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NAVAL AIR FIGHTING DEVELOPMENT UNIT

CENTRAL FIGHTER ESTABLISHMENT
R.A.F. WEST RAYNHAM

TRIAL REPORT

TITLE - INTERIM REPORT ON SEAFIRE 47 -, GENERAL SERVICE TRIALS.

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R.A.F. STATION. WEST RAYNHAM.

INTERIM REPORT ON

SEAFIRE 47 GENERAL SERVICE TRIALS.

TRIAL NO. 194/NAFDU/197. 9TH MAY, 1949.

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1. INTRODUCTION.

1(1) In accordance with H.A.C. Form 101 of 20th March, 1947, General Service Trials on the 'clean' aircraft have now been completed.

1(2) Seafire 47 PS 955 was received on 3rd November, 1947, and Seafire 47 PS 957 on 20th January, 1948.

The trial has been delayed for the following reasons:-

(a) Unserviceability of PS 955 necessitating the transfer of trials equipment to PS 957.

(b) Periodical unserviceability of both aircraft awaiting AOG items.

(c) General grounding of all Seafire 47 aircraft.

(d) Damage to the fin and rudder of PS 957..

1(3) The Seafire 47 is a single seat low wing monoplane fighter and fighter bomber. It is powered with a Rolls Royce Griffon 87 or 88 engine driving a Rotol 6 blade, constant speed, contra propeller. The aircraft carries 152 gallons of internal fuel in 7 tanks, all of which are self-sealing with the exception of the upper fuselage tank. In addition, the aircraft can carry a 22½ gallon combat tank under each wing and a 50 gallon drop tank under the fuselage, giving a total fuel capacity of 247 gallons.

11. GENERAL AND FLIGHT CHARACTERISTICS.

11(1) Engine Starting. The starting technique as laid down in Pilots' Notes has been found satisfactory. It is stressed, however, that the engine may be easily over primed. One full stroke of the priming pump is all that is required for a 'cold' start except in extremely cold weather. The engine takes 1½-2 minutes to reach its minimum take-off temperature on an average winter's day in this country.

11(2) Handling on the Ground. The aircraft is easy to taxy; little recourse to the brakes is necessary, except when manoeuvring in confined spaces; forward view is however, very poor and constant weaving is necessary in order to see ahead.

11(3) Handling in the Air. At low speeds, in the 'clean' condition' the controls are very sensitive in the pitching plane. In particular, in the climb, when the emptying of the rear fuselage tank and the opening of the radiator flaps induce changes of longitudinal trim, the pilot's attention is constantly required in keeping the aircraft in an accurate climbing attitude. In general flight at medium altitudes and for aerobatics, the Seafire 47 handles in much the same way as previous marks of Seafire, with the exception, in the case of the 47, that due to the contra-prop there is very little alteration of rudder trim with changes of power and speed.

The handling qualities of the aircraft at high altitudes are reasonably good, but above 32,000' it is difficult to maintain a really effective climbing attitude. Trouble has also been experienced at high altitudes with the stiffening of the controls, particularly the ailerons. Violent lateral movement of the control column frees the controls quickly; but they begin to stiffen up again almost immediately afterwards.

When flying with the rear fuselage tank full, the aircraft shows a marked tendency to tighten up in turns; and at high altitudes, with or without the rear tank full this 'tightening up' tendency is noticeable.

There is considerably more vibration in the 47 than that encountered on earlier marks of Seafire; it occurs at nearly all engine powers but is particularly noticeable at low RPM and high boost conditions.

The cockpit of the Seafire 47 is small, and a large pilot is forced to sit in a hunched attitude, which although ideal for combat, becomes uncomfortable on long sorties. The positioning of several of the controls, in particular the fuel cocks and Grid ring of the compass is such that they can not be reached without loosening the safety harness. The safety harness release is awkwardly positioned, being situated too high and too far aft in the cockpit to be accessible. Considerable physical effort is required to reach this control.

The instructions laid down in Pilots' Notes for the management of the fuel system are satisfactory, but nevertheless complicated; and very considerable thought is required by the pilot on this point, particularly when wing combat and drop tanks are fitted. On low flying sorties it is vital that the pilot should keep a very close watch on his fuel state. Should the pilot be flying on the rear fuselage or drop tank and either tank inadvertently run dry; the time required to release the harness, lower the seat and reselect the awkwardly situated fuel cocks may cause him to lose flying speed before the engine picks up again.

There is no cockpit heating other than that indirectly derived from the engine and on prolonged sorties at high altitude the cockpit becomes uncomfortably cold.

11(4) Take-off and Landing. Take-off in the 47 is easier than in previous marks of Seafire, since there is no tendency to swing. The landing presents no new problem except for the very marked drop of the nose if power is taken off quickly.

11(5) Instrument and bad weather flying. The Seafire 47 is uncomfortable to fly in 'bumpy' conditions; in particular the rudder is very sensitive and it is very easy to over-correct. In addition, the forward view is very poor, particularly in low visibility when it is necessary to make continuous 'S' turns in order to see ahead.

Instrument flying is quite satisfactory and all the instruments, with the exception of the engine speed indicator are visible with the seat fully lowered and up to the half raised position; with the seat any higher the top half of the instrument panel is obscured.

The de-icer is satisfactory and will clear moderate ice formations from the front panel of the windscreen.

11(6) Night flying. The aircraft has not been flown under completely dark conditions, but several flights at dusk showed that exhaust glare would make night flying difficult; since even at dusk the exhausts present a blinding glare to the pilot. The red cockpit lighting at present fitted is satisfactory, but U.V. lighting would be desirable if the aircraft were to be used regularly at night.

11(7) Low flying. The aircraft is very manoeuvrable, but the very poor forward view makes low flying and pin-pointing difficult, in all but the fairest weather.

11(8) Pilot navigation. The cramped conditions in the cockpit make the operation of a plotting board uncomfortable and difficult. Maps have to be carried in the leg pocket of the pilots flying suit since no stowage is provided in the aircraft.

When flying at low airspeeds, viz flying for range, the increased angle of attack further restricts the already poor forward view and limits pin-pointing to objects fine on the bow or on the quarter.

11(9) Misting. The de-mister is only partially effective; although it will keep the inside of the front windscreen clear, it has no effect on the side panels which mist up completely when descending rapidly from altitude. Rubbing the panels with the glove clears them temporarily but the mist soon reforms; flying around at low altitude for 5-10 minutes is usually necessary to clear them satisfactorily.

A layer of ice may also form on the inside of the panels and this can take anything up to 10 minutes to clear. Opening the canopy at low altitudes will assist in dispersing either mist or ice. It is recommended that the hot air de-mister be made to operate on all windscreen panels and not the front one only. The canopy does not appear to be susceptible to misting.

11(10) Conclusions.

(i) The Seafire 47 handles much the same as previous Marks of Seafire ; the cockpit is however more cramped and pilot fatigue is considerable on long sorties.

(ii) The aircraft has a good high altitude performance, but the cockpit heating is inadequate for prolonged flights at high altitude.

(iii) Exhaust glare makes the aircraft unsuitable for night operations.

(iv) Misting of the windscreens is a serious handicap if a rapid descent is made from high altitude, which could be remedied by the provision of heating on the side panels.

(v) The engine speed indicator is difficult to read in its present position.

11(11) Recommendations.

(i) That the engine speed indicator should be resighted in the position now occupied by the supercharger gear change switch and the switch placed in the position occupied by the indicator.

(ii) That the safety harness release should be placed lower and further foward in the cockpit for greater accessability and easier operation.

(iii) That an improved demister should be installed which will direct hot air into the side panels of the windscreen as well as the front one.

111. TACTICAL CHARACTERISTICS.

111(1) H.A.C. Form 101 for this trial does not call for a complete report on this aircraft in all its roles; but a brief summary of the main characteristics is made below.

111(2) Combat flying. In common with previous marks of Seafire the 47 is a good combat aircraft and is very manoeuvrable. Its chief advantage over earlier marks is due to the contra rotating propellors which almost entirely eliminate the need for changes of rudder trim with speed. This considerably reduces the chances of skid whilst in the curve of pursuit or dive and should make it a more accurate gun platform.

Its chief disadvantage is in its poor forward view, for whilst having a slightly greater angular view over the nose than some earlier marks, the double sandwich bullet proof glass and curved perspex windscreens reduce forward visibility and make flying in all but the fairest weather unpleasant and also considerably reduces the search view.

111(3) Formation flying. The 47 is pleasant to fly in formation, the response to throttle movements being very positive if the RPM are kept around 2400.

111(4) Harmonisation. The 50 yard alignment diagram for the Seafire 47 was issued in this Unit's report 154/NAFDU/192 of 18th February, 1949. The R/P sight settings which were the subject of a separate trial will now be included in the Final Report.

111(5) Re-arming. The re-arming drill for this aircraft is given in Appendix H of this report.

111(6) Conclusions. The Seafire 47 is suitable for use in most fighter and fighter bomber roles, but not as a night fighter. Its high altitude performance and manoeuvrability make it the best high altitude fighter of all the piston engined aircraft now in service.

lV. lV(1) Suggested Modifications.

(a) The wing folding selector box is situated directly over the main fuse panel and switches; a very slight leak of hydraulic fluid from the selector box will drop on to the fuse panel and associated cables causing deterioration of the electrical equipment and earths. It is considered that the fuse panel or the selector box should be repositioned to obviate this.

(b) The R/P earth from the auto selector is carried to the main earthing point under the wing root fillet; this necessitates the removal of the fillet in order to carry out the R/P insulation checks prior to R/P firing. The earth has been provisionally repositioned to a frame on the port side of the cockpit aft, in which position it is readily accessible and cuts down the amount of time necessary to carry out these tests.

lV(2) Servicing and Maintenance.

(a) The instructions contained in the Air Publication covering servicing and maintenance have proved satisfactory.

(b) The turn round time of engine and power plant inspections and servicing are increased by as much as one and a half hours, due to the time taken in removing and replacing engine and power plant cowlings. The cowlings at present are secured by a large number of Amal fasteners (Part No.Amal 149/7, Stores Ref. 26AJ/43904). To eliminate this excessive turn round time, a considerable portion of which is spent in servicing the fasteners themselves, it is considered that these cowlings should be secured by toggle type fasteners (Part No.3.E.C.7.A.,Stores Ref. 26EW/201) such as those in use on Sea Hornet aircraft. Reference to this matter was made originally in paragraph 12 of this Unit's Report 69/MISC/7 of 3rd September, 1946.

(c) The flap pneumatic system has proved difficult to service due to the compact build of the airframe and the pipeline stowage being relatively inaccessible.

(d) The turn round time for routine servicing and maintenance operations are as follows:-

...ration.	Turn round time.	No of men employed.	Remarks.
Normal Daily Inspection.	45 mins.	1 per trade.	-
Starred Daily Inspection.	3 hours.	1 per trade.	Turn round time includes time taken to remove and replace cowlings.
Refuelling.	15 minutes.	1 "E" rating with refueller driver in attendance.	-

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V. PERFORMANCE.

V(1) The performance data is presented in the following appendices:-

Appendix A - Consumption in Gallons per hour at Combat, Rated and Max. Weak Power.

Appendix B - Level speeds at Combat, Rated and Max. Weak Power.

Appendix C - Rates of Climb and Times to Height at Combat and Rated Power.

Appendix D - Distance gone in still air and gallons used in climb at Rated Power.

Appendix E - Figures (i) & (2) Specific Air Range in MS and FS gear for the conditions stated on the graphs.

Appendix F - Figures (i) & (2) Consumptions in MS and FS gear for same conditions as in Appendix E, Figs. 1 & 2.

Appendix G - Consumption at 5000 feet in MS Gear at 1800 RPM.

V(2) All results have been reduced to Standard conditions in accordance with A & AEE report/Res/170.

V(3) The results refer to the clean aircraft carrying ammunition at a weight of 10,700 lbs.

V(4) Conditions for Best Range and Endurance.

(a) Range - Appendix E, figs 1 & 2 confirm the Range Speed of 160 - 170 knots given in Pilots' Notes. The following table gives a summary of the optimum results obtained;-

Height.	Gear.	Engine Conditions.	Speed/EAS Knots.	S.A.R.
5-10,000'	MS	1800 RPM and sufficient boost for recommended speed.	160-170.	5-5.1 AMPG.
30,000'.	FS	1900 RPM and Full throttle.	160-170.	4.7. AMPG.

(b) Endurance - Experience has shown that 150 Knots EAS is approximately the lowest speed at which the aircraft can be flown comfortably and is recommended as a reasonable endurance speed. From Appendix G it is seen that a consumption of 34 gallons per hour is obtained at this speed at 5,000 feet. A slight improvement may be expected at a lower altitude.

V(5) The engine conditions given on the graphs of Specific Air Range are intended as an approximate guide only. The values of full throttle boost given are those obtained by reducing RPM from 2400 with the throttle set for +7 lbs boost.

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D.A.E.	- 2.
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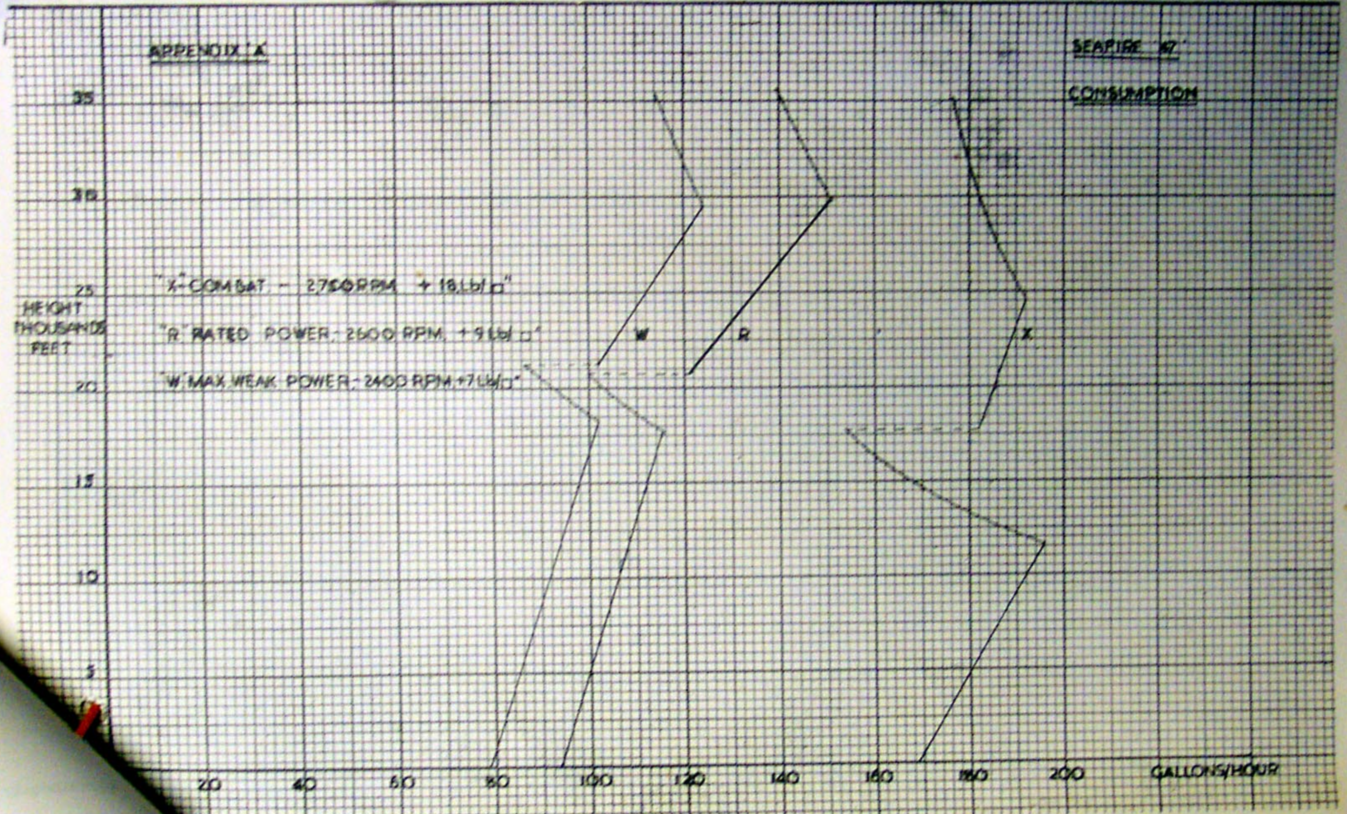
D.A.M.R.	- 2.
D.A.E.R.	- 1.
C.N.R.	- 4.
D.N.D.	- 2.
D.N.O.	- 1.
D.N.D.P.	- 2.
S.N.A.W.	- 1.
C.F.E.	- 1.
H.M.S. "DRYAD".	- 1.
S.N.L.O., R.C.N.	1.
N.L.O., R.A.N.	1.

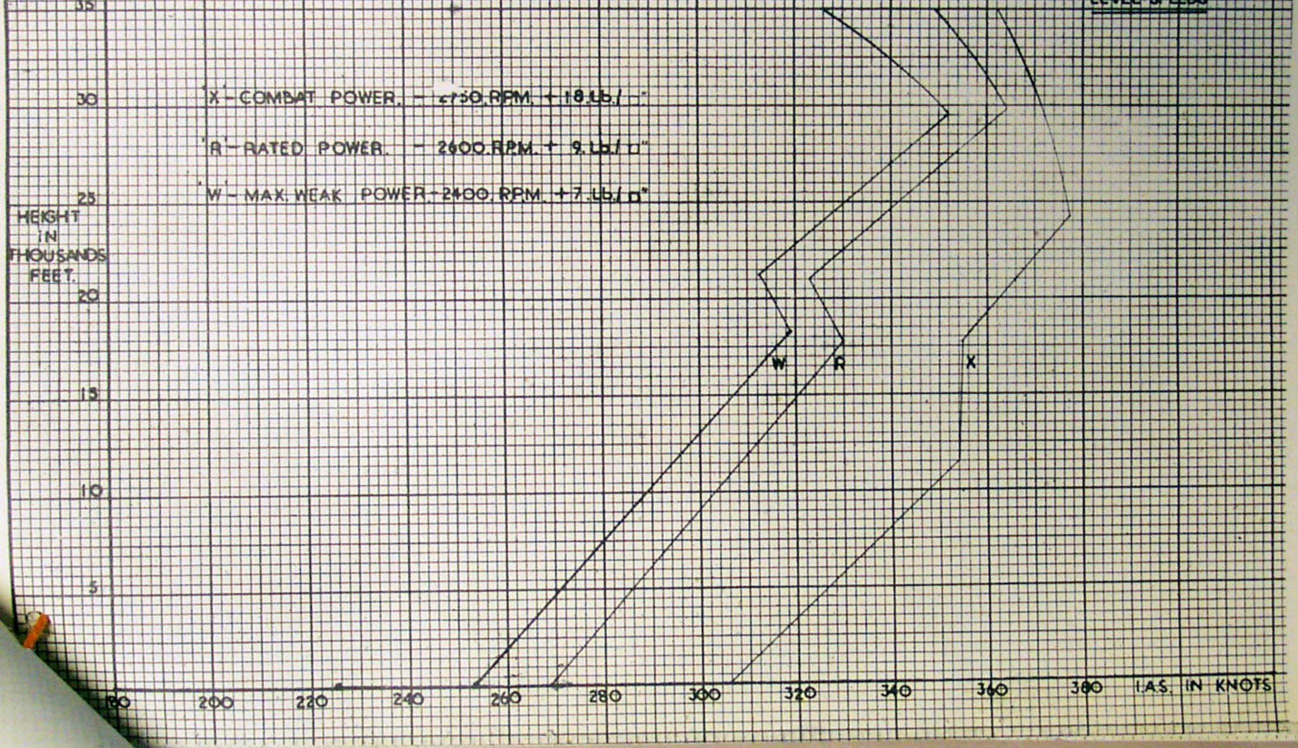


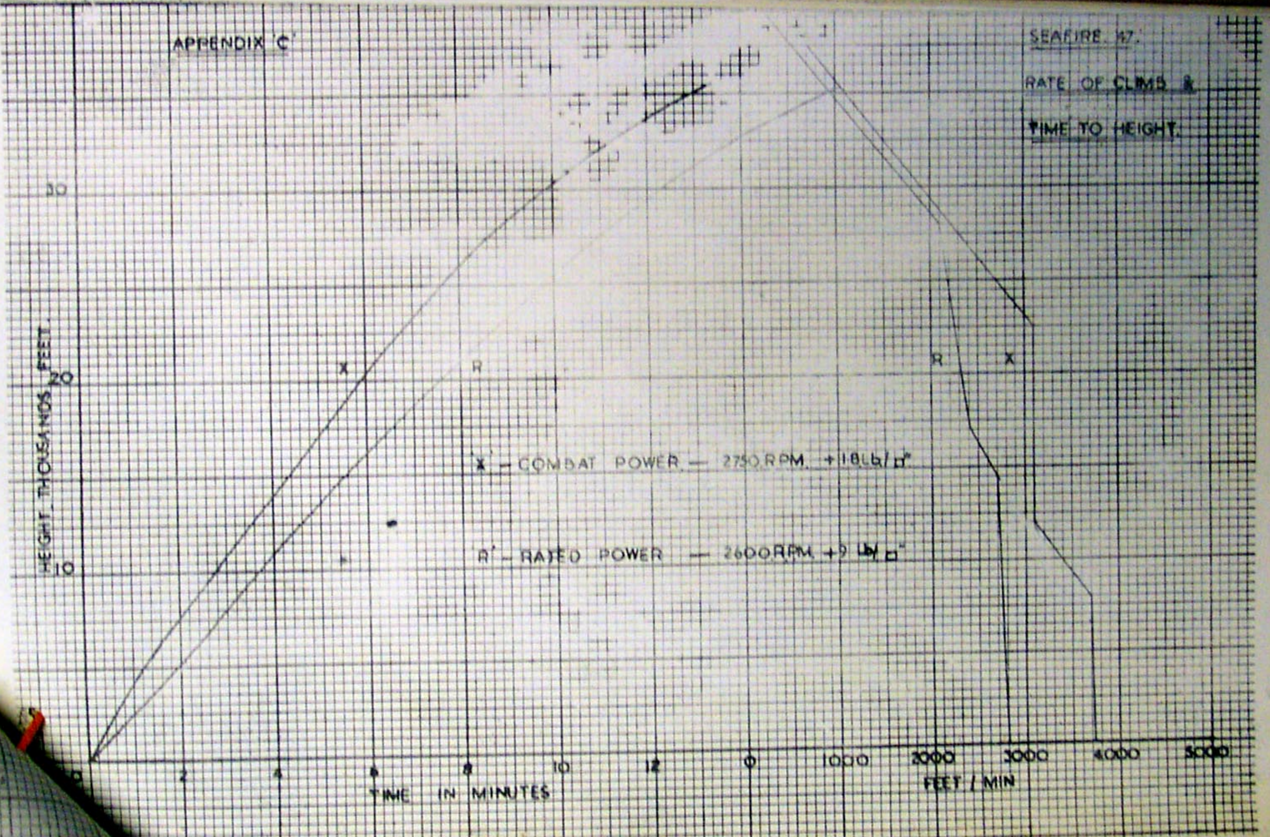
APPENDIX 'A'
SEAFIRE '47'
CONSUMPTION
"X" COMBAT – 2750 RPM + 18 Lb/□"
"R" RATED POWER – 2600 RPM + 9 Lb/□"
"W" MAX WEAK POWER – 2400 RPM + 7 Lb/□"
HEIGHT THOUSANDS FEET
35
30
25
20
15
10
5
0
W
R
X
20
40
60
80
100
120
140
160
180
200
GALLONS/HOUR

APPENDIX 'B'

SEAFIRE '47'

LEVEL SPEEDS

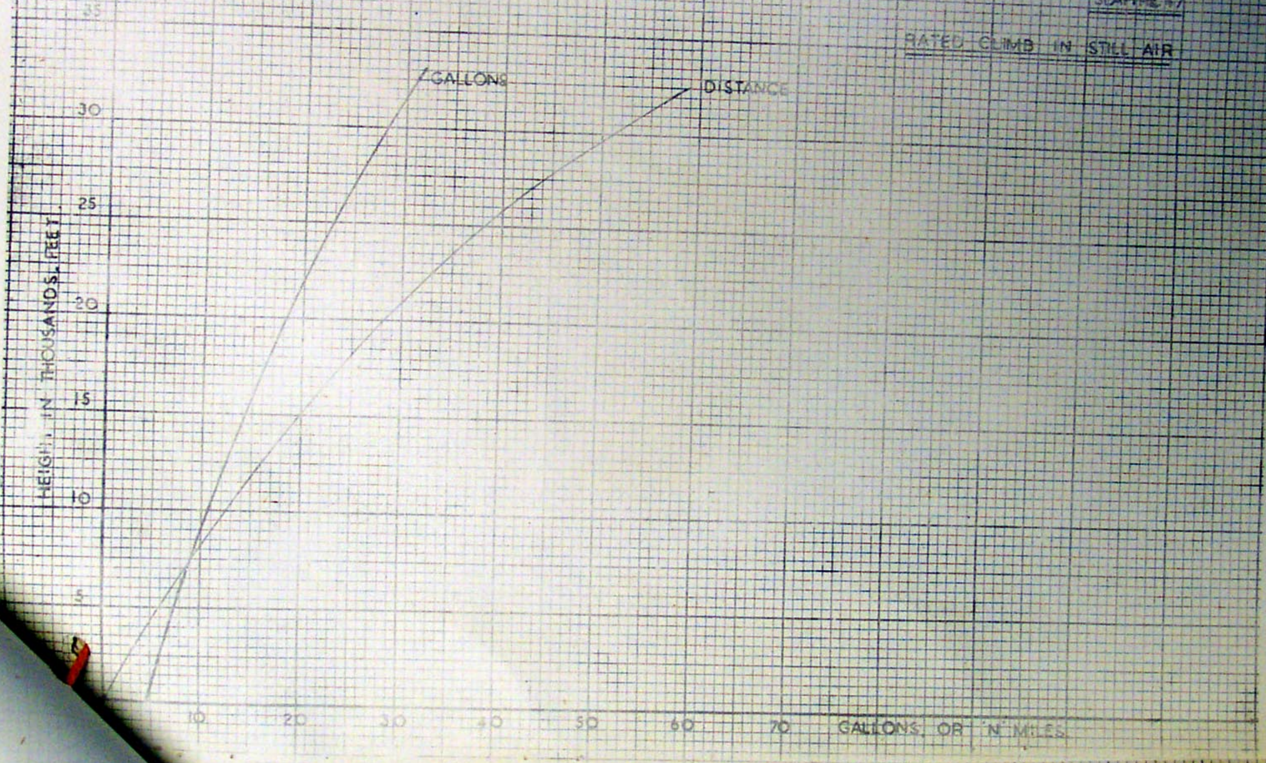



APPENDIX 'C'
SEAFIRE 47.
RATE OF CLIMB & TIME TO HEIGHT.
HEIGHT THOUSANDS FEET.
30
20
10
X
R
R
X
'X' – COMBAT POWER – 2750 R.P.M. +18 Lb/□"
'R' – RATED POWER – 2600 RPM +9 Lb/□"
2
4
6
8
10
12
TIME IN MINUTES
0
1000
2000
3000
4000
5000
FEET / MIN

APPENDIX 'D'

SEAFIRE 47

RATED CLIMB IN STILL AIR



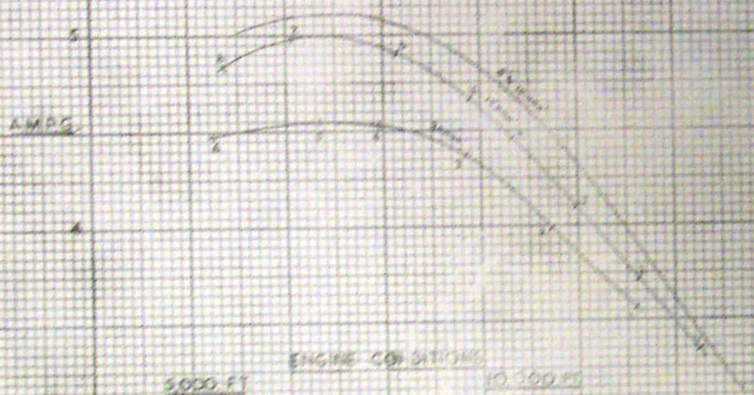
APPENDIX 'E' FIG. 1

SEAFIRE 47

SPECIFIC AIR RANGE

M.S. GEAR

NOTE – RESULTS AT S.L & 10000 FT. ARE PLOTTED AS A SINGLE CURVE SINCE THEY ARE VIRTUALLY IDENTICAL.



ENGINE CONDITIONS

5000 FT

EAS	RPM	BOOST	
256	2400	+7	CONSTANT BOOST.
250	2200	+7	
247	2000	+7	
234.5	1800	+6.75	
218	1800	+4	CONSTANT RPM.
208	1800	+2	
196	1800	0	
[illegible]	1800	−2	
151.5	1800	−4	

10,000 FT

E.A.S.	R.P.M.	BOOST	
253	2400	+7	CONSTANT BOOST.
246	2200	+7	
242	2000	+7	FULL THROTTLE.
227.5	1800	+5	
210	1800	+2	CONSTANT R.P.M.
197	1800	0	
178	1800	−2	
158	1800	−4	

15000 FT

	R.P.M.	BOOST	
(1)	2400	+7	CONSTANT BOOST
(2)	2200	+4½	FULL THROTTLE
(3)	2000	+3	
(4)	1800	+1¼	
(5)	1800	0	CONSTANT RPM.
(6)	1800	−2	
(7)	1800	−4	
(8)	1800	−6	

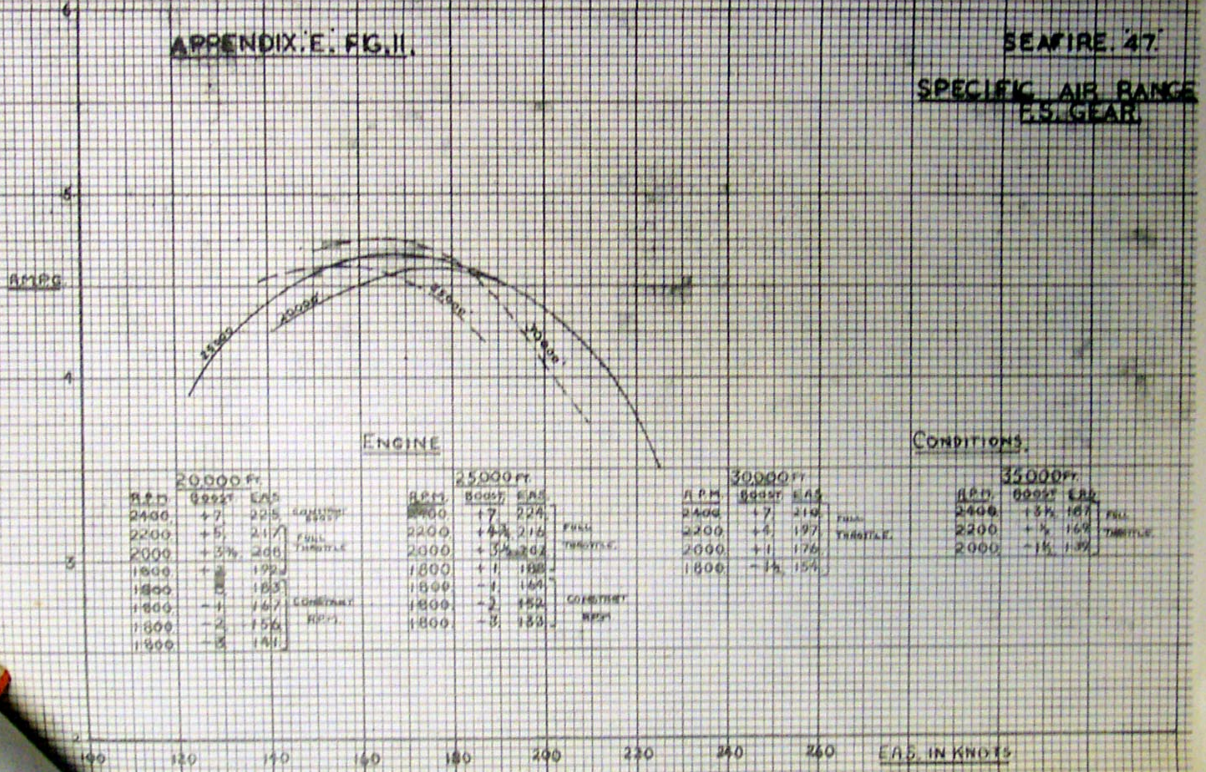
20000 FT

	RPM	BOOST	
(1)	2400	+6½	FULL
(2)	2200	+7½	THROTTLE
(3)	2000	+4	
(4)	1800	−	CONSTANT
(5)	1800	−3	RPM
(6)	1800	−6	

APPENDIX. E. FIG. II.

SEAFIRE. 47.

SPECIFIC AIR RANGE F.S. GEAR.



ENGINE CONDITIONS.

20000 FT.

R.P.M.	BOOST	E.A.S.	
2400	+7	225	CONSTANT BOOST
2200	+5	217	FULL THROTTLE
2000	+3½	208	
1800	+2	192	
1800	0	183	CONSTANT RPM.
1800	−1	167	
1800	−2	156	
1800	−3	141	

25000 FT.

R.P.M.	BOOST	E.A.S.	
2400	+7	224	FULL THROTTLE.
2200	+4½	216	
2000	+3½	207	
1800	+1	188	
1800	−1	164	CONSTANT RPM
1800	−2	152	
1800	−3	133	

30000 FT.

R.P.M.	BOOST	E.A.S.	
2400	+7	219	FULL THROTTLE.
2200	+4	197	
2000	+1	176	
1800	−1½	154	

35000 FT.

R.P.M.	BOOST	E.A.S.	
2400	+3½	167	FULL THROTTLE.
2200	+½	164	
2000	−1½	139	

APPENDIX "H".

RE-ARMING DRILL FOR SEAFIRE MK. 47 AIRCRAFT.

WITH WINGS SPREAD.

Armament four 20-mm. Hispano Mk.V Cannon.

1. COMPOSITION OF CREW.

Crew numbers.	Rating.	Duty.
	Petty Officer Airman A.M.(O). or Leading N.A. A.M. (O).	In Charge.
1 & 2.	N.A. A.M. (O).	Ammunition Loaders.
3.	N.A. A.M. (O). or Flight Deck Party.	Ammunition Supply Number.

Stores Required for Loading.

Four B.F.M.'s full tensioned and loaded with 14 rounds. Ammunition to be provided in several belts - eight belts with 30 rounds in each - four for each inner gun. Eight belts with 25 rounds in each - four for each outer gun. A total of 496 rounds is required, made up as follows:-

Inner Guns - 120 rounds in each tank.
14 rounds in B.F.M.
134 rounds.

Outer Guns - 100 rounds in each tank.
14 rounds in B.F.M.
114 rounds.

1 Flexible or rigid cleaning rod and gun cleaning oil.

3 Screwdrivers - one for each member of the crew.

1 Cocking Unit.

2 Breech stoppage tools.

2 Positioning guages for checking joins in ammunition belts.

5 "Guns Loaded" notices.

1 Wing mat.

11. PREPARATION OF AMMUNITION.

The ammunition tanks are normally stowed in the wing bay, but they are removable. The inner gun tanks (nearest the leading edge of the wing) hold 120 rounds each, and the outer gun tanks hold 100 rounds each.

The ammunition is to be made up in short belts with the end links on toP