SPEC. AN-H-8
DEC. 18, 1942

FORM ASC-512

AIRPLANE MODELS
RP-40D, P-40E & E1

SPECIFIC ENGINE FLIGHT CHART

ENGINE MODELS
V-1710-39
(WITH STREAMLINE MANIFOLDS)

CONDITION	FUEL PRESSURE (LB/SQ. IN.)	OIL PRESSURE (LB/SQ. IN.)	OIL TEMP. °C	OIL TEMP. °F	COOLANT TEMP. °C	COOLANT TEMP. °F		
DESIRED	12-16	60-70	60-80	140-176	105-118	220-260		
MAXIMUM	16	85	95	203	125	257		
MINIMUM	12	55			85	185		
IDLING	9	15						

MAX. PERMISSIBLE DIVING RPM: 3120

CONDITION	ALLOWABLE OIL CONSUMPTION
MAX. CONT.	.13.3 U.S.QT/HR. 22.2 IMP.PT/HR
MAX. CRUISE	.19 U.S.QT/HR. 15.8 IMP.PT/HR
MIN. SPECIFIC	.5-7 U.S.QT/HR. 8-11 IMP.PT/HR

OIL GRADE: (S) 1120 (W) 1100

SUPERCHARGER TYPE: SINGLE STAGE

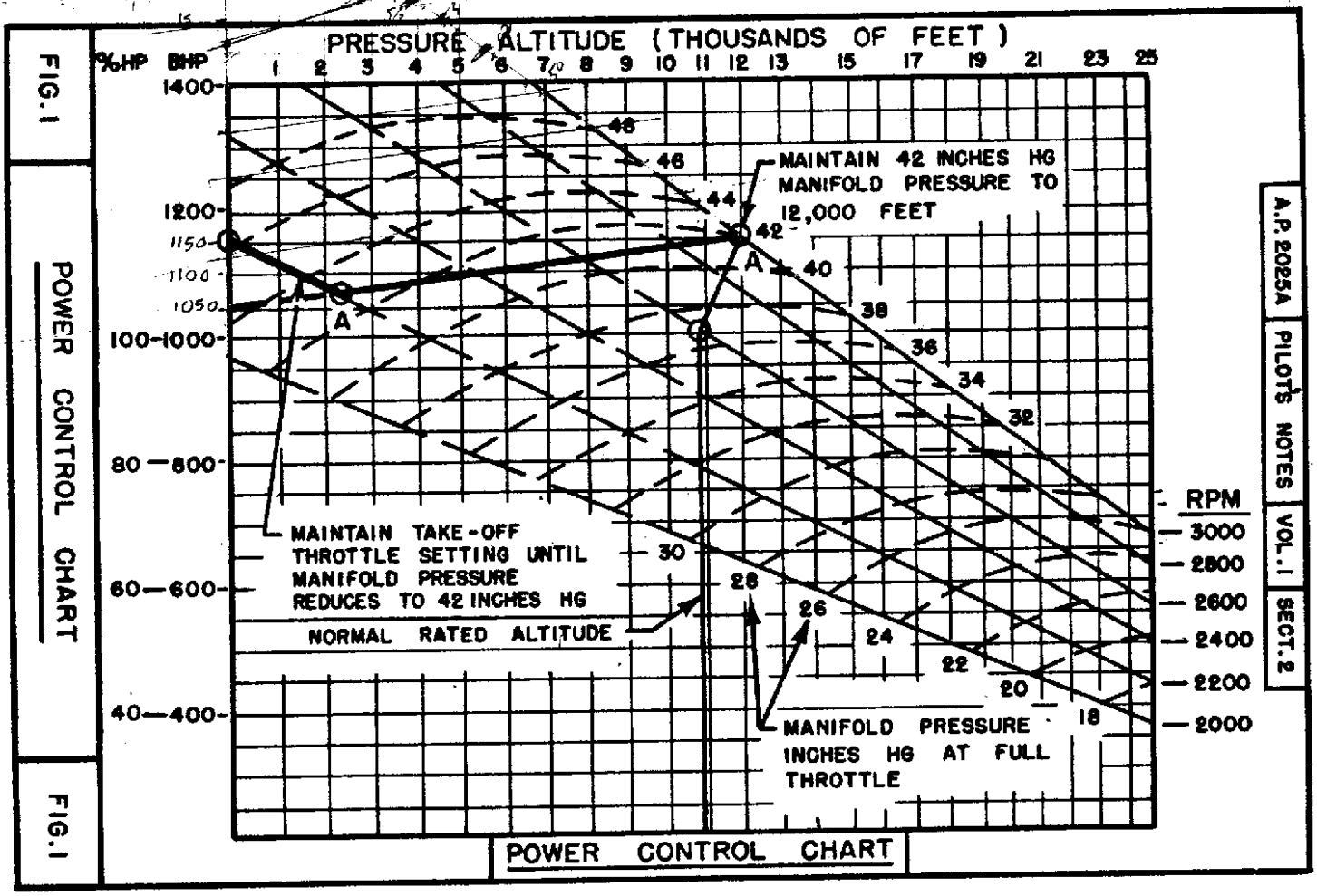
FUEL GRADE: 3-1 + 1.0 OCTANE *

OPERATING CONDITION	RPM	MANIFOLD PRESSURE (BOOST)	HORSE-POWER	CRITICAL ALTITUDE WITH RAM	CRITICAL ALTITUDE NO RAM	BLOWER	USE LOW BLOWER BELOW:	MIXTURE CONTROL POSITION	FUEL FLOW (GAL/HR/ENG.) U.S.	FUEL FLOW (GAL/HR/ENG.) IMP.	MAXIMUM CYL. TEMP. °C	MAXIMUM CYL. TEMP. °F	MAXIMUM DURATION (MINUTES)
TAKE-OFF	3000	45.5	1150	Sea Level				Auto Rich	125	104			5
WAR EMERGENCY	3000	56	1470	Sea Level				Auto Rich	163	136			5
MILITARY	3000	44.2	1150	11,800				Auto Rich	132	110			15
MAXIMUM CONTINUOUS	2600	37.8	1000	11,000				Auto Rich	105	88			
MAXIMUM CRUISE	2280	31.0	750	11,000				Auto Rich	65	54			
MINIMUM SPECIFIC CONSUMPTION	1950	22.5	395	Sea Level				Auto Lean	30	25			
	1950	22.5	420	5,000				Auto Lean	32	27			
	1950	22.5	450	10,000				Auto Lean	34	28			
	1950	22.5	475	15,000				Auto Lean	36	30			
	1950	F.T.	460	20,000				Auto Lean	35	29			

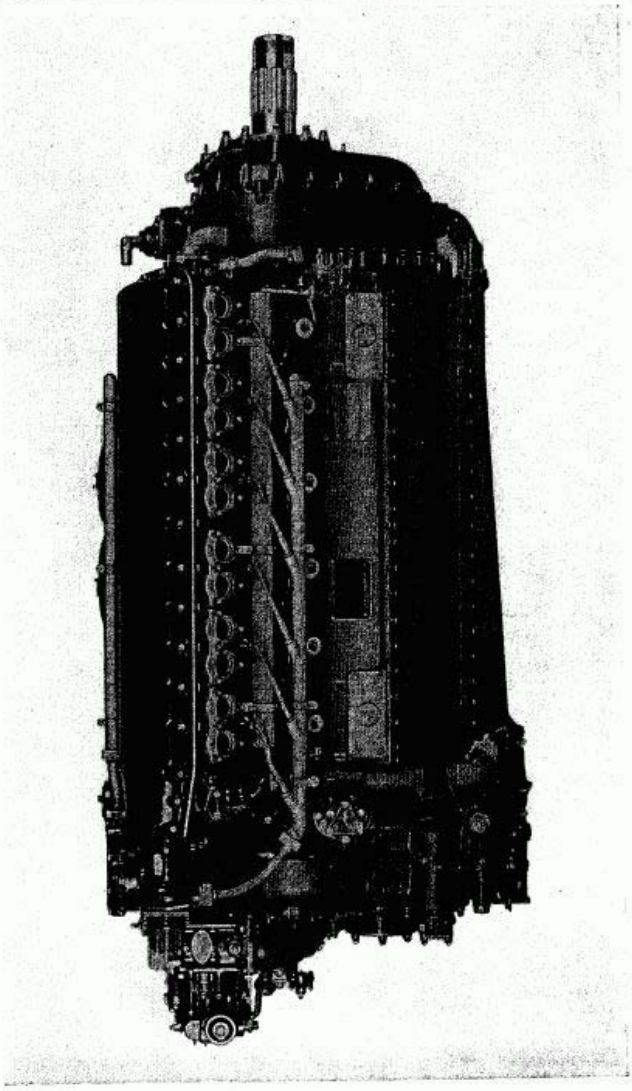
REMARKS: * Fuel Specification AN-VV-F-781 (Amend. 5)

VP-1-1-45-AM

1710-39 (1642x1232x2 gif)



allisonv1710_39 (1024x778x24b jpeg)



Allison V-1710-F

Allison V-1710-F

Model .....V-1710-F3R (39) (military).

Type .....12 cylinders, vee 60 degrees, ethylene glycol cooled, geared drive, supercharged, 4-cycle.

Construction .....2-piece aluminum alloy crankcase. 2 cylinder blocks each consisting of 6 steel cylinder barrels shrunk in a 1-piece aluminum alloy head with an aluminum alloy coolant jacket attached to the head and to each of the 6 barrels. Each head-cylinder-jacket assembly attached to crankcase by 14 long stud bolts extending through head. 2 inlet valves and 2 exhaust valves (sodium cooled) per cylinder actuated by overhead camshaft. 6-throw 1-piece counterbalanced crankshaft supported in 6 plain bearings and 1 roller bearing. Spur reduction gear, ratio 0.50:1. Tractor propeller.

Supercharger .....Gear-driven 1-speed supercharger, ratio 8.8:1.

Carburation .....1 Bendix-Stromberg PD-12K2 2-barrel injection type downdraft carburetor with automatic mixture control.

Ignition .....1 Bendix-Scintilla DF dual magneto and 2 12-point distributors.

Starter .....Eclipse hand and/or electric starter.

Bore	5.50 in.	140 mm
Stroke	6.00 in.	152 mm
Displacement	1,710 cu.in.	28,0 l
Compression ratio	6.65:1	6,65:1
Width	29.3 in.	0,745 m
Height	36.5 in.	0,927 m
Length	85.6 in.	2,174 m
Frontal area	6.1 sq.ft.	0,57 m²
Weight	1,310 lb.	594 kg
Weight/horsepower	1.14 lb.	0,51 kg
Fuel consumption (cr.)	0.45 lb./h.p./hr.	205 g/hp/hr
Oil consumption (cr.)	0.020 lb./h.p./hr.	9 g/hp/hr
Gasoline rating	100 octane	100 octane
Output/displacement	0.67 h.p./cu.in.	41,1 hp/l
Output/piston area	4.03 h.p./sq.in.	0,63 hp/cm²
Piston speed (max.)	3,000 ft./min.	15,2 m/sec
B.m.e.p. (max.)	177 lb./sq.in.	12,4 kg/cm²

Output (take-off) .....1,150 h.p./3,000 r.p.m./45.5 in. (1 156 mm) Hg. boost
Output (rated) .....1,150 h.p./3,000 r.p.m./12,000 ft. (3 650 m)
Output (cruising) .....750 h.p./2,280 r.p.m./10,800 ft. (3 300 m)

The latest model of this engine develops 1,325 h.p. for take-off.

V-1710-C15 (33): 1,040 h.p./3,000 r.p.m./take-off; 1,090 h.p./3,000 r.p.m./13,200 ft. (4 000 m) rated output. Reduction gear ratio 0.50:1. 1-speed supercharger, ratio 8.8:1. 100-octane gasoline. Tractor propeller.

V-1710-D2 (23): Same performance as V-1710-C15 (33). Geared drive. 1-speed supercharger. 100-octane gasoline. Equipped with extension drive shaft for pusher propeller.

V-1710-F2R (27): 1,150 h.p./3,000 r.p.m./take-off and rated output at sea level. Geared drive. 1-speed supercharger. 100-octane gasoline. Tractor propeller.

V-1710-F2L (29): Same as V1710-F2R (27). Opposite propeller rotation.

v-1710-39 specs 2 (1200x1600x24b jpeg)

6F

TABLE I.

POWER PLANT INSTALLATION.

Engine Details.
(Extracted chiefly from U.S. Army Air Corps Technical Order No.02-SAB-1A

Manufacturer: Allison Division of General Motors' Corporation, Indianapolis, Indiana.

Engine name : Air Corps Type No. Allison V-1710-39 (Makers Type No. V-1710-F3R).

Serial Nos. : No. 1-10019, No. 2-3400.

Type : 12 cylinder liquid cooled Vee - single stage supercharger.

Weight : 1310 lbs. dry (maker's figure).

Specification:

Bore	5.50"
Stroke	6.00"
Capacity - cubic ins.	1710
Compression Ratio	6.65:1
Supercharger Ratio	8.80:1
Airscrew gear Ratio	0.50:1

Power Ratings :

	B.H.P.	R.P.M.	Man. Press. ins.Hg.	Mixture	Height Ft.	Fuel Cons. G.P.H.
Take-off	1150	2800	46.2	A.R.	S.L.	125
Military (5 min.)	1200	3000	43.9	A.R.	11,200	125
Rated (Max. cont.)	1000	2600	38.7	A.R.	10,200	103
75% Cruise	750	2280	31.6	A.R.	10,200	61
67% "	670	2280	28.9	A.R.	10,200	55
				A.L.		50
60% "	600	2190	27.4	A.R.	10,200	49
				A.L.		45
Max. Economy Cruise	375	1950	24.6	A.L.	S.L.	27.5
	430	1950	24.6	A.L.	5,000	31.6
	475	1950	24.6	A.L.	10,000	34.9
	520	1950	24.6	A.L.	15,000	38.2
	420	1950	F.T.	A.L.	20,000	31.6

Diving Rating 3120 R.P.M. (30 secs.)

Recommended Fuel : 100 octane.

Carburettor : PD-12K2 pressure type with automatic mixture control.

v-1710-39 specs 3 (1200x1600x24b jpeg)

Lubrication System.

Desired inlet oil temperature	60-80°C.
Maximum " " "	95°C.
Desired oil pressure	70-70 lbs./in.^{2}
Maximum " "	85 " "
Minimum " "	55 " "
Idling " "	15 " "

Maximum allowable oil consumption -

At rated power	13.3 quarts/hour
" cruising power	10.0 " "

Cooling System

Desired coolant temperature	105-115°C.
Maximum " "	125°C.
Minimum " "	85°C.

old power table 1710-39 (1600x1200x24b jpeg)

KITTYHAWK - POWER TABLE - ALLISON V1710-39 ENGINE 100 OCTANE FUEL.

Operating Condition	B. H. P.	R. P. M.	Man press.	Altitude Density	Mixture Control	Fuel Flow G. P. H.	Performance M. P. H. Normal	Performance M. P. H. Belly Tank	Remarks
Take off	1150	2800	46.2	S/Level	A. R.	104	-		5 min. deviation only.
Military Rated Power	1150	3000	43.9	15,000	A. R.	104	359	330	5 min. Deviation only.
Normal Rated Power	1,000	2,600	38.7	15,000	A. R.	86	342	321	Highest permissible continuous Power.
Max. Cruising (75%)	750	2,280	31.6	15,000	A. R.	51	303	287	
Desired Cruising (67%)	670	2,280	28.9	15,000	A. R. A. L.	46 42	289	270	
Desired Cruising (60%)	600	2,190	27.1	15,000	A. R. A. L.	41 37.5	274	255	
Cruise for Minimum Specific Fuel Flow	375 430 475 520 420	1950 1950 1950 1950 1950	24.6 24.6 24.6 24.6 Full Throttle	S/Level 5,000 10,000 15,000 20,000	A. L. A. L. A. L. A. L. A. L.	23 26 29 32 26	183 200 228 254 233	172 191 214 238 220	

NOTES : (a) To obtain maximum engine efficiency, manifold pressures shown against R.P.M. must not be exceeded when operating under normal conditions.

(b) Where 90 Octane fuel has to be used in the case of emergency, the following R.P.M. and Man. Pressures must not be exceeded and fuel tanks drained and refilled with 100 Octane immediately after conclusion of flight:-

Take off	2650 R.P.M.	37.0" Hg.	Man. Pressure
Climb	2450 "	30.0" "	" "
Cruise	2300 "	26.5" "	" "

v-1710-39 specs original (729x449x24b jpeg)

KITTYHAWK - POWER TABLE - ALLISON V1710-39 ENGINE 100 OCTANE FUEL

Operating Condition	B.H.P.	R.P.M.	Man. press.	Altitude Density	Mixture Control	Fuel Flow G.P.H.	Remarks.
Take off	1150	2800	46.2	S/Level	A.R.	104	5 minutes duration only.
Military rated power	1150	3000	43.9	15,000	A.R.	104	5 minutes duration only.
Normal rated power	1000	2600	38.7	15,000	A.R.	86	Highest permissible continuous power and climb.
Maximum cruising (75%)	750	2280	31.6	15,000	A.R.	51	
Desired cruising (67%)	670	2280	28.9	15,000	A.R. A.L.	46 42	
Desired cruising (60%)	600	2190	27.1	15,000	A.R. A.L.	41 37.5	
Cruise for minimum specific fuel flow	375 430 475 520 420	1950 1950 1950 1950 1950	24.6 24.6 24.6 24.6 Full throttle	S/Level 5,000 10,000 15,000 20,000	A.L. A.L. A.L. A.L. A.L.	23 26 29 32 26	

NOTES: (a) To obtain maximum engine efficiency, manifold pressures shown against R.P.M. must not be exceeded when operating under normal conditions.

(b) Where 90 octane fuel has to be used in the case of emergency, the following R.P.M. and Man. Pressures must not be exceeded and fuel tanks drained and refilled with 100 octane immediately after conclusion of flight:-

Take off	2650 R.P.M.	37.0" Hg.	Man. Pressure
Climb	2450 "	30.0" "	" "
Cruise	2300 "	26.5" "	" "

ENCLOSURE 4B.

FOR OFFICIAL USE ONLY

AIR FORCE HEAD-QUARTERS

AMENDMENT LIST NO.1 TO ALLISON INSTRUCTIONS
AMENDMENT LIST NO.1 TO KITTYHAWK INSTRUCTIONS

Allison Instruction No.2 and Kittyhawk Instruction No.2 are amended as follows:-

Remove and destroy existing "Power Table" and insert new Power Table (Issue 2) attached.

Reference: File R.....F. 150/4/1847.

Date of Issue: 3rd July, 1942.

v-1710-39 specs new (751x460x24b jpeg)

KITTYHAWK POWER TABLE - ALLISON V-1710-F3R (-39) (Issue 2) FUEL - 100 OCTANE.

OPERATING CONDITION	B.H.P.	R.P.M.	MANIFOLD PRESSURE	CRITICAL ALTITUDE	MIXTURE CONTROL	FUEL CONS. G.P.H.	REMARKS
Take off	1,150	3,000	46.2		Auto Rich	104	5 minute duration only.
Military rated power	1,150	3,000	44.6	10,700	Auto Rich	110	5 minute duration only.
Normal rated power	1,000	3,000	39.5	9,900	Auto Rich	97½	Highest permissible continuous power and climb.
Maximum cruising (75%)	750	2,280	30.8	9,900	Auto Rich	54	
Desired cruising (67½)	670	2,200	28.2	9,900	Auto Rich Auto Lean	46½ 41½	
Desired cruising (60%)	600	2,190	26.0	9,900	Auto Rich Auto Lean	41½ 37½	
Cruise for minimum specific fuel consumption	575 420 460 490 450	1,950 1,950 1,950 1,950 1,950	22.5 22.5 22.5 22.5 F.T.	Sea Level 5,000 10,000 15,000 20,000	Auto Lean Auto Lean Auto Lean Auto Lean Auto Lean	33 26½ 29 31 28	

NOTES: (a) To obtain maximum engine efficiency, manifold pressures shown against r.p.m. must not be exceeded when operating under normal conditions.

(b) Where 90 octane fuel has to be used in the case of emergency, the following r.p.m. and manifold pressures must not be exceeded. Tanks must be drained before refuelling with 100 octane:-

Take off 3650 r.p.m. - 37" Hg. Man. Press.
Climb 2450 " - 30" Hg. " "
Cruise 2300 " - 28.5" Hg. Man. Press.

(A.L.1, July, 1942)