HANDBOOK

OF

OPERATION AND FLIGHT INSTRUCTIONS

FOR THE

MODEL V-1710-35 ENGINE AND ASSOCIATED MODELS

(V-1710-35 AND -37)

MANUFACTURED BY

ALLISON DIVISION

OF THE

GENERAL MOTORS CORP.

INDIANAPOLIS, INDIANA

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INDEX

ILLUSTRATIONS

FIG.-1-

LEFT SIDE VIEW V-1710-35,-37 ENGINES

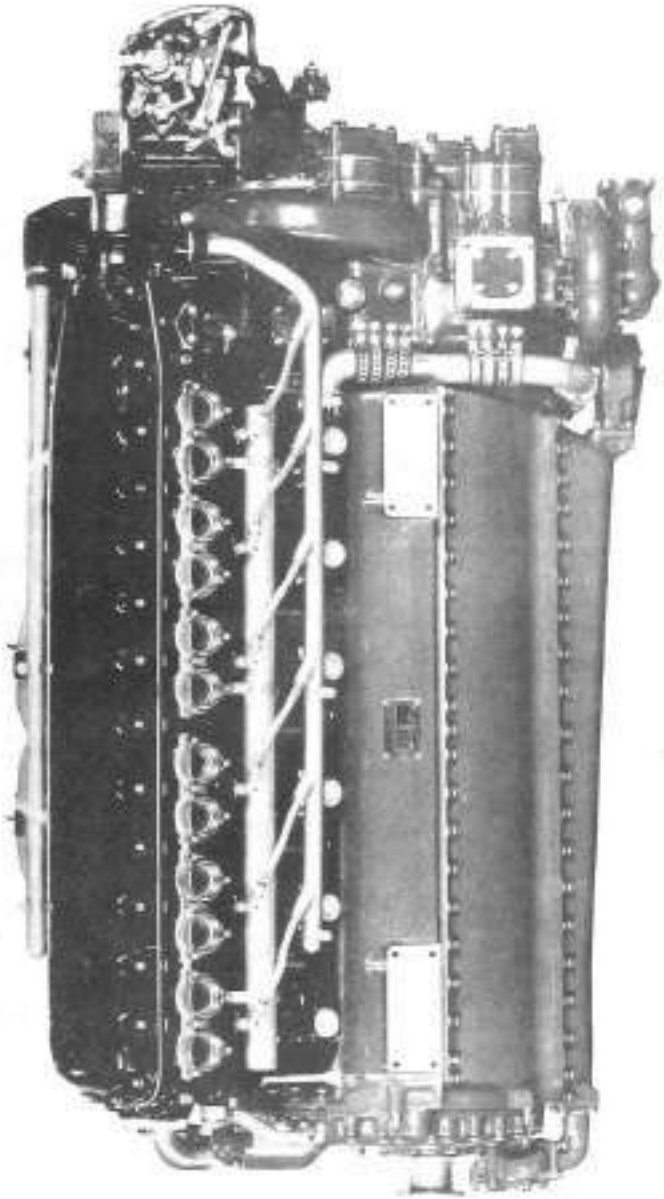

FIG.-2-
LEFT SIDE VIEW V-1710-35, -37 ENGINES
(WITHOUT EXT. SHAFT AND REDUCTION GEAR BOX ASS'Y)

SECTION I

INTRODUCTION

1. This Technical Order is the Operation and Flight Instructions for the model V-1710-35, and V-1710-37 engines. Pilots and other personnel who are required to understand the operation of these engines will read and be familiar with the information contained herein.

2. Reference has been made in this Handbook to the following Technical Orders which contain applicable data and instructions. Exceptions and supplementary instructions to these orders are included in Section II, "General Operating Instructions".

T. O. No.	
02-1-5	Operation of Carburetor Heaters
02-1-7	Detonation in Aircraft Engines
02-1-23	Flight Operation of Aircraft Engines
02-1-29	Ground Operation Instructions for Aircraft Engines
02-1-29A	Ground Operation Instructions for Aircraft Engines
02-5A-5	Special Lubrication Requirements - V-1710-17, -35 and -37 Models
03-105-1	Operation of Carburetor Mixture Controls
03-20-6	Operation of Propeller Controls During Landing
06-5-1	Fuels, Use and Disposition
06-10-1	Aircraft Engine Lubricating Oil, Grades and Use

SECTION II

GENERAL OPERATING INSTRUCTIONS

1. *GENERAL*

Specific operation instructions set forth in Section III are temporary and subject to verification (or change) following completion of calibration tests. A revision of this Technical Order will be issued at that time.

2. *STARTING*

a. Starting will be accomplished in accordance with T.O. No. 02-1-29 supplemented by the following special instructions.

b. The engine will be started with the propeller control in the high rpm (low pitch) position.

CAUTION: The priming system on these engines is extremely effective and overpriming is more of a contributing factor to poor starting than underpriming.

3. *GROUND TEST*

a. This engine will be pre-flight ground tested in accordance with T.O. No. 02-1-29 supplemented by the following paragraphs, 3. b. and 3. c.

b. Limits of 30 In. Hg manifold pressure and not over 2300 rpm will provide a sufficient range of power and speed in ground operation to adequately check magnetos, spark plugs, propeller controls, etc.

c. The loss of speed in running on either magneto alone should not exceed 80 rpm when engine is warm and functioning properly.

4. *TAKE-OFF*

a. The propeller control will be set at 2800 rpm for take-off, and the mixture control in "Auto-Rich".

b. Refer to Section III for specific operating limits.

5. *FLIGHT*

a. The rpm, oil temperature, oil pressure, oil and coolant temperatures give the most satisfactory indication of the engine's performance. If any of these appears irregular, the engine will be throttled and, if the cause cannot be eliminated, a landing should be made to investigate and remove the trouble.

b. Refer to T.O. No. 06-10-1 for maximum and minimum oil temperatures. Refer to Section III for detailed flight information and paragraph 7. of this section for mixture control information.

c. Refer to T.O. No. 02-1-33 for instructions on increasing or decreasing power during flight.

6. *LANDING*

a. When the engine is throttled to make a landing, the mixture control will be set the same as for take-off and the propeller controls in accordance with instructions contained in T.O. No. 03-30-6.

b. Care will be exercised to prevent over-cooling of the engine during long glides.

7. *STOPPING*

These engines are equipped with carburetors having an "Idle Cut-off", and will be stopped in accordance with instructions contained in T.O. No. 02-1-29.

8. *OPERATION OF CARBURETOR HEATERS*

Refer to T.O. No. 02-1-5 for general information concerning the operation of carburetor heaters.

9. *MIXTURE CONTROL*

a. These engines are equipped with PD12K2 injection type carburetors incorporating a mixture control having four main control lever settings: namely, "Full Rich", "Auto-Rich", "Auto-Lean" and "Idle Cut-off" in the order mentioned. Refer to T.O. No. 03-10C-1 for general information, including definition of carburetor settings such as "Auto-Rich" and "Auto-Lean" referred to hereinafter.

b. Above desired cruising manifold pressure and speed, the mixture control lever shall be set at "Auto-Rich".

c. At or below desired cruising manifold pressure and speed, the mixture control may be set at "Auto-Lean" if fuel economy is important.

d. When adjusting the mixture control lever below desired cruising manifold pressure and engine rpm, the propeller control should be set in "Manual". Then make the desired mixture control setting in accordance with T.O. No. 03-10C-1. After the desired mixture adjustment is obtained, the propeller control should be reset in "Automatic".

CAUTION: When operating at "Auto-Lean" the setting should be changed to "Auto-Rich" immediately before a rapid change in altitude or a change in cruising conditions is made.

10. *FUEL AND OIL*

a. The grade of fuel to be used in the operation of these engines is given in Section III. Refer to T.O. No. 06-5-1 for use and disposition of fuels.

b. The grade of oil to be used in the operation of these engines will be determined by reference to T.O. No. 06-10-1.

c. The grade of oil and grease to be used in the lubrication of the Remote Reduction Gear Assembly, Center Bearing, Extension Shaft and Extension Shaft System will be determined by reference to T.O. No. 02-5A-5.

11. *DETONATION*

Refer to T.O. No. 02-1-7 for general information and instructions pertaining to detonation in aircraft engines.

SECTION III

TEMPORARY SPECIFIC OPERATING INSTRUCTIONS

ENGINE: V-1710-35 (With Allison #40043 & 40840 Backfire Screens) DATE: October 25, 1941

CONDITION	FUEL PRESSURE #/IN.²	ENGINE OIL PRESSURE #/IN.²	REDUCTION GEAR OIL PRESSURE #/IN.²	OIL TEMP. °C	COOLANT TEMP. °C
DESIRED	12-18	60-70	70-125	60-80	105-115
MAXIMUM	18	85	180	95	125
MINIMUM	12	55	40 at 1800 rpm	-	95
IDLING	9	15	15 Minimum	-	-

MAX. PERMISSIBLE ENGINE OVER SPEED: 3120 R.P.M.

MAX. ALLOWABLE OIL CONSUMPTION AT:

NORMAL RATED POWER	13.3	QTS./HR.
MAXIMUM CRUISING	10	QTS./HR.
MINIMUM SPECIFIC FUEL FLOW	5-7	QTS./HR.

FUEL GRADE 100 OCTANE

* OPERATING CONDITION	HORSE POWER	R.P.M.	MAN. PRESS IN.HG	CRITICAL ALTITUDE (DENSITY)	BLOWER CONTROL POSITION	USE LOW BLOWER BELOW	MIXTURE CONTROL POSITION	F/A RATIO	FUEL FLOW GAL./HR	MAX. CYL. HD. TEMP.	REMARKS
TAKE-OFF	1150	2800	46.2	Sea Level	-	-	Auto-Rich	-	125	-	5 Minute Duration Only
MILITARY RATED POWER	1150	3000	43.9	11,200	-	-	Auto-Rich	-	125	-	5 Minute Duration Only
@ NORMAL RATED POWER (100%)	1000	2600	38.7	10,200	-	-	Auto-Rich	-	103	-	-
MAX. CRUISING (75%)	750	2280	31.6	10,200	-	-	Auto-Rich	-	61	-	-
DESIRED CRUISE (67%)	670	2280	28.9	10,200	-	-	Auto-Rich Auto-Lean	- -	55 50	- -	- -
DESIRED CRUISE (60%)	600	2190	27.1	10,200	-	-	Auto-Rich Auto-Lean	- -	49 45	- -	- -
CRUISE FOR MIN. SPECIFIC FUEL FLOW	375 430 475 520 620	1950 1950 1950 1950 1950	24.6 24.6 24.6 24.6 **F.T.	Sea Level 5,000 10,000 15,000 20,000	- - - - -	- - - - -	Auto-Lean Auto-Lean Auto-Lean Auto-Lean Auto-Lean	- - - - -	27.5 31.5 34.9 38.2 31.6	- - - - -	- - - - **Full Throttle

* REFER TO T.O. NO. 00-10 FOR DEFINITION OF EACH OPERATING CONDITION @ MAXIMUM PERMISSIBLE CONTINUOUS HORSE POWER

SECTION III

TEMPORARY SPECIFIC OPERATING INSTRUCTIONS

ENGINE: V-1710-37 (With Allison #40043 #40040 Backfire Screens) DATE: October 25, 1941

CONDITION	FUEL PRESSURE #/IN.²	ENGINE OIL PRESSURE #/IN.²	REDUCTION GEAR OIL PRESSURE #/IN.²	OIL TEMP. °C	COOLANT TEMP. °C
DESIRED	12-16	60-70	70-125	60-80	105-115
MAXIMUM	16	85	190	95	125
MINIMUM	12	55	40 at 1800 rpm	-	85
IDLING	9	15	15 Minimum	-	-

MAX. PERMISSIBLE ENGINE OVER SPEED: 3120 R.P.M.

MAX. ALLOWABLE OIL CONSUMPTION AT:

NORMAL RATED POWER 12.8 QTS./HR.
MAXIMUM CRUISING 5.6 QTS./HR.
MINIMUM SPECIFIC FUEL FLOW 5-7 QTS./HR.

FUEL GRADE 100 OCTANE

* OPERATING CONDITION	HORSE POWER	R.P.M.	MAN. PRESS. IN. HG	CRITICAL ALTITUDE (DENSITY)	BLOWER CONTROL POSITION	USE LOW BLOWER BELOW	MIXTURE CONTROL POSITION	F/A RATIO	FUEL FLOW GAL./HR	MAX. CYL. HD. TEMP.	REMARKS
TAKE-OFF	1090	2800	44.8	Sea Level	-	-	Auto-Rich	-	119	-	5 Minute Duration Only
MILITARY RATED POWER	1090	3000	42.0	12,500	-	-	Auto-Rich	-	119	-	5 Minute Duration Only
② NORMAL RATED POWER (100%)	960	2800	37.0	11,300	-	-	Auto-Rich	-	98	-	-
MAX. CRUISING (75%)	720	2280	30.3	11,300	-	-	Auto-Rich	-	59	-	-
DESIRED CRUISE (67%)	643	2280	27.8	11,300	-	-	Auto-Rich Auto-Lean	- -	53 48	- -	- -
DESIRED CRUISE (60%)	576	2190	26.0	11,300	-	-	Auto-Rich Auto-Lean	- -	47 43	- -	- -
CRUISE FOR MIN. SPECIFIC FUEL FLOW	375 430 475 520 430	1950 1950 1950 1950 1950	24.6 24.6 24.6 24.6 **F.T.	Sea Level 5,000 10,000 15,000 20,000	- - - - -	- - - - -	Auto-Lean Auto-Lean Auto-Lean Auto-Lean Auto-Lean	- - - - -	27.5 31.0 34.9 38.2 31.5	- - - - -	- - - - **Full Throttle

* REFER TO T.O. NO. 00-10-1 FOR DEFINITION OF EACH OPERATING CONDITION. ② MAXIMUM PERMISSIBLE CONTINUOUS HORSE POWER

RESTRICTED

T.O. NO. 02-540-1

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RESTRICTED