

Preliminary report on Japanese fighter planes
Production

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S E C R E T

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JOINT INTELLIGENCE SUBCOMMITTEE

WORKING COMMITTEE ON JAPANESE AIRCRAFT

PRELIMINARY REPORT ON JAPANESE FIGHTER
PLANE PRODUCTION

(Based solely on name-plate analysis)

DECLASSIFIED
EO 11652

E N C L O S U R EPRODUCTION RATES

1. Japanese production of Zekes and Haps is estimated to be at the rate of 150 per month (See Appendices "A", "B", "C", and "D"). In addition to these there is a probable production of about 35 Rufes per month. (See Appendices "E" and "F") Beyond this there appears to be some production, as yet numerically unimportant, of Japanese versions of the ME 109 and the FW 190. It is probable that the total production of fighter planes of all types during the second quarter of 1943 closely approximates 200 per month.

2. The production rate estimates for the Zekes, Haps and Rufes is based principally on name-plate analysis. In the case of the Zekes and Haps, the evidence is relatively good; for the Rufes, it is far from adequate.

3. Various internal tests suggest a high degree of reliability for production estimates for the Hap and Zeke for the period 1941-1942, which involved only minor interpolations to fill in gaps in the series data. Estimates for the first two quarters of 1943 are more speculative; on the basis of the production rates established for the earlier period, an optimum or ultimate maximum production rate has been assumed. In the case of the Mitsubishi Hap, the peak rate of production (2.4 per day rounded out to 2.5) on the superseded Zeke has been used as the optimum; in the case of the Nakajima Zeke the peak rate of production at the end of 1942 (2.5 per day) has been assumed to represent the optimum.

4. It appears likely that any bias in the 1943 estimate will be toward understatement. Conversely, however, there is a distinct possibility that Nakajima may be called upon to convert from the manufacture of the Zeke to the Hap, or to some other new model. Such a conversion clearly would lead to an interruption in the current production rate.

5. In addition to the Zeke and Hap, there is a type Zero float (Rufe) plane manufactured by Nakajima, concerning which the evidence is less convincing. An inadequate series of component part plates only are available. These suggest that the Rufe was in production in the 2nd Quarter of 1942 at a rate of approximately one per day.

6. Throughout these calculations we have borne in mind the possibility that the name-plate data at hand might not include all production series, or more specifically, might cover only Navy planes to the exclusion of the Army. Analysis of the data, however, leads us to believe that it is most unlikely that any other series in this group exists and that planes for the two branches of the service are produced in the same plants and are assigned from those produced without disturbance to the sequence of identifying serial numbers. Observations that lead us to this conclusion are as follows:

a. Serial numbers and dates on plates examined are generally consistent throughout and show no evidence of two separate series within a given plant.

b. Although no recovered name-plates have borne the Army stamp, all plates do not bear the Navy stamp.

c. All plates are not identical - some carry Type 0 (Zero) Mark 1 or 2 - Model #2; others carry Type 0 (Zero) Mark blank, Model #21. While no interpretation can be made with assurance as to the distinction intended on these two types of plates, it is just possible that one may identify Army and the other Navy.

d. Examination of rather limited data leading to a tentative estimate of the production of Sakae 12 engines used in the Zekes and Rufes indicate that the 2500th engine was made in December, 1942. The total number of Zekes and Rufes produced at the end of 1942 according to our estimates would be about 1500. The relationship of engines to planes produced would thus be about 1.66 to 1. The margin of extra engines

is clearly not large enough to more than inadequately take care of necessary spares. Since the Sakae 12 engine is the only type that has been found on these planes it seems very unlikely that more planes than the estimated 1500 could have been put into operation.

7. Total Japanese fighter strength is estimated to have varied between 1250 and 1450 in the period from November, 1942 through April, 1943, and generally averaged about 37% of total operational strength of all types. If for purposes of checking we tentatively assume these figures to be correct, certain observations are possible concerning the production rate estimates for Zero type fighters.

8. If total wastage of fighters amounted to 10% per month, a production of about 135 per month would have been necessary to maintain an even strength; if total wastage amounted to 15% per month, maintenance of strength would have required a production of about 193 per month. Actually, estimates of total Japanese fighter strength show a decline through 1942, and a rise through the first four months of 1943 at an average rate of about 48 per month.

9. The rise in the estimated strength of the Japanese fighter force in early 1943, following a decline in strength through 1942, follows roughly the estimated production pattern of the Zero type fighters. Continuing to assume the accuracy of the strength estimates for the period November, 1942 to April, 1943, unless total wastage and losses were lower than 10%, the Zero types in the calculated sequence would include most but not all of fighter plane production. Assuming an arbitrary 10% total loss per month, and deriving monthly deliveries (hence production) from this calculation, the following hypothetical table would result from strength estimates:

S E C R E T

<u>Date</u>	<u>Strength</u>	<u>10% Loss Per Month</u>	<u>Net</u>	<u>Necessary New Supply to Attain Estimated Strength</u>
12-31-42	1249	125	1124	207
1-31-43	1331	133	1198	140
3-1-43	1338	134	1204	182
4-1-43	1386	139	1247	194
5-1-43	1441			—
Total New Fighters				723
Average New Fighters, per month				181

If this hypothetical table approaches the facts, the small difference between the production rate implied by it and the production estimates of Zero type fighters could be accounted for by the small additional production of other types that have been observed in operation.

COMPONENTS

10. All available evidence suggests that all Zekes, Haps and Rufes are assembled either by Mitsubishi or Nakajima. Examination of plates taken from component parts of these planes reveals, however, a rather extensive system of specialized component fabrication involving many sources other than the two final assemblers. For purposes of this study components have been grouped in ten major categories and the sources of supply established for each such group. (See Appendix "G")

11. Particularly significant is the fact that within these groups single sources of supply appear for three important components, namely engines (Nakajima), propellers and constant speed governor controls (Sumitomo), and wheels (Kayaba). (See Appendix "H") It is possible, of course, that these firms have subcontractors producing these items under license; the plates afford no evidence that will either support or deny such a theory.

12. According to the name-plates on component parts of fallen aircraft, the following observations seem valid concerning the flow of components into the final assembly. (See Appendix "I")

S E C R E T

for details concerning component parts by sources of manufacture and Appendix "J" for a brief discussion of the manufacturers.)

Engines:

Manufactured by Nakajima for both the Zeke and Hap. The Sakae 12 is used on the Zeke and the Sakae 21 is used on the Hap.

Constant Speed Governor Control:

Supplied for both the Zeke and the Hap from a single source - Sumitomo.

Actuating Control Mechanisms:

Hydraulic Gear for Flap: Supplied from three sources, Mitaka Koku Kogyo, Tokyo Kiki Kogyo (Tokyo Machine and Instrument Company) and Yonezawa.

Hydraulic Jack: Manufactured by Mitaka and used on the Hap.

Landing Gear Assembly:

Six companies, in addition to the assembly plants - Mitsubishi and Nakajima, are contributing to the manufacture of under-carriage parts. Kayaba is the most important of these six. On the crashed planes examined for which plates are available, Kayaba is manufacturing approximately two-thirds of the landing wheel struts, over one-half of the tail wheel oleo legs, large proportion of under-carriage shock absorbers, and all of the wheels. Of the other six, Mitaka, Yonezawa, and Tokyo Kiki Kogyo manufacture hydraulic gears, Nippon Kentetsu Kogyo manufactures arrester assembly components, and Sakura Gomu manufactures rubber equipment (hydraulic lines).

Fuel and Oil Storage and Distribution:

Fuel Tanks: At the beginning of the 2nd Quarter of 1942 we get an estimated production rate of 11 fuel tanks per month manufactured by Mitsubishi for use on the Hap. However, since this quarter is the period of the initial production of the Hap, and since the plates had been revised from Mark 1 to Mark 2, we can assume that these fuel tanks were taken from stockpiles.

Available plates indicate jettisonable fuel tanks are manufactured by three companies, Nippon Kentetsu Kogyo, Osaka Arminiyumu and Hiro. We find a high production rate for this part but this can be attributed to the fact that so many are lost.

Oil Radiators: Apparently manufactured by Mitsubishi at the assembly plant. Production computation would indicate Mitsubishi during the last quarter of 1941 was manufacturing oil radiators for the Zeke at approximately 1-1/2 per plane (85 per month). Manufactured for the Hap by Mitsubishi, Nitto Koku Kiki and its subsidiary plant, Sansho Seisakusho and by Osaka Arminiyumu.

Oil Filters: Seem to come from a single source for both the Zeke and the Hap - Tokyo Seisakusho, a subsidiary company of Nakajima.

Magnetos:

Three types - supplied from a single source, Yokogawa Denki. No conclusive evidence that any one type is peculiar to either the Zeke or the Hap.

Carburetors:

Two sources, Asahina and Tokyo Kiki Seizosho. Two models manufactured, one used on the Zeke and one on the Hap. Asahina manufactures both models.

Starters:

The Inertia Starter, American patented, is manufactured by Tokyo Keiki Seisakusho. An electric starter boost is manufactured by Kokusan Denki.

Generators:

Manufactured by Oana Seisakusho and Fuji Denki. Control Box Charging Generator Model 1: Manufactured for Hap only by Oana Seisakusho.

APPENDIX "A"PRODUCTION RATE CALCULATIONSTYPE O, MARK 2 S.S.F. (Hap) MANUFACTURED BY MITSUBISHIPLANESAIRCRAFT

<u>Serial No.</u>	<u>Date</u>	<u>Implied Daily Production Rate</u>
3018	6-15-42	.76
3028 ^{1/}	6-28-42	
	7-4-42	
3030	6-30-42	.66
3032	7-3-42	
3036	7-7-42	
		.80

1/ Plate on No. 3028 carried two dates, 7-4-42 stamped over 6-28-42. This probably indicates a return to the assembly line for adjustment and could account for the production drop in period 6-30-42 to 7-3-42.

COMPONENTSFuselage

<u>Serial No.</u>	<u>Date</u>	<u>Implied Daily Production Rate</u>
3018	6-2-42	1.0
3024	6-3-42	
3032	6-17-42	
		0.88
		0.93

Rudder

<u>Serial No.</u>	<u>Date</u>	<u>Implied Daily Production Rate</u>
5904	6-2-42	1.44
3927	6-18-42	
5929	6-18-42	
4933	6-20-42	2.00
		1.56
		1.61

Engine - Sakae #21

<u>Serial No.</u>	<u>Date</u>	<u>Implied Daily Production Rate</u>
2138	1-8-42	1.83
21106 ^{1/}	2-14-42	
21137 ^{1/}	4-11-42	
21145 ^{1/}	4-9-42	0.55
		0.72
		1.06
		1.17

1/ The fact that the serial numbers and dates for the last two items are not consistent renders this calculation somewhat uncertain. It appears likely that engines were being accumulated for pending production of "Hap."

S E C R E T

Arrester Hook (Nippon Kentetsu)

<u>Serial No.</u>	<u>Date</u>	<u>Implied Daily Production Rate</u>
242	4-15-42	0.75
249	4-27-42	
251	4-27-42	

Arrester Hook (Mitsubishi)

3702	5-29-42	1.23
4728	6-19-42	
5734	6-24-42	

Questions can be raised as to whether Nippon Kentetsu stopped manufacture when Mitsubishi came into production. If so, production of approximately 37 Hooks per month would compare favorably with plane production of 30 per month in third quarter.

SUMMARY

ESTIMATED DAILY PRODUCTION RATE BY QUARTERS

1942

2nd Quarter

3rd Quarter

.33

1.0

APPENDIX "B"

TYPE-O, MARK 1 S.S.F. (Zeke) MANUFACTURED BY NAKAJIMA

Planes	Serial No.	Date	Implied Daily Production Rate
	911	Late 1941	
	913	(Approx.) 12-19-41	
	545	2-27-42	1.1
	7236	8-26-42	
	83281/	(Est. 1/) 10-3-42	2.4
	43671/	(Est. 1/) 10-18-42	2.4
	55441/	12-31-42	

Estimated Daily Production Rate

1941	1942			
4th Quarter	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
-	0.5	1.0	1.75	2.4

1/ These serial numbers are from airframe component parts not aircraft plates. Date used is estimated on basis of lead factor for these parts established from relationship of component to completed aircraft assembly on other planes in series.

TYPE O, MARK 1 S.S.F. (Zeke) MANUFACTURED BY MITSUBISHI

Planes	Serial No.	Date	Implied Daily Production Rate
	5349	10-4-41	
	3372	10-21-41	1.35
	4443	11-20-41	2.00
	3537	1-4-42	2.08
	1575	2-9-42	1.05
	4593	2-19-42	1.20
			1.78
			1.23

Estimated Daily Production Rate (by Quarters)

1941				1942
1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	1st Quarter
0.5	1.0	2.0	2.0	1.25

Based on assumption that plane dated 10-4-41 was 349 of its model and that production started in late 1940.

S E C R E T

APPENDIX "E"

TYPE 0 - SEAPLANE FIGHTER - NAKAJIMA

<u>Serial No.</u>	<u>Date</u>	<u>Implied Daily Production Rate</u>
913	4-28-42	
914	4-26-42	
915	4-25-42	
916	4-22-42	1.08 <u>1/</u>
822	5-4-42	
826	4-25-42	

1/ These serial numbers are from airframe parts that have sometimes, when found on the "Hap" and "Zeke", borne the aircraft number. A calculation based on this assumption is somewhat hazardous and is further complicated by the fact the numbers and dates are not consistent when arranged in series. A single calculation can be made by taking the spread in serial numbers 9-13 to 8-26* = 13 and the spread in dates 4-22 to 5-4 = 12, indicating 13 planes in 12 days - a daily rate of 1.08 or monthly rate of 32.

* (first digits are interpreted as part of code and not of production serial numbers).

S E C R E T

APPENDIX "F"

TYPE O MARK 1 AND MARK 2 S.S.F.

Estimated Average Production by Quarters Showing Serial Numbers ^{1/}

	1941				1942				1943	
	1st qtr.	2nd qtr.	3rd qtr.	4th qtr.	1st qtr.	2nd qtr.	3rd qtr.	4th qtr.	1st qtr.	2nd qtr.
	<u>Type O Mark 1 (Zeke) Mitsubishi</u>									
Avge. Daily Prod.	0.5	1.0	2.0	2.0	1.25	x	x	x	x	x
Avge. Monthly "	15	30	60	60.0	37	x	x	x	x	x
Serial Numbers	21-66	67-158	159-342	343-527	528-639	x	x	x	x	x
	<u>Type O Mark 2 (Hap) Mitsubishi</u>									
Avge. Daily Prod.	x	x	x	x	x	0.33	1.0	2.0	2.5	2.5
Avge. Monthly "	x	x	x	x	x	10	30	60	75	75
Serial Numbers	x	x	x	x	x	1-30	31-168	169-352	353-577	578-807
	<u>Type O Mark 1 (Zeke) Nakajima</u>									
Avge. Daily Prod.	x	x	x	x	.5	1.0	1.75	2.4	2.5	2.5
Avge. Monthly "	x	x	x	x	15	30	52	72	75	75
Serial Numbers	x	x	x	1-24	25-71	72-163	164-375	376-546	547-775	776-1005
	<u>Totals</u>									
Avge. per month	15	30	60	60	52	40	82	132	150	150

^{1/} Serial numbers are those that would be expected to fall in the stated periods according to production rate calculation. Dated aircraft plates received in the future can be matched against this table and, insofar as they do or do not conform to the serial numbers as given, can be used to evaluate the production rate calculations.

APPENDIX "H"

COMPANIES SUPPLYING COMPONENTS FOR USE ON

TYPE O. MARK 1 and MARK 2, S. S. F.

COMPANY NAME	COMPONENTS													
	Airframe	Control Mechanisms (airframe)	Landing Gear Assembly	Engines	Engine Mounted Accessories	Propeller Blades	Governor (Propeller)	Fuel & Oil Storage	Fuel & Oil Dist. & Misc.	Generators, Dynamos, Starters, Motors	Switches & Misc. Elec. Components	Instruments, Gauges, Indicators	Radio & Radar	Miscellaneous
ASAHINA					x									
FUJI DENKI SEISAKUSHO										x				
FUJI KOKU KEIKI												x		
FUJIKURA									x					
HIRO NAVAL ARSENAL								x						
KAIGUN KOKU GIJUTSHO												x		
KAYABA			x											
KOKUSAN DENKI											x			
MITAKA		x	x											
MITSUBISHI	x		x		x			x	x					x
MITSUBISHI DENKI											x	x		
NAKAJIMA	x		x	x				x	x		x			
NICHIRIN									x					
NIPPON KENTETSU KOGYO	x		x					x						
NIPPON MUSEN DENSHIN DENWA												x		
NIPPON TSUSHIN KOGYO													x	
NITTO KOKUKI KI									x					
OANA SEISAKUSHO (SHOKETSU)										x			x	
OKAMOTO			x											
OKI DENKI													x	
OSAKA ARMINIYUMU								x	x					x
SAKURA GOMU			x						x					
SANSHO SEISAKUSHO 1/									x					
SUMITOMO							x							
TANAKA KEIKI SEISAKUSHO												x		x
TAKENOTO DENKI KEIKI SEISAKUSHO												x		
TOKUSHU KOSAKUSHO														x
TOKYO KEIKI SEISAKUSHO								x	x	x	x			
TOKYO KIKI KOGYO		x	x											
TOKYO KIKI SEIZOSHO					x									
TOKYO KOKU KEIKI									x			x		
TOKYO SEISAKUSHO 2/										x				
TOYO TSUSHINKI													x	
YOKOGAWA DENKI					x					x	x	x		
YONEZAWA KOKU KOGYO		x	x											
TOTAL	3	3	9	1	4	0	1	6	10	5	5	8	4	4

1/ Plant of Nitto Kokuki Ki

2/ Plant of Nakajima Hikoki

APPENDIX TABLE "I"

COMPONENT PARTS BY SOURCES OF MANUFACTURE

Type O Mark 1 and Mark 2 S.S.F.

Landing Gear Assembly

ZEKE

HAP

Part No.	Component Name	Supplier's Name	<u>Estimated Monthly Production</u>		Estimated Combined Monthly Production	Notes
			No. of Units	Last Date in Series		
3330	Hydraulic Pump - Re-fraction Gear Tail and Main Supply Tank for Hydraulic System	Mitsubishi Jukogyo Nakajima	--	Dec. 1941 Jan. 1942	--	Zeke only
7010	Undercarriage - Landing Wheel Strut	Kayaba Seisakusho Mitsubishi Jukogyo	165 47	May 1942 May 1942	212	-- --
7450	Undercarriage - Oleo Leg or Shock Absorber	Kayaba Seisakusho Mitsubishi Jukogyo	192 --	Nov. 1942 Jan. 1942	-- --	-- --
7500	Tail Wheel Strut	Kayaba Seisakusho Mitsubishi Jukogyo	-- --	April 1942 May 1942	-- --	-- --
7570	Tail Wheel - Oleo Leg	Kayaba Seisakusho Mitsubishi Jukogyo	69 34	June 1942 May 1942	103	-- --
7615	Hydraulic Gear - Cylinder or Jack	Mitaka Koku Kogyo Yonezawa Koku Kogyo Tokyo Kiki Kogyo	108 -- --	June 1942 Sept. 1942 Feb. 1942	-- -- --	-- -- --
7650	Arrester Gear	Nippon Kentetsu Kogyo	--	Feb. 1942	--	Zeke only
7795	Arrester Hook	Mitsubishi Jukogyo Nippon Kentetsu Kogyo	37 25	June 1942 April 1942	62	Hap only
--	Wheels	Kayaba Seisakusho	210	Aug. 1942	210	--
--	Hydraulic Line (Rubber)	Sakura Gomu	--	July 1941	--	Zeke only

25 May 1943

APPENDIX TABLE "I"
(Cont.)

COMPONENT PARTS BY SOURCES OF MANUFACTURE

Type O Mark 1 and Mark 2 S.S.F.

ZEKE

HAP

Actuating Control Mechanisms

Part No. or Model No.	Component Name	Supplier's Name	<u>Implied Monthly Production Rate</u>			Notes
			Individual Company	Last Date in Series	Combined Company	
3370	Hydraulic Gear for Flap Hydraulic Cylinder	Mitaka Koku Kogyo Tokyo Kiki Kogyo Yonezawa Koku Kogyo	91 --- --	May 1942 Dec. 1941 Sept. 1942	--- --- ---	--- --- --
3150	Hydraulic Jack - Flap Actuator	Mitaka Koku Kogyo	15	May 1942	---	Hap only

Type O Mark 1 and Mark 2 S.S.F.

ZEKE

HAP

Fuel and Oil Pumps

Part No. or Model No.	Component Name	Supplier's Name	<u>Implied Monthly Production Rate</u>			Notes
			Individual Company	Last Date in Series	Combined Company	
Model No. 11	Fuel Pump - Inlet	Nakajima	235	Feb. 1942	---	---
Model No. 12	Hand Fuel Pump Controller	Nakajima	--	June 1942	---	--
Model No. 12	Hydraulic Oil Pump - H/P	Nakajima	325	Dec. 1941	---	Also used on Type 1 M/B
Model No. 1	Vacuum Pump (for gauge)	Tokyo Keiki Seisakusho	355	Feb. 1942	---	Also used on Type 1 M/B

25 May 1943

APPENDIX TABLE "I."

(Cont'd)

COMPONENT PARTS BY SOURCES OF MANUFACTUREType O Mark 1 and Mark 2 S.S.F.

ZEKE

HAP

Generators and Starters

Part No. or Model No.	Component Name	Supplier's Name	<u>Implied Monthly Production Rate</u>			Notes
			Individual Company	Last Date in Series	Combined Company	
Model No. 1	Charging Generator	Oana Seisakusho Fuji Denki	74 --	May 1942 Aug. 1942	-- --	-- --
--	Control Box - Charging Generator Model No. 1	Oana Seisakusho	--	--	--	Hap only
Model No. 1 (Eclipse)	Inertia Starter	Tokyo Keiki Seisaku- sho	168	Dec. 1941	168	Also used on Val. Betty, Helen
--	Electric Starter - Boost	Kokusan Denki	--	March 1942	--	Also used on Val. Betty

25 May 1943

SECRET

APPENDIX TABLE "I"

COMPONENT PARTS BY SOURCES OF MANUFACTURE

Type O Mark 1 and Mark 2 S.S.F.

Magnetos

25 May 1943

ZEKE

HAP

Part No. or Model No.	Component Name	Supplier's Name	<u>Implied Monthly Production Rate</u>			Notes
			Individual Company	Last Date in Series	Combined Company	
KS 2	Magneto Type 14 BF ₂ L	Yokogawa Denki	--	June 1942	--	--
NK1F	Magneto	Yokogawa Denki	162	Jan. 1942	--	--
--	Magneto - Type 14 CF ₂ L	Yokogawa Denki	--	--	--	Zeke only
--	Magneto	Yokogawa Denki	--	Dec. 1941	--	Zeke only

Type O Mark 1 and Mark 2 S.S.F.

Carburetors

ZEKE

HAP

Part No. or Model No.	Component Name	Supplier's Name	<u>Implied Monthly Production Rate</u>			Notes
			Individual Company	Last Date in Series	Combined Company	
Nakajima-Duplex 100 Otsu Model	Carburetor	Asahina	--	Nov. 1941	--	Zeke only
Nakajima-Duplex Down draft Model 100	Carburetor	Asahina Tokyo Kiki Seizosho	--	May 1942 June 1942	--	Hap only

S E C R E T

APPENDIX TABLE "I"

COMPONENT PARTS BY SOURCES OF MANUFACTURE

Type O Mark 1 and Mark 2 S.S.F.
ZEKE HAP

Engines and Constant Speed Governor

Model No.	Component Name	Supplier's Name	Implied Monthly Production Rate			Notes
			Individual Company	Last Date in Series	Combined Company	
Sakae No. 12	Engine	Nakajima	--	1941	--	Zeke only
Sakae No. 21	Engine	Nakajima	35	April 1942	--	Hap only
100A - 1a	Constant Speed Governor Control	Sumitomo	.	May 1942	--	Also used on Type 1 M/B

Type O Mark 1 and Mark 2 S.S.F.
ZEKE HAP

Oil Radiators

Part No. or Model No.	Component Name	Supplier's Name	Implied Monthly Production Rate			Notes
			Individual Company	Last Date in Series	Combined Company	
2836	Oil Radiator · Oil Cooler	Mitsubishi Jukogyo Nitto Koku Kiki	35 --	Dec. 1941 Dec. 1941	--- --	Zeke only
22080	Oil Radiator	Nitto Koku Kiki	--	June 1942	--	1 plate only Hap
22265 1/	Oil Radiator	Mitsubishi Jukogyo	--	May 1942	--	1 plate only Hap
22183	Oil Cooler	Osaka Arminiyumu	--	No date	--	1 plate only Hap
--	Oil Cooler	Sansho Seisakusho 2/	.	No date	--	2 plates Hap & Zeke

1/ Called Pattern No.

2/ Plant of Nitto Koku Kiki

25 May 1943

SECRET

APPENDIX TABLE "I"

COMPONENT PARTS BY SOURCES OF MANUFACTURE

Type O Mark 1 and Mark 2 S.S.F.

ZEKE

HAP

Oil Filters

Part No. or Model No.	Component Name	Supplier's Name	<u>Implied Monthly Production Rate</u>			Notes
			Individual Company	Last Date in Series	Combined Company	
Model 11	Oil Filters	Tokyo Seisakusho	188	Feb. 1942	--	--

Type O Mark 1 and Mark 2 S.S.F.

ZEKE

HAP

Fuel Tanks

Part No. or Model No.	Component Name	Supplier's Name	<u>Implied Monthly Production Rate</u>			Notes
			Individual Company	Last Date in Series	Combined Company	
2085	Jettisonable Belly Tank	Nippon Kentetsu Kogyo Osaka Arminiyumu	142 --	Feb. 1942 May 1942	-- --	Zeke only
2015	Jettisonable Belly Tank	Nippon Kentetsu Kogyo	193	Jan. 1942	--	Zeke only
--	Jettisonable Belly Tank	Hiro Naval Arsenal	--	Nov. 1941	--	1 plate only Zeke?
22147 <u>1</u> /	Fuel Tank	Mitsubishi Jukogyo	11	April 1942	--	Hap only

1/ Only 2 plates available

May 25, 1943

APPENDIX "J"

Fuji Denki Seizo K. K.

Main office and factory: Kanagawa Prefecture, Kawasaki-shi

Sales offices: Tokyo, Moji, Nagoya, etc.

Founded: August, 1923

Capital: 25,000,000 Yen. 17,500,000 Yen paid up.

Fuji Denki Seizo is one of the large electrical instruments companies. Mitsubishi Jukogyo is one of the main stockholders.

Products are various kinds of electric motors, all kinds of electrical instruments, electrical machine tools.

Hiro Naval Arsenal

Location: Kure Naval Base, Kure-shi, Hiroshima-ken

This Naval Arsenal is engaged in aircraft manufacture and repair, but since the greatest secrecy has always surrounded it, there is very little information available regarding size or products. Japanese sources report that both airplanes and engines are manufactured here and this arsenal is used as a military standard for civilian companies.

Nameplate identification - captured planes: Manufacture of jettisonable belly tanks and also the repair or replacement of wings, ailerons, elevators, etc.

Kayaba Seisakusho K. K.

Main office and factory: Tokyo-shi, Shiba-ku, Shibatori, 1:1:1

Founded: January, 1927; in March, 1935 was reorganized as a joint stock company.

Capital: 5,000,000 Yen

Designs and manufactures landing gear, wing gear, and body parts for aircraft; guns and special arms.

Kokusan Denki K. K.

Factories: Tokyo-shi, Toshima-ku, Hara-cho
Shizuoka Prefecture, Shunto Gun
Mukden, Manchuria - Tetsunishi-ku, Kikigai

Founded: July, 1931

Capital: 1931 - 260,000 Yen; by 1939 - ¥5,400,000
(¥4,455,000 paid up)

In July 1931 Kokusan Denki bought out the Takuto Electrical Industrial Works. Monthly capacity in 1939 was ¥700,000 and was expected to increase to ¥1,000,000 by 1941. In early 1941 about 2,500 persons were employed in the aviation department of the Tokyo plant. The tendency in recent years has been to expand the Mukden factory; however, there has also been considerable expansion of the plants in Japan Proper.

This company manufactures practically all kinds of electrical equipment used in connection with airplane engines, with particular emphasis on the manufacture of magnetos. It also makes electrical parts for automobiles.

Mitaka Koku Kogyo K. K.

Office and factory: Tokyo, Kitatama-gun, Mitaka-machi,
Kami Renja 990.

Founded: March, 1937

Capital: 1937 - 1,500,000 Yen; 1940 3,000,000 Yen

Mitaka manufactures airplanes and parts, internal combustion engines, and precision machines.

Nameplate identification - captured planes: Hydraulic gears, oil filters, auxiliary pumps, and carburetors for aircraft.

Mitsubishi Jukogyo K. K.

Aircraft factories: Nagoya-shi, Minato-ku, 7 Oe-machi,
Aichi Ken
Nagoya-shi, Higashi-ku, Daiko-machi
998 Okinaka, Aichi Ken
Tokyo-shi, Kamata-ku, 321 Shimomaruko
cho
Tokyo-shi, Shinagawa-ku, Oi-mori-mae
cho 5600
Tsurumi, outside of Yokohama
Tokyo-shi, Shiba-ku, Shibaura-machi,
7, Hinode-cho

S E C R E T

The Mitsubishi Company began aircraft manufacture in 1928 and at the present time is the largest producer of aircraft in Japan. Capital of Mitsubishi Jukogyo in July 1941 was ¥240,000,000; paid up ¥210,000,000. Over half of this amount was devoted to aircraft production.

Mitsubishi is a "through process" company, possessing facilities to design and manufacture complete aircraft. In addition to the direct control and operation of the above mentioned plants, Mitsubishi has interests in a great many other companies that operate as "shadow factories" for Mitsubishi.

Nameplate identification - captured planes: Manufacture of fighters and bombers - engines, airframes and component parts. Information not sufficient to identify plants with parts they manufacture.

Nakajima Kikoki K. K.

Factories: 650 Nishikubo, Musashino-machi, Kitatama Gun, Tokyo Fu
Ogikubo, 88 Shuku machi, Suginami-ku, Tokyo-shi Ota
3011 Yato, Tanishi-machi, Kitatama Gun, Tokyo Fu

Capital: ¥50,000,000

Founded: 1917

The Nakajima Aircraft Company is one of the three most important aircraft producers in Japan. Its factories produce airframes and component parts and airplane engines. Nakajima has held licenses to manufacture foreign types as well as the Japanese developed aircraft models.

Nameplate identification - captured planes: Manufacture Type 0 Mark 1 S.S.F. (Zeke), Type 1 S.S.F. (Oscar), 0 Type 1 Fighter Floatplane (Rufe), and Sakae Motors 12 and 21 used in Zeke and Hap.

Nippon Kentetsu Kogyo K. K.

Main office: Kojimachi-ku, Marunouchi 4 of 2, Tokyo-shi

Factory: Unknown

Founded: April, 1935

Capital: ¥2,000,000

Information from trade directories and year books list this company as the manufacturer of steel fixtures, steel parts for concrete bridges and things used in building furniture.

Nameplate identification - captured planes: Manufacture airframes and components such as rudders, ailerons, flaps, engine cowling, and jettisonable fuel tanks.

Nitto Kokuki Ki K. K.

Factories: Hyogo Prefecture, Muko-gun, Osyo-mura
Hyogo Prefecture, Kobe-shi, Hayashida-ku

Founded: August, 1937

Capital: ¥300,000

This is a relatively new and small company. Japanese sources indicate it as engaged in the manufacture of airplane parts, refrigeration machinery and other machinery.

Nameplate identification - captured planes: Oil radiators and oil coolers for aircraft.

Oana Seisakusho K. K.

Head office and factory: No. 12, Kiyokawa-cho, 3-chome,
Asakusa-ku, Tokyo-shi

Founded: 1914; reorganized to present joint stock company in 1917

This firm was organized as a producer and distributor of electric machinery and supplies. In 1921 this company patented and began production of synchronous induction motors which is one of the great engineering achievements of Japan. Besides these motors, Oana manufactures generators for airplanes and constant speed governors appurtenant thereto, high frequency generators, charging dynamos, spark plugs, etc.

S E C R E T

Osaka Aruminiyumu Seisakusho K. K.

Main office and factory: Osaka, Osaka-shi, Naniwa-ku

Branch factories: Tokyo, Tokyo-shi, Asakusa-ku
Kai, Osaka Fu

Founded: May, 1918

Capital: ¥1,500,000

Nameplate identification - captured planes: Manufacture
jettisonable fuel tanks, oil cooler air scoops, pilot's seats,
cockpit, instrument panel frames.

Sakura Gomu K. K.

Office and factory: Tokyo-shi, Shibuya-ku, Hatagaya
Sasazuka #1037

Founded: May, 1918

Capital: ¥540,000; ¥472,000 paid up

This is one of the smaller manufacturing companies. It
specializes in the manufacture of rubber hose. Makes oil pipe
used in the Zeke.

Tokyo Keiki Seisakusho K. K.

Head office and factory: 860, Shinjuku-cho, Kamata-ku,
Tokyo-shi

Branch office: Osaka

Founded: 1896

Capital: ¥5,000,000; ¥4,000,000 paid up

This company was established for and has since been engaged
in the manufacture of gyro-compasses, searchlight projectors,
automatic steering gears, pressure gauges, revolution counters,
dynamometers, thermometers, electric meters, instruments and
apparatus for Nautical and Aeronautical purposes. Tokyo Keiki,
through agreements between Mitsui and Sperry Co., has licenses
to manufacture Sperry products. This is also true with Bendix
Aviation, giving Tokyo Keiki the right to manufacture Eclipse
starters.

S E C R E T

Nameplate identification - captured planes: In addition to the above, Tokyo Keiki manufactures vacuum pumps, vacuum regulating valves, aero engine starters and automatic pilots.

Yokogawa Denki Seisakusho K. K.

Head office: No. 28, Naka, Marunouchi, Kojimachi-ku, Tokyo

Factories: No. 3000, Musashino-machi, Kitatama-gun,
Tokyo-fu
No. 794, Kogane, Kaganei, machi, Tokyo-fu

Founded: 1915

Capital: ¥3,000,000

Yokogawa Denki is the foremost maker of electrical measuring instruments in Japan.

Nameplate identification - captured planes: Manufacture of magnetos, speedometers, temperature gauges, aerial navigation compasses, mixture ratio gauges, and pressure gauges.

Yonezawa Koku Kogyo K. K.

Location: Unknown

Founded: Unknown

Capital: Unknown

Nameplate identification - captured planes: Manufacture hydraulic gear.