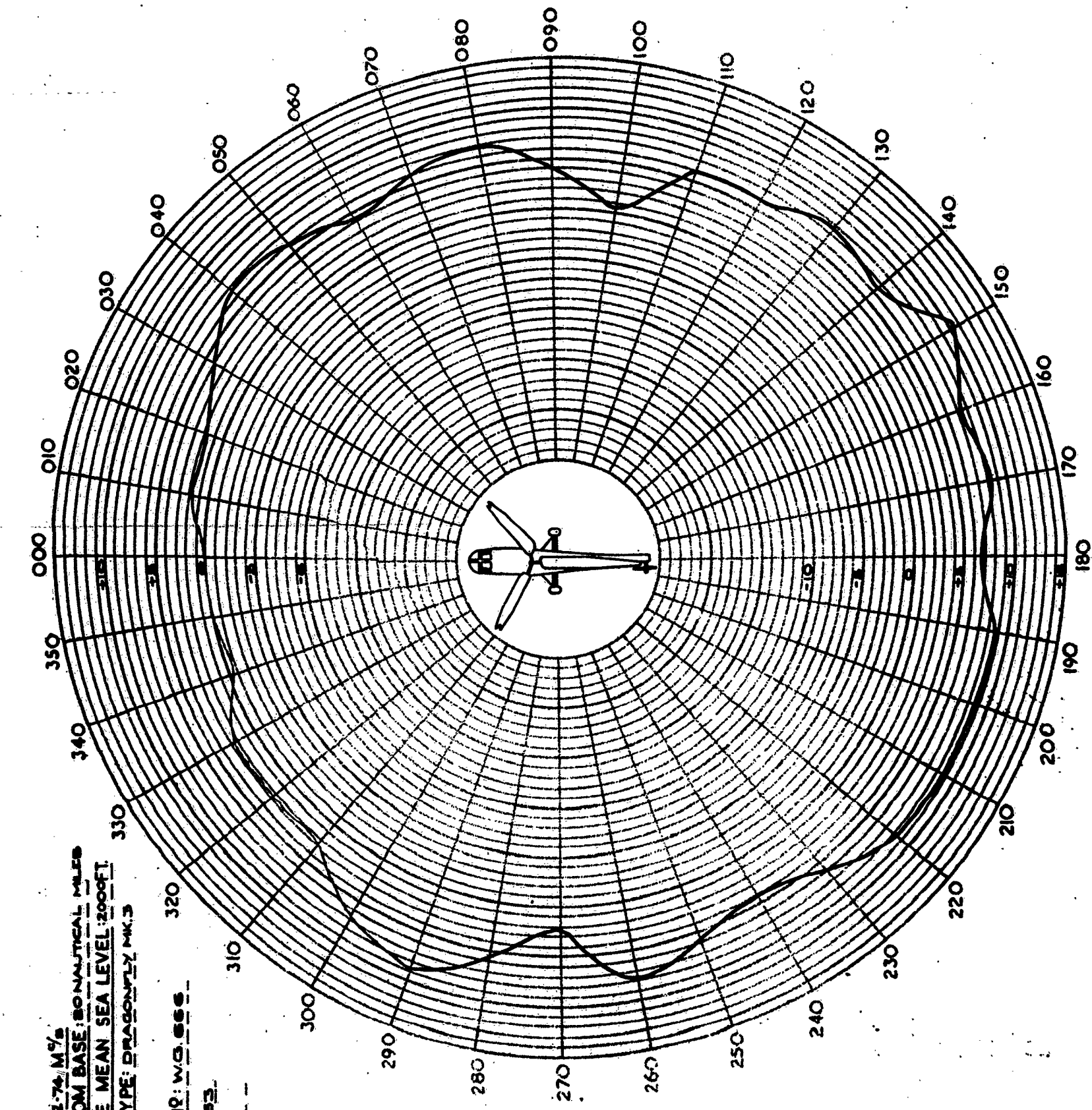
TYPE: DRAGONFLY MK.3

AIRCRAFT:

NR: WG. 666

DATE: 26.5.53

A.R.I. 5272



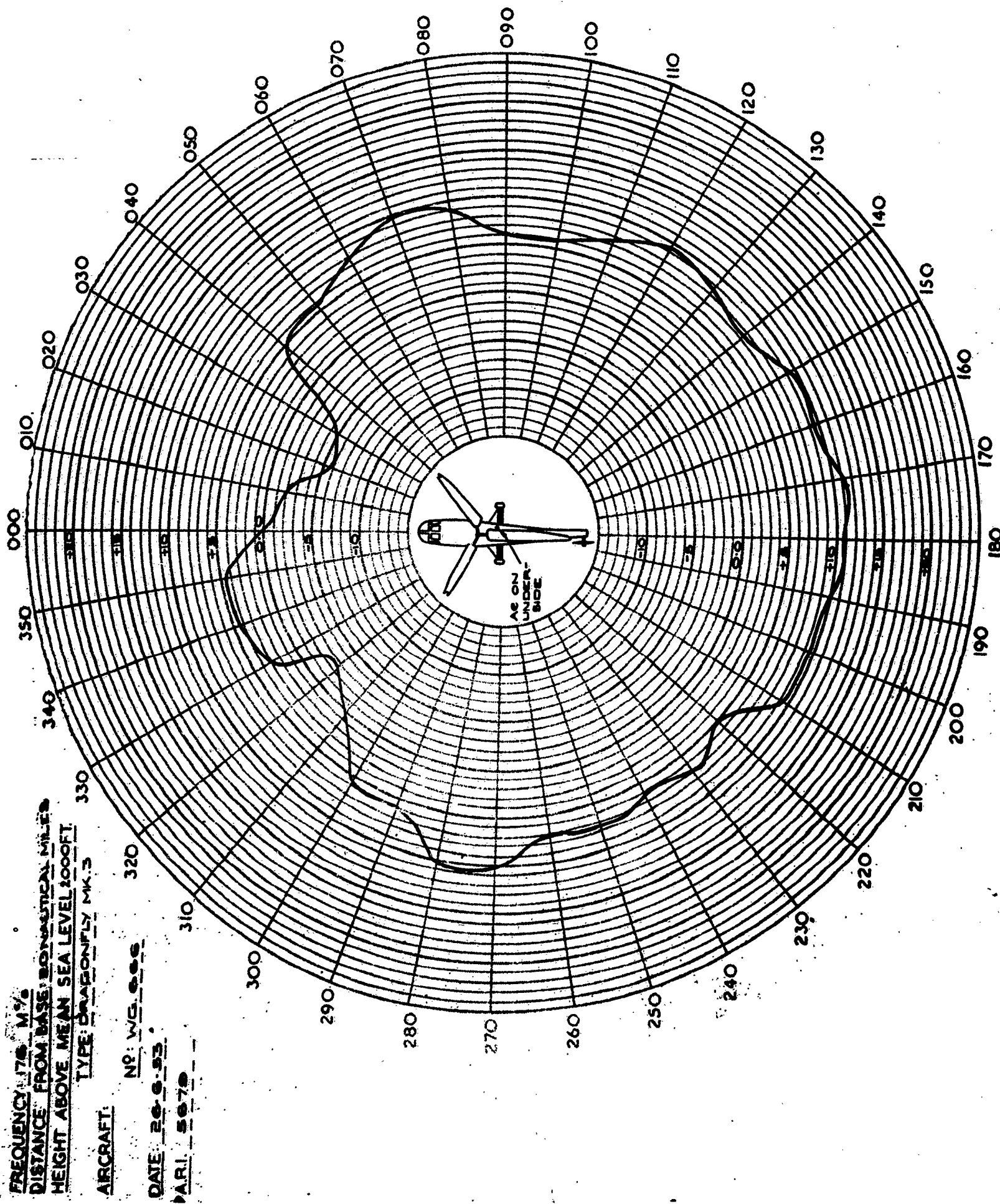
dBs $\pm$ RELATIVE TO HEAD ASPECT

VHF POLAR DIAGRAM
OF

AERIAL SYSTEM TYPE 226 USED ON AIRCRAFT DRAGONFLY WG. 666

FIG. 8

FIG. 9

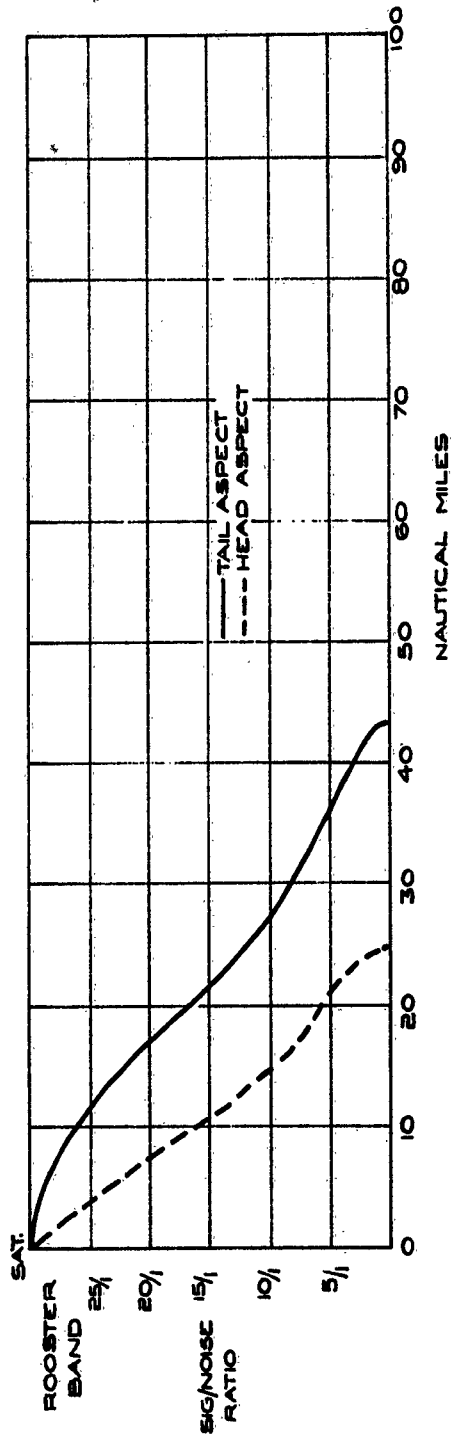
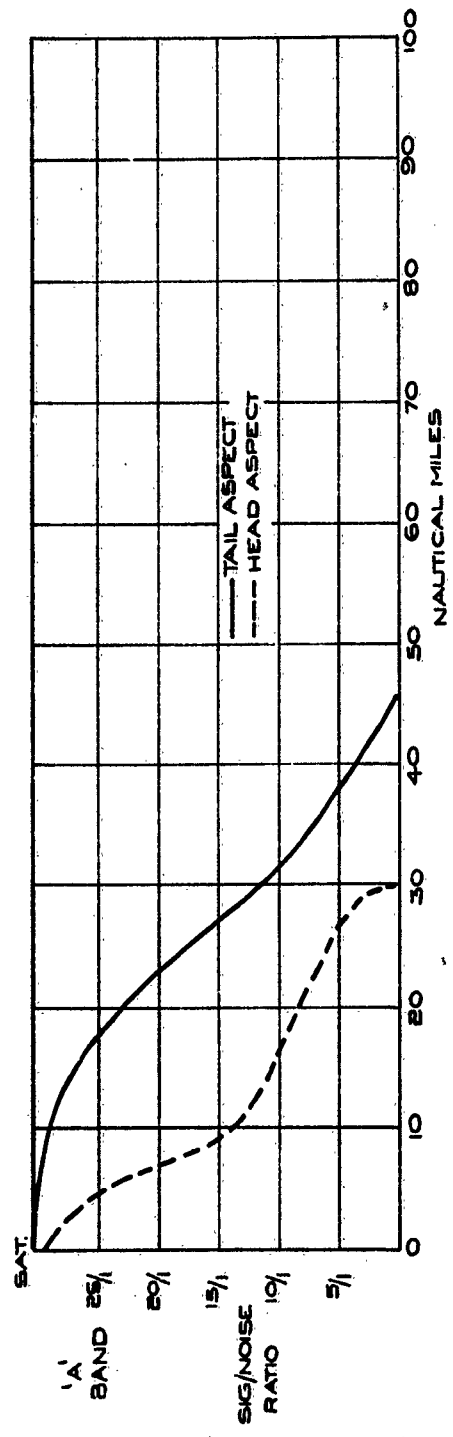


POLAR DIAGRAM

OF

AERIAL SYSTEM TYPE 90 USED ON AIRCRAFT DRAGONFLY MK. 3

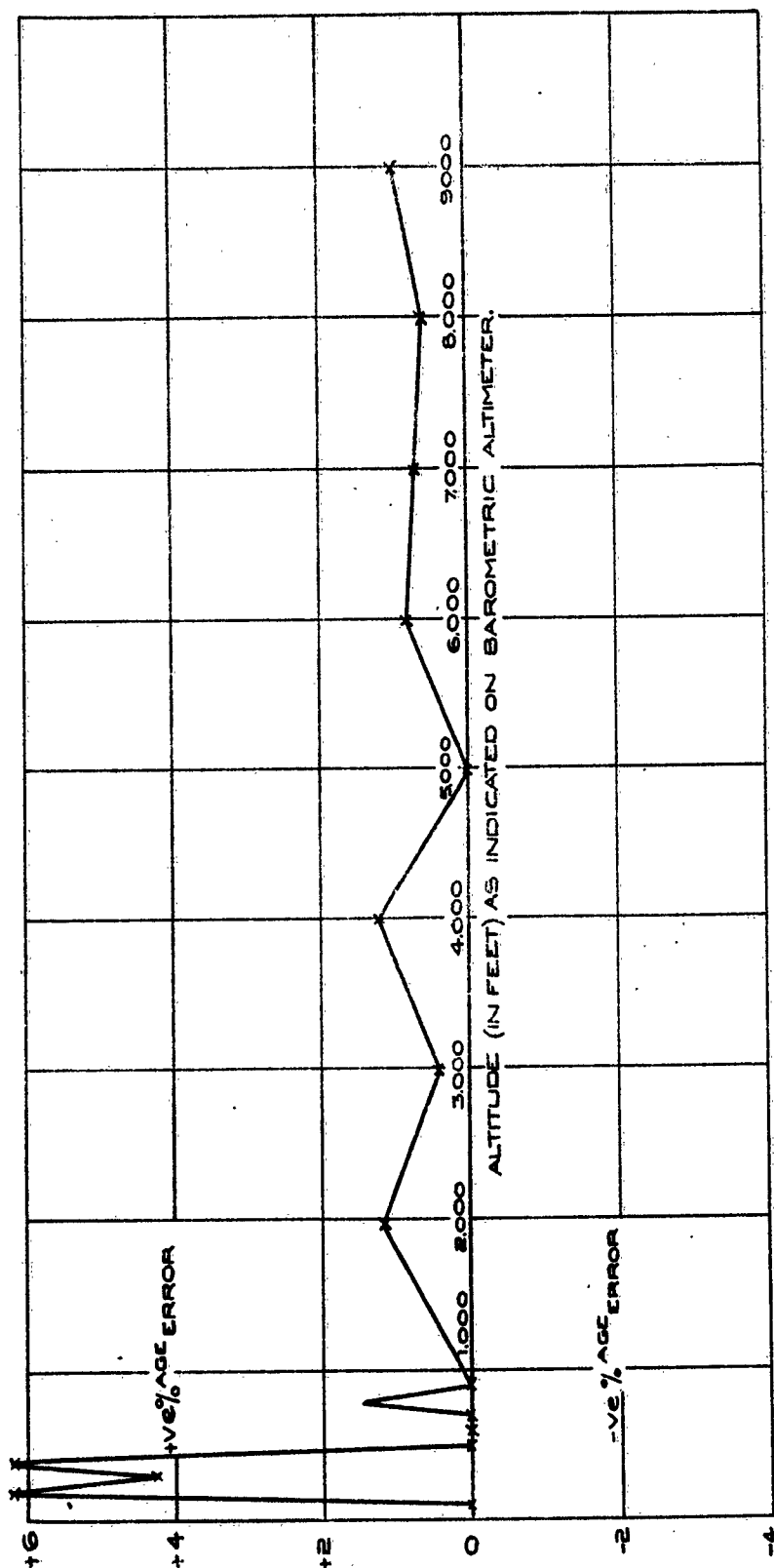
IFF (AN/APX-1) RANGE TESTS
HEIGHT 2,000 FEET.



IFF. (AN/APX-1) RANGE TESTS.

FIG. 10

FIG. II



GRAPH SHOWING AVERAGE PERCENTAGE ERROR IN HEIGHT AGAINST TRUE HEIGHT.



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