

BY SAFE HAND

BRITISH EMBASSY
WASHINGTON, D.C.

May 3rd 1944.

Reg

Dear Walter,

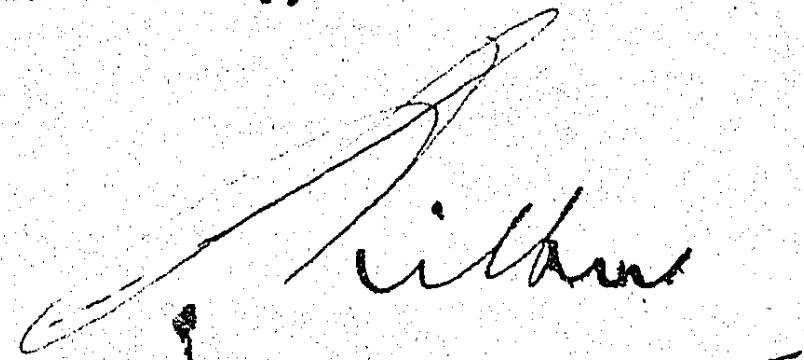
GERMAN AIR FORCE CONSUMPTION

The memorandum which you and Major Tarr prepared jointly, dated March 29th 1944, entitled "German Air Force Requirements" and dealing with the definition of operation and non-operational consumption was forwarded to London for their comments.

It was submitted to Squadron Leader Dewdney, who prepares the German Air Force estimates on the British side and you will be interested in the enclosure which contains his comments.

I do not know whether this will answer all your queries and enable you to reconcile the two estimates and if this is not entirely satisfactory to you I will endeavour to seek further clarification.

Yours sincerely,


S. Kilbey

Walter Levy, Esq.,
Office of Strategic Services,
Washington, D.C.

cc: John D. Murch, Esq.,

B.H. Grove, Esq.,

Major Russel S. Tarr.

The Ministry of Economic Warfare,
Berkeley Square House,
Berkeley Square,
W.1

17th April 1944.

AG 105/2/2

Dear Kilbey,

GERMAN AIR FORCE CONSUMPTION.

With reference to your L.D. 914 of the 30th March,
I passed on your query to Dewdney, who has given me the
following reply:-

"The point is rather a tricky one. Non-operational
consumption as depicted by the Americans includes the consumption
by non-operational aircraft in my figures (which is included
under operational consumption, miscellaneous flying, and repair
consumption). Little of the repair consumption and only a part
of the miscellaneous flying consumption falls on the operational
airfields, which is what I mean by the front-line. I suggest
we assume that all the repair consumption and half the
miscellaneous consumption occurs in back areas."

I hope this clears up the point which you had in mind.

Yours sincerely,

Sgd. E. HERBERT.

S. Kilbey, Esq.,
British Embassy,
Washington.

OFFICE OF STRATEGIC SERVICES
Research and Analysis Branch

MEMORANDUM

CONFIDENTIAL
29 March 1944

TO: Sidney Kilbey
FROM: Major Russell Tarr and Walter Levy
SUBJECT: Re: German Air Force Requirements.

1. Aviation Fuel Consumption by Operational A/C. The U. S. estimate (740,000 tons) includes (a) combat consumption by operational A/C and (b) non-combat consumption by operational A/C. The former corresponds to the British estimate for operational A/C (349,000 tons) and is of about the same order of magnitude. The latter is based on USAAF experience in overseas theaters (i.e., forward areas). The relationship between non-operational and operational consumption by USAAF A/C in overseas theaters was determined and was applied to the operational consumption of GAF A/C in forward areas to estimate non-operational consumption by these craft, of course, with certain modifications.

The overall agreement in the British and U. S. estimates is not in our opinion misleading. The difference is only as to whether the non-operational consumption by operational A/C should be allocated to forward areas. It was our belief that it should and this element in the total consumption was therefore included with operational A/C.

2. We have no other comments to make on the paper, except to say that it is noteworthy that the British and U. S. methods employed, though differing in some respects from each other, have led to practically the same figures. We are finding the data on engine hours per sortie and on fuel consumption per engine hour very useful in checking the data we have used.

WLC:cjs

✓ cc: Major Tarr

AFICP-TI

18 January 1944

MEMORANDUM FOR: Colonel G. Perera

SUBJECT: GAF Aviation Gasoline and Plane Performance

1. GAF aircraft can be flown for combat purposes with "blue" gasoline (87 octane) if the Luftwaffe were compelled to substitute this for the lighter "green" grade aviation fuel now used in their fighter planes.
2. Substitution of the lower grade aviation gasoline would affect performance by cutting the top speed obtainable and the rate of climb and by increasing the take-off distance required. The critical altitude obtainable and cruising speed would probably not be affected, but the speed attainable especially at high altitudes would be reduced. The resulting reduction in performance would depend on how close the engines would be to the "detonation point." An estimate based on some experimentation in which GAF FW 190s were flown at Dayton on fuel of reduced octane rating below the "green" grade for which they were designed, indicates that a 1450 HP engine would drop to between 1,000 - 1,250 HP on the "blue" grade fuel.
3. The substitution would not require any change in the motors. AAF experience in substituting 91/96 for 100/130 fuel for training flight purposes has been satisfactory. Only minor carburetor adjustments were required in the same planes with the same engines designed for the higher grade fuel, and it was doubted that the German engines would even require such adjustments.
4. The foregoing opinion was given today over the long-distance telephone to Major Ralph A. Colbert, Air Corps, by Mr. Robert V. Kerley of Wright Field, Dayton, Ohio (extension 30227). Mr. Kerley has been in charge of testing the performance of various grades of aviation fuel, seemed fully conversant with the problem and to speak with some authority on it. He was referred to as one who could express an expert opinion on this question by Major James A. Dawson (WM & D, 4534 Munitions Building) and Colonel Johnston, Chief of the section on Petroleum Requirements, AAF. Colonel Johnston himself expressed a similar general opinion on the question under consideration.

RALPH A. COLBERT
Major, Air Corps

AFLAN-EU
7 April 1944
RST:mm:72120

MEMORANDUM FOR COLONEL JOHN F. TURNER

Subject: Comment on Oil Reports as Requested

1. First Report - Rumanian Crude Oil Production - A. O. (44) 22, 8th March 1944. English Technical Sub-Committee on Axis Oil. This report was discussed at the last Enemy Oil Committee meeting along with a letter from the former Rumanian resident Standard Oil Company geologist. It was agreed that on account of probable slight increases in Rumanian oil production during 1943, we should consider, for purposes of calculating 1944 depletion, that production in 1943 was 5,300,000 tons instead of the former figure of 5,067,000 tons.

2. Second Report - A. O. (44) 14, 19th February 1944. Axis Air Force Requirements of Petroleum 1943. This report is interesting because it admits that the English estimates made prior to this report were less (actually ours were 60% higher than the English) and because of the present close agreement. In Table II the totals are nearly in agreement but the breakdown varies widely due to a difference of opinion over where operational flying begins and training and testing ends.

3. Attached is a copy of the minutes of the meeting of the Western Axis Sub-Committee. It will be appreciated if it can be returned for filing.

1 Incl

Min. West.Axis Sub-Comm.

DEWITT L. SAGE

Lt. Colonel, Air Corps
Chief, European Branch

(and w/orig only)

(THIS DOCUMENT IS THE PROPERTY OF HIS BRITANNIC MAJESTY'S
GOVERNMENT)

S E C R E T

A.O. (44) 14.

COPY NO. 3

19TH FEBRUARY, 1944.

WAR CABINET

TECHNICAL SUB-COMMITTEE ON AXIS OIL

AXIS AIR FORCE REQUIREMENTS OF
PETROLEUM 1943.

Note by the Joint Secretary

The attached note from Squadron Leader Dewdney
is circulated for information.

(Signed) A.E. HOUSEMAN

Offices of the War Cabinet,
S.W.1.

19TH FEBRUARY, 1944.

AXIS AIR FORCE REQUIREMENTS
OF PETROLEUM 1943

A.O.(44) 1 reviewed British and American estimates of Air Forces Consumption for 1942. It was mentioned there that recent intelligence had indicated that estimates so far made for 1943 were too low, due to increasing unit consumption in newer types of aircraft and the growth in establishment of miscellaneous formations such as communications aircraft, air-sea rescue etc. Satellite air forces had also been excluded.

The estimates have now been reviewed, and the attached pro-forma shows the new basis. Changes from the pro-forma attached to A.O.(44) 1 are as follows:-

1. G.A.F. Consumption

- (a) LRB consumption increased from 50 to 60 galls per engine hour.
- (b) Transport and training flight factors and establishments have been brought up to date.
- (c) Ferrying consumption revised in the light of latest production figures.
- (d) Communications aircraft establishment introduced.
- (e) Experimental establishments introduced.
- (f) 10% on all flying consumption added to cover miscellaneous aircraft.
- (g) 10% on all flying consumption added to cover consumption in repair organisations.

2. Satellite Air Forces now included at 12000 tons/month. Table I attached gives Details of the revised estimates. The following table compares these figures with the American estimates of EOC 68-6.

Table II

<u>Aviation Fuel G.A.F.</u>	<u>U.S. Estimates</u>	<u>Air Min Est.</u>
Operational A/C	740	349
Transport A/C	441	394
Training and Testing	392	741
Total	1573	1484
Total	99	98
Satellites	100	144
	1764	1726

+ Includes ferrying and communications.

= Includes experimental, misc. and repairs.

<u>Motor Fuel</u>	<u>U.S. Estimates</u>	<u>Air Min. Est.</u>
Total	499	604
Lubricants	88	93
Grand Total	2366	2425

The overall agreement is quite satisfactory, but it appears that the U.S. estimates include training in operational aircraft and consumption in miscellaneous flying and repairs under the heading of operational flying. This appears to be misleading in that it suggests too high a consumption in forward areas.

TABLE I

AXIS AIR FORCE REQUIREMENTS OF PETROL

MONTH	G A F C O N S U M P T I O N									I.A.F. Consumption TOTAL	Satelli Air For TOTAL
	Operational Aircraft	Ferrying	Transport	Training	Communica- tions A/c	Experimental A/c	Misc. Flying	Repairs	TOTAL GAF Aviation Consumption		
JAN.	23,138	1,900	25,050	39,900	5,700	1,500	9,640	9,640	116,518	11,500	12,000
FEB.	23,726	1,855	25,050	39,900	5,700	1,500	9,698	9,698	117,127	11,000	12,000
MAR.	30,718	1,905	25,050	39,900	5,700	1,500	10,393	10,393	125,559	12,927	12,000
APR.	32,820	2,025	25,050	39,900	5,700	1,500	10,603	10,603	128,201	13,000	12,000
MAY	27,404	2,025	25,050	39,900	5,700	1,500	10,061	10,062	121,702	12,500	12,000
JUNE	31,800	2,150	25,050	39,900	5,700	1,500	10,502	10,502	127,104	12,500	12,000
JULY	40,355	2,265	25,050	39,900	5,700	1,500	11,355	11,357	137,483	12,500	12,000
AUG.	35,821	2,280	25,050	39,900	5,700	1,500	10,203	10,203	128,657	12,500	12,000
SEPT.	33,270	2,150	25,050	39,900	5,700	1,500	10,648	10,648	128,866	-	12,000
OCT.	23,622	2,140	25,050	39,900	5,700	1,500	9,684	9,684	117,280	-	12,000
NOV.	25,130	2,060	25,050	39,900	5,700	1,500	9,934	9,934	120,208	-	12,000
DEC.	22,323	1,930	25,050	39,900	5,700	1,500	9,553	9,553	115,509	-	12,000
TOTALS	349,177	24,685	300,600	478,800	68,400	18,000	122,275	122,277	1,484,214	98,427	144,000

TABLE I

AIR FORCE REQUIREMENTS OF PETROLEUM 1943

O N				I.A.F.	Satellite	Total	Total Motor	Motor	Aviation	Civil	GRAND
Experimental	Misc.	Repairs	TOTAL GAF	Consumption	Air Forces	Aviation Fuel	Fuel	Lubes	Lubes	Air	TOTAL
A/c	Flying		Aviation	TOTAL	TOTAL	Consumption	Consumption			Line	
			Consumption								
1,500	9,640	9,640	116,518	11,500	12,000	140,018	52,000	2,080	5,607	1,000	200,705
1,500	9,698	9,698	117,127	11,000	12,000	140,127	46,500	1,940	5,573	1,000	197,140
1,500	10,393	10,393	125,559	12,927	12,000	150,486	53,500	2,140	5,986	1,000	213,112
1,500	10,603	10,603	128,201	13,000	12,000	153,201	52,000	2,080	6,089	1,000	214,370
1,500	10,061	10,062	121,702	12,500	12,000	146,202	53,600	2,144	5,809	1,000	208,755
1,500	10,502	10,502	127,104	12,500	12,000	151,604	52,000	2,080	6,020	1,000	212,704
1,500	11,356	11,357	137,403	12,500	12,000	161,983	53,600	2,144	6,431	1,000	225,158
1,500	10,203	10,203	128,657	12,500	12,000	153,157	45,000	1,800	6,116	1,000	207,073
1,500	10,648	10,648	128,866	-	12,000	146,866	52,000	2,080	5,591	1,000	201,537
1,500	9,684	9,684	117,280	-	12,000	129,280	45,000	1,800	5,128	1,000	182,208
1,500	9,934	9,934	128,208	-	12,000	132,208	45,000	1,800	5,243	1,000	185,256
1,500	9,553	9,553	115,509	-	12,000	127,509	52,000	2,080	5,106	1,000	187,695
0,000	122,275	122,277	1,484,214	98,127	114,000	1,726,641	604,200	24,168	68,704	12,000	2,435,713

SEPTEMBER 1943
CONSUMPTION OF AVIATION GASOLINE
AFR OVERSEAS TACTICAL UNITS
(Excluding Air Transport Command)
(000 Gallons Omitted)

<u>Plane Type</u>	<u>United Kingdom</u>	<u>% of U.K.</u>	<u>Total all Theaters</u>	<u>% of Total all Theaters</u>
<u>Bombers</u>				
Heavy & Anti-Sub	6,783	66	14,883	40.7
Medium	1,782	18	9,013	24.6
Light	-----	---	252	0.7
<u>Fighters</u>				
Single-engine	1,061	11	4,395	12
Twin-engine	11	0.11	3,089	8
Other Types*	241	2.5	4,975	14
TOTALS	9,873	100	36,607	100

* Troop Carrier, Photo, Reconnaissance, and Other.

DECEMBER 1943
ESTIMATED AAF CONSUMPTION AVIATION GASOLINE
bbis. (42 U.S. gals.) per day

<u>Plane Type</u>	<u>United Kingdom</u>	<u>% of UK</u>	<u>All A/C in Tactical Grps.</u>	<u>% of Total AAF Consumption*-(171,220)</u>
<u>Bombers</u>				
Heavy & Anti-Sub	11,551	61.1	20,350	12
Medium	1,365	7.2	12,300	7
Light	-----	---	350	0.2
<u>Fighters</u>				
Single-engine	3,452	18.2	6,000	3.5
Twin-engine	941	4.9	4,000	2.5
Others	1,598	8.1	7,000	4

* Total AAF Consumption figure (171,220 bbis/day) includes both Continental and Overseas uses covering requirements of Aircraft in Tactical Groups, A/C enroute to overseas theaters, A/C at modification centers and depots, for training (flying training, AATSAT, Technical Training, Tow Target etc. RTUs & OTUs) for Transports (Air Transport Command) and for Flyaway (Aircraft manufacturers, etc.)

COMBAT AND NON COMBAT HOURS PER MONTH
BY TYPES OF AAF PLANES

Weighted Average All Theaters
July - September 1943

June - August 1943
SC - SF - 180

<u>Plane Type</u>	<u>Total Hrs.</u> <u>per plane/no.</u>	<u>Combat Hrs.</u> <u>per plane/no.</u>	<u>% Combat</u>	<u>% Non Combat</u>	<u>Total Hrs.</u>	<u>% Combat</u>	<u>% Non Combat</u>
Heavy Bomber	47	33.4	71	29		66	34
Medium Bomber	37.9	25.2	66	34	) -- 34.49 ----- 68 ----- 32		
Light & Dive Bomber	26.1	14.3	55	23			
Single-engine Fighter	32	18.7	58	42	33	58	42
Twin-engine Fighter	54.1	43.3	80	20	49.98	84	16

GAF
ESTIMATED COMBAT PLANE CONSUMPTION OF AVIATION GASOLINE, 1943
(ENEMY OIL COMMITTEE, BY THE MILITARY SUBCOMMITTEE)
(000 Metric Tons Omitted)

<u>Type & Front</u>	<u>Tons Consumed</u>	<u>% of Total</u>	<u>% Operational*</u>	<u>% Non-Operational</u>
<u>Fighters</u>				
Russian Front	55	15	47	53
Mediterranean Front	43	27	71	29
Western Front	94	47	55	45
<u>Total Fighters</u>	<u>192</u>	<u>26</u>	<u>57</u>	<u>43</u>
<u>All Others</u>				
Russian Front	324	85	72	28
Mediterranean Front	117	73	61	39
Western Front	107	53	57	43
<u>Total All Others</u>	<u>548**</u>	<u>74</u>	<u>67</u>	<u>33</u>
GRAND TOTAL	740	100		

* Very rough estimate

** Includes 20 for Fighter Bombers

R.A.F.
ESTIMATED CONSUMPTION AVIATION GASOLINE
BY SQUADRONS - AUGUST 1943
(000 gallons omitted)

<u>Plane Type</u>	<u>Total</u> <u>All Theaters</u>	<u>% of Total</u>	<u>Operational</u>	<u>% Operational</u>	<u>%</u> <u>Non Operational</u>
Heavy Bombers	22,746		18,744	81	19
Medium Bombers	2,029		1,701	85	15
Light Bombers	2,502		1,581	63	37
<u>Total Bombers</u>	<u>27,877</u>	<u>73</u>	<u>22,448</u>	<u>80</u>	<u>20</u>
Single-engine Fighters	4,319		1,751	40	60
Twin-engine Fighters	3,684		1,741	47	53
<u>Total Fighters</u>	<u>8,003</u>	<u>21</u>	<u>3,492</u>	<u>43</u>	<u>57</u>
Others*	2,159	6	1,264	58	42
TOTAL	38,042	100			

* Troop Carrier, Photographic, Reconnaissance, All other.

SEPTEMBER 1944
ESTIMATED AAF CONSUMPTION AVIATION GASOLINE
Bbls (42 U.S. Gals. per day)

<u>Plane Type</u>	<u>United Kingdom</u>	<u>% of UK</u>	<u>All A/C in Tactical Grps.</u>	<u>% of Total AAF Consumption* (259,305)</u>
<u>Bombers</u>				
Heavy and Anti-Sub	20,570	52.2	32,000	12
Medium	2,389	6	20,000	7.7
Light	510	1.2	560	0.2
<u>Fighters</u>				
Single-engine	6,544	16.6	9,600	3.8
Twin-engine	1,735	4.4	6,400	2.5
Others	7,652	19.4	11,200	4

* Total AAF Consumption figures (259,305 bbls/day) includes Continental U.S. and Overseas Uses, covering requirements of A/C in Tactical groups, A/C enroute to overseas theaters, A/C at modification centers and depots, aviation gas for training (flying, AAFSAT, Technical Tr., Tow Target, etc. RTUs & OTUs) for transports (Air Transp. Command) & for Flyaway (A/C mfrs. etc.)

WAR CABINET

TECHNICAL SUB-COMMITTEE ON AXIS OIL

REVIEW OF A.O.C. (43) 60 - ESTIMATE PREPARED BY U.S.
 ENEMY OIL COMMITTEE ON AXIS AIR FORCES CONSUMPTION OF
 OIL AND PETROLEUM 1942 (A.O.C.-58 dated 10th June, 1943)

The overall agreement between Air Ministry and U.S. estimates for the Axis Air Forces is good. The U.S. figures for 1942 give a total of 1,143,000 tons of aviation spirit plus 690,000 tons of motor fuel and lubricant while the Air Ministry figures are 1,150,000 tons of aviation gasoline and 750,000 tons of motor fuel and lubricants. However, there are considerable differences in detail within the estimates; the following table shows the break-down of the figures side by side.

Figures in brackets denote British estimates.
 Other figures denote U.S. estimates.

	1942 TOTAL			Grand Total
	Av. Gas	Mot. Fuel	Lubes	
I. FLYING	Thousands of Metric Tonnes			
(a) G.A.F.				
Operational	549.3 (310.3)	-	27.5	576.8
Transport	169.7 (130.1)	-	3.5	173.2
Ferrying	9.5 (12.4)	-	0.5	10.0
Training	133.7 (321.0)	-	0.1	133.8
Total G.A.F.	862.2 (1023.8)	-	45.6 (41.0)	907.8 (1064.8)
(b) I.A.F.				
Operational	34.4 (57.5)	-	3.2	67.6
Transport	21.3 (24.0)	-	1.1	22.9
Training	13.3 (46.5)	-	0.9	14.7
Total I.A.F.	69.0 (128.0)	-	5.2 (5.0)	74.2 (133.0)
(c) Axis				
Satellites				
Operational	93.6 (-)	-	4.7	98.3
Transport	14.0 (-)	-	0.7	14.7
Training	13.6 (-)	-	1.0	14.6
Total	121.2 (-)	-	6.4	127.6
Total Flying	1143.6 (1151.8)	-	57.2 (46.0)	1200.8 (1197.8)
II. SUPPLY AND GROUND SERVICES				
G.A.F.	-	430.0 (696)	24.0 (23.0)	504.0 (724)
I.A.F.	-	60.0 (29)	3.0 (1.0)	63.0 (30)
Satellites	-	60.0 (-)	3.0 (-)	63.0 (-)
Total Supply and Ground Services	-	600.0 (725)	30.0 (29.0)	630.0 (754)
Total	1143.6 (1151.8)	600.0 (725)	87.2 (75.0)	1830.8 (1951.8)

Includes Fuel for Ferrying

The most obvious point is that the Air Ministry estimates include nothing for satellite Air Forces; apart from this the major discrepancy is in the relative proportion of consumption allotted to operational aircraft and training aircraft respectively in the two sets of estimates.

Operational Consumption

Both sets of estimates are based on figures for sorties flown by each type of aircraft. The sortie figures for operational aircraft are set out below and considering the nature of the figures they may be said to agree satisfactorily. It is also understood that the U.S. figures were arbitrarily increased to cover non-operational consumption.

German Aeroplane Sorties, 1942

Plane	T O T A L	
	American Estimates	British Estimates
	<u>No. of Sorties</u>	
Long range bombers a/	114,240)	127,765
Bomber Reconnaissance b/	28,324)	
Dive bombers	66,500	60,435
Single engine fighters	194,565	170,865
Twin engine fighters	45,078	37,730
Army cooperation planes	39,213	34,733
Coastal planes	15,537	14,087
Total Sorties	503,257	445,618

- a/ Includes reconnaissance sorties for November and December 1942
b/ January to October 1942 only.

There is a difference between the two sets of estimates in the method used for arriving at a figure for consumption in tons per sortie.

The U.S. estimate is based on tankage capacity and the assumptions about the average extent to which tankage capacity is used in in each sortie. The British figures are based on a somewhat more elaborate calculation as follows.

Figures are available for the number of operational aircraft by types divided into two categories - those operationally engaged and those not operationally engaged. For each type of aircraft an average length of sorties is estimated on the basis of British experience and this gives the number of engine hours per operational sortie. To this is added another 25% to cover non-operational engine hours and to this total of engine hours by aircraft operationally engaged is added a figure of 10 engine hours per week for twin engined aircraft non-operationally engaged, and 4 engine hours per week for single engined aircraft non-operationally engaged. In this way a total number of engine hours for each type of aircraft is obtained. An estimated average consumption of between 15 and 75 gallons per engine hour according to the type of aircraft then gives the total daily consumption by each type of aircraft. The attached form is used in making up the estimates.

The British estimates thus specifically provide for consumption by aircraft on non-operational flights and on the ground which the U.S. estimates do not.

The following table shows the U.S. and British figures for traffic.

Average Aviation Gasoline Consumption
per Airtic
(Metric Tonnes)

Plane	Consumption	
	U.S. estimates	British estimates
Long range bomber	4.97)	4.4
Bomber reconnaissance	2.45)	
Dive bombers	0.35	0.2
Single engine fighter	3.28	0.3
Twin engine fighter	4.48	0.9
Army Cooperation Plane	0.39	0.4
Coastal Plane	0.87	2.3

It will be seen that in general in spite of the allowance for non-operational consumption the British figures tend to be lower. An exception is the figure for coastal aircraft; it should perhaps be pointed out that the British figure does not necessarily have to be lower than the normal or even the maximum tankage capacity of the type of aircraft.

G.A.F. Consumption. The following table compares the two estimates of G.A.F. Operational consumption.

Comparison of G.A.F. Operational Consumption by
Aircraft Types

Thousand metric tonnes

	Aviation		Total
	Gasoline	Lubricants	
Long range bombers and bombers reconnaissance	357.3 (476.5)	7.0	375.2
Dive Bombers	27.9 (44.0)	1.1	29.3
Single engine fighters	65.7 (43.0)	3.3	69.0
Twin engine fighters	64.6 (30.9)	3.2	67.8
Army cooperation planes	16.4 (13.0)	0.9	17.3
Coastal planes	46.9 (32.3)	0.4	46.6
Total	549.4 (540.3)	27.5	576.8

The U.S. figures for consumption by operational aircraft are 75% more than the British being largely due to the higher figure used for consumption of airtic in long range bombers which make up a large fraction of the total consumption. In addition the American figures include 20% allowance for waste and losses in all their estimates, while the British figures make no such allowance, it being assumed to be taken care of in the factors used. In any case it is felt that a 20% allowance for waste and losses is very high particularly in view of the stringent regulations known

to be in force in the G. I. F. about misuse and mishandling of fuel. It is assumed that the U.S. figure for wastage and losses does not refer to "battle casualties" among petrol storage.

G. I. F. Transport. The U.S. figure for consumption by transport aircraft is 170,000 tons and corresponds closely with the British figure of 180,000 tons. British figures for transport aircraft are based on an estimated number of aircraft of four types - 3 engined, operational twin engined, light twin engined, and light single engined aircraft, each flying on the average between 1 and 1 1/2 hours per day with a petrol consumption of 35 gallons per engine hour for the 3-engined aircraft, 50 gallons per hour for the operational twin-engined aircraft, 20 gallons per hour for the light twin-engined aircraft and 8 gallons per hour for the light single-engined aircraft. No separate estimate for the number of sorties has been made for transport aircraft. The inclusion in the U.S. estimates of 20% allowance for wastage and losses makes the good agreement above more apparent than real.

G. I. F. Ferrying. The British estimates are based on the assumption that on the average each new aircraft makes one flight of three hours. Consumption by each type of aircraft is calculated using the gallon per engine hour factors given above. The total number of aircraft involved in 1942 is estimated at 22,100 with a petrol consumption of 12,500 tons close to the U.S. estimate of 10,000 tons.

G. I. F. Training. The main discrepancy in the two estimates in the case of training aircraft where the British estimates are about three times the American at 521,000 tons as compared with 184,000 tons. The British estimate of numbers of training aircraft for January 1942 was 6,270 Elementary and Advanced trainers, 3,500 operational and 3-engined aircraft. In December these figures were revised to 4,500 elementary and advanced trainers plus 3,345 three-engined and operational trainers. Flying times per day for each aircraft were estimated varying between 1 and 3 hours according to type, petrol consumption varying also according to type. Both the numbers of aircraft engaged and the amount of flying done are estimated at higher levels by the Air Ministry than by the U.S. Forces. This is offset in the total estimates by the figures for operational consumption which differ in the opposite sense. About half the training consumption in the British estimate is accounted for by operational types and it may be that in the U.S. estimates these are included in the operational consumption. If this is so the internal agreement in the two sets of figures becomes closer, as is shown by the table below.

	<u>Thousand Tons</u>		
	<u>U.S.</u>	<u>British I.</u>	<u>British II</u>
OPERATIONAL	549	310	570
TRAINING	184	521	261

ITALIAN AIR FORCE

The disagreement in consumption estimates for the Italian Air Force are comparatively small but again consumption by training aircraft is put much higher by the Air Ministry than by the U.S. paper.

GROUND CONSUMPTION. Here again the British figures are higher than the American. This is due to the larger number of vehicles taken in the British estimates. The figure for the G.A.F. only is given as 100,000 by the Air Ministry of which 75,000 are assumed to be in service at any one time which compares with the 61,000 estimated by the U.S. Committee. In addition, the Air Ministry estimates 65,000 vehicles in the Flak establishment of which about 40,000 are in service at any one time. The corresponding figure from the U.S. paper is only 16,000. The figure of 9 - 10 U.S. gallons per vehicle per day agrees fairly well with the British figure of 4 imperial gallons per day. The balance, to some extent, is restored by the higher figure shown for the Italian Air Force ground figures by the U.S. estimates as compared with the Air Ministry estimates.

GENERAL It was pointed out above that the Air Ministry estimates did not include anything for Satellite Air Forces since their requirements have been assumed to be included in the G.A.F. figures. It is now felt that some allowance should be made in addition and in the light of recent Intelligence, the figure of 10 - 12,000 tons per month used in the U.S. estimates seems to be of the right order.

The British estimates include 4% by weight on the aviation gasoline consumption to give lubricating oil consumption, a figure based on U.S. experience. This is below the U.S. figure of 5%.

Recent Intelligence also indicates that while the consumption figures for 1942 estimated by the Air Ministry are of the right order of magnitude the actual figures for 1943 are above those at present estimated. The change is believed to be mainly due to the increased unit consumption by modern types of aircraft and to the inclusion from the British estimates of consumption by communication and non-combat aircraft etc. The question is being examined and revised figures for 1943 will be circulated later. Estimates for training consumption will be reconsidered at the same time.

However, the order of magnitude of the 1942 figures is probably correct as the following comparison between G.A.F. estimates and actual U.S. experience shows:-

Type of Aircraft	OPERATIONAL AIRCRAFT ONLY					
	August 1942		September 1942		October 1942	
	R.A.F.	G.A.F.	R.A.F.	G.A.F.	R.A.F.	G.A.F.
		Tons/		Aircraft/		
				Month		
Day Fighters (S.E. etc.)	5.2	4.6	4.8	4.4	4.3	3.4
Night Fighters (P.O. etc.)	7.5	7.3	6.9	4.6	5.5	4.3
Army Co-op.	2.1	4.9	2.7	4.2	3.3	3.0
Long Range Bombers	13.6	11.4	14.3	11.5	13.5	8.2
Fighter/Dive/Bombers	5.0	3.6	4.8	4.0	5.2	3.4
Recco.	12.5	25.0	11.5	27.0	10.0	25.6
Average #	7.8	8.3	7.5	8.3	7.6	6.1

Including other R.A.F.

AIR FORCE CONSUMPTION
ESTIMATES

Month of:

G.A.F. FIGURES

(days)

AIRCRAFT		ENGINE HOURS				TONS (2)	
Type and No. of Engines	Number	No. of Sorties per day	Per Sortie	(3) Oper: Non-Oper: -----per-----day-----	Total	Galls/Eng. hour.	Per day. Total for period
L.R.B. A & B.R. B (2) C			6			50	
D.B. A (1) B C			1			50	
S.E.F. A (1) B C			0.75			75	
T.E.F. A (2) B C			3			55	
A.C. A (1) B C			1.5			50	
C.S. A (2) B C			10.0			50	
TOTAL C							
Transport (3) & (4) C)			10.0				
Training (1.5) C)			4.5				

(1) A = I.E. Aircraft
B = I.E. " "
C = New Aircraft

(2) 300 gallons per

(3) Assumes 25% of
10 eng
4

(4) All new aircraft

(5) Basis as follows
Type of A/C.
3E
Op. 2E
Lt. 2E
1E
TOTAL

(6) EL. 1E
Ad. 1E
2E
3E
Op. 1E
2E
TOTAL

(7) I.A.F. Consumption
Type of A/C

L.R.B.
2 & 3

S.E.F.
(1)

A.C.
1, 2 & 3

C.S.
1 & 3
TOTAL

I.A.F. Total
Fuel
T

TOTAL

(8) M/T Fuel R

TOTAL for operational aircraft

TOTAL for ferrying (see Note 4)

Transport Operations (see Note 5)

Training Operations (see Note 6)

Civil Air Lines

TOTAL G.A.F. Aviation Fuel Consumption

TOTAL I.A.F. " " " (see Note 7)

TOTAL Aviation Fuel Consumption

TOTAL Motor Fuel Consumption (see Note 8)

Add 4% for Lube Oil Consumption.

AIR FORCE CONSUMPTION ESTIMATES

Month of:

(days)

Total	Galls/ Eng. hour.	TONS (2) Per day.	Total for period
	50		
	50		
	75		
	55		
	50		
	50		

NOTES

- (1) A = I.E. Aircraft Operationally Engaged
B = I.E. " non- "
C = New Aircraft Built During The Period

(2) 300 gallons per ton.

(3) Assumes 25% of operational engine hours for operational aircraft.
10 engine hours p.w. for T.E. non- " "
4 " " " " S.E. non- " "

(4) All new aircraft assumed to make one flight of 3 hours.

(5) Basis as follows:-

Type of A/C.	No. of A/C.	Hours/Day.	Galls/Eng.hr.	Tons/D.
3E		1.5	35	
Op. 2E		1.5	50	
Lt. 2E		1.0	20	
1E		1.0	8	
TOTAL				

(6)	El. 1E	3	3
	Ad. 1E	1.5	35
	2E	1.5	20
	3E	1.5	35
	Op. 1E	1.5	60
	2E	1.5	50
	TOTAL		

(7) I.A.F. Consumption estimated as follows:-

Type of A/C	No. of A/C	Oper: Sorties per day	Eng-hrs per sortie	Eng-hrs per day	Eng-hrs per day	Consumption Galls. Eng-hr.	Tons per day
L.R.B. 2 & 3		9				40	
S.E.F. (1)		1.5				60	
A.C. 1, 2 & 3		7				40	
C.S. 1 & 3		8				40	
TOTAL							
I.A.F. Transport	9					35	
Ferrying	5					45	
Training	1.65					30	
TOTAL							

- (8) M/T Fuel Requirements.
G.A.F. Vehicles
FLAK. Vehicles
I.A.F. Vehicles

@ 4 galls/day/vehicle