

WAR DEPARTMENT
HEADQUARTERS OF THE ARMY AIR FORCES
WASHINGTON

November 30, 1942

AIRCRAFT ACCESSORIES

AUTOMATIC MANIFOLD PRESSURE REGULATOR - ADJUSTMENT OF ALLISON REGULATOR
NO. 42685 FOR WAR EMERGENCY POWER

This Technical Order replaces T.O. No. 02-5AB-11 dated October 26, 1942, revised to include additional information.

NOTE: *The provisions of T.O. No. 00-20A will be complied with in this case, these instructions being entered on AAF Forms 60-B for the engines affected. The work directed herein will be accomplished as soon as possible by service activities with the aid of sub-depots, if necessary. In accordance with T.O. No. 00-20A-2 a summary of the periodic inspection prescribed in paragraph 3. will be entered in the preflight section of the master airplane maintenance instruction form maintained in the back of AAF Form 41-B for the airplanes affected.*

CAUTION: *Automatic manifold pressure regulators will not be set for war emergency power on airplanes unless operating in combat zones until the throttle stops are installed on the airplane in accordance with T.O. No. 01-1-72; and the V-1710-35 and -39 engines have had the spark plug ceramic end assemblies installed in accordance with T.O. No. 02-5A-48.*

1. To obtain war emergency ratings, automatic manifold pressure regulators, part No. 42685, will be adjusted in accordance with the instructions contained in paragraph 2., on the engines listed below, after the special requirements for war emergency power as outlined in the Technical Orders listed have been complied with.

*V-1710-35 (E4) T.O. No. 02-5AD-1
*V-1710-39 (F3R) T.O. No. 02-5AB-1
*V-1710-63 (E-6) T.O. No. 02-5AD-1
V-1710-73 (F-4R) T.O. No. 02-5AB-1
V-1710-81 (F-2OR) T.O. No. 02-5AB-1
V-1710-83 (E-18) T.O. No. 02-5AD-1
V-1710-85 (E-19) T.O. No. 02-5AD-1

NOTE: **With the exception of the V-1710-39 engines installed on P-51 airplanes, V-1710-35, -39, and -63 engines were not equipped with automatic manifold pressure regulators when delivered and therefore this Technical Order will be accomplished when preparing for installation in accordance with T.O. No. 02-5A-47.*

2. The instructions for accomplishing this adjustment as contained in Allison Service Bulletin No. 131, dated September 7, 1942, and No. 129 dated November 9, 1942, are as shown in figure 1 and as follows:

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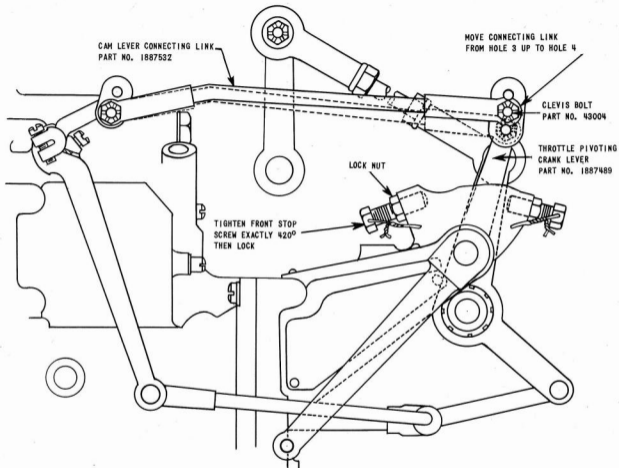


Figure 1- Adjusting Automatic Manifold Pressure Regulator to Provide Maximum Manifold Pressure

g. The amount of manifold pressure is governed by the position of the pressure selection cam, which is operated by the small lever "b" at the top of the main body of the regulator unit. When this small lever "b" is rotated counterclockwise (toward the front), the manifold pressure is increased. Therefore, the maximum manifold pressure setting is established by the hook-up of the connecting link "q-b" and the setting of the front adjustable stop "v." (See attached sketch.)

(1) Regulators delivered from the factory have the front adjustable stop "v" and the rear adjustable stop "w" set with a gage, locked into position, and the lock wire sealed. Therefore, the position of these adjustable stop screws should not be changed, unless the adjustment is made in definite increments, or decrements, in compliance with specific instructions contained herein.

(2) When the front adjustable stop has been changed from its original gaged position, the revised maximum manifold pressure setting is inscribed, on the red plate, with yellow paint.

(3) The red plate, attached to the strengthening rib of the lever bracket, contains a table showing the maximum manifold pressures obtainable by connecting the link "q-b" to the various holes in levers "b" and "q," when the front adjustable stop "v" is set in its original gaged position.

(4) When intermediate pressure setting is desired, between the settings obtainable by shifting the linkage, the

intermediate pressure is obtained by adjusting the front adjustable stop "v." For example, if the connecting link "q-b" is connected to hole "1", in lever "b," and the rear end is shifted from hole "3" to hole "4," in lever "q," the maximum pressure will be increased from 52 in. Hg to 59 in. Hg. (See the table on the red plate.) If the desired maximum pressure is 57 in. Hg, it can be obtained by turning the front adjustable stop "v" clockwise, approximately 240 degrees.

(5) The front adjustable stop "v" permits INCREASING the maximum pressure 1 in. Hg by turning the screw counterclockwise (out) 103 degrees and permits DECREASING the maximum pressure 1 in. Hg by turning the screw clockwise (in) 103 degrees.

CAUTION: The use of the front adjustable stop, for changing the maximum pressure setting, should be limited to not more than 1 in. Hg of INCREASE and not more than 6 in. Hg of DECREASE. Since the linkage variations do not exceed 7 in. Hg, the additional change, obtained by the front adjustable stop "v," permits setting at any intermediate pressure desired.

b. The war emergency ratings may be obtained by adjusting regulator, part No. 42685, in accordance with the appropriate table as follows:

(1) If the red plate, on the lever bracket of the regulator unit, DOES NOT CONTAIN A LARGE YELLOW PAINTED FIGURE, use the following table:

ENGINE MODEL	DESIRED MAXIMUM M.P SETTING	CONNECT LINK "q-b"	TURN FRONT ADJUSTABLE STOP		ON RED PLATE PAINT YELLOW
			IN	OUT	
V-1710-35	55 in. to 56 in. Hg	1-4	360 degrees		56
V-1710-39	55 in. to 56 in. Hg	1-4	360 degrees		56
V-1710-63	59 in. to 60 in. Hg	1-4		60 degrees	60
V-1710-73	59 in. to 60 in. Hg	1-4		60 degrees	60
V-1710-81	56 in. to 57 in. Hg	1-4	240 degrees		57
V-1710-83	56 in. to 57 in. Hg	1-4	240 degrees		57
V-1710-85	56 in. to 57 in. Hg	1-4	240 degrees		57

(2) If the red plate CONTAINS A FIGURE "55" PAINTED WITH YELLOW PAINT, it will only be necessary to change the front adjustable stop, in accordance with the following table:

ENGINE MODEL	EXISTING	DESIRED	TURN	FRONT	ON RED PLATE PAINT YELLOW
	MAXIMUM M.P. SETTING	MAXIMUM M.P. SETTING	ADJUSTABLE STOP IN	STOP OUT	
V-1710-73	55 in. Hg	59 in. to 60 in. Hg		480 degrees	60
V-1710-81	55 in. Hg	56 in. to 57 in. Hg		180 degrees	57
V-1710-83	55 in. Hg	56 in. to 57 in. Hg		180 degrees	57

(3) If it is not convenient to use a protractor, the adjusting screw can be turned the proper amount by watching the flat sides of the hexagon head of the stop screw. The turning of the screw from one flat to the next equals 60 degrees. Three flats equal 180 degrees, four flats equal 240 degrees, six flats equal 360 degrees, and eight flats equal 480 degrees.

CAUTION: Do not forget to mark the new maximum setting on the red plate with yellow paint.

g. To prevent the pressure selecting cam from locking the entire throttle control mechanism in the fully closed position, the regulator will be gaged and adjusted to prevent the cam lever from traveling beyond the minimum position as shown on figure 1, and as follows:

(1) While the main lever of the regulator is in the fully "closed" position, the distance from the center line of the eccentric sleeve lever clevis bolt to the center line of the cam lever bolt after link "q-b" has been connected to the No. 1 and No. 4 holes should not be less than 4-9/32 inches. The above measurement can be accomplished by using manifold pressure regulator cam lever minimum position gage, tool No. 2546, or an ordinary steel scale.

(2) If this dimension is less than 4-9/32 inches, turn the rear adjustable stop "w" clockwise (in) 180 degrees (1/2 turn). This can be done without breaking the seal.

(3) If the position of the rear adjustable stop is changed, adjust the throttle lever link to provide a gap or cushion of .000 inch to .015 inch between the end of the adjustable stop and the lever "q."

(4) When the rear adjustable stop "w" has been readjusted, as outlined above, put a daub of yellow paint on the lock nut and the threads of the screw of the rear stop to show that this setting has been made.

d. Start the engine and check the position of the cockpit throttle control lever stop. The stop must be set so that it contacts the throttle control lever at the "take-off" position. If necessary, reset the stop and lock it in the position which gives the specific take-off manifold pressure

3. Following each flight the throttle control lever stop will be inspected to determine if the lock wire seal is broken, indicating that emergency horse power has been used. If emergency horse power has been used, the following inspection will be performed on the engine prior to release of the airplane for flight:

a. The Cuno filter will be removed and inspected for the presence of metal particles.

b. The oil drain plugs will be removed and the oil examined for contamination with metal particles.

g. The valve covers will be removed and the valve clearances checked. The rocker arm bearing brackets studs will be checked. Valve springs will be checked for breakage. The engine will be turned by hand to check for blow-by at the valves.

d. If war emergency power is employed for an extended period, all spark plugs will be removed and a new or reconditioned set installed. The removed plugs will be reconditioned and returned to AF stock.

g. A visual inspection for cracked structures will be made of the engine and engine mount. The supercharger inlet elbow will be checked for evidence of chafing by the supercharger impeller. This may be evidenced by peeled or scorched paint on the supercharger inlet elbow.

f. When the airplane is equipped with

a manifold pressure gage on which the full scale reading is less than the war emergency manifold pressure being applied, there is a slight possibility that the gage will become permanently damaged. Therefore, the operation of the gage will be checked by comparing it to the barometric pressure obtained from the sensitive altimeter installed in the airplane. The manifold pressure gage should read the barometric pressure plus or minus .300 in. Hg.

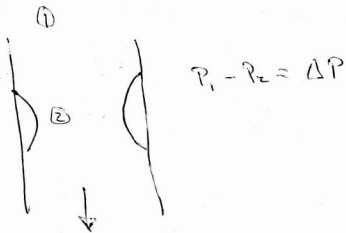
4. Evidence of erratic operation or engine malfunctioning, which ordinary maintenance cannot remedy, will be considered adequate cause for engine replacement.

5. The following tool is not essential but may be used in performing the inspection directed in paragraph 2.g. and if desired may be obtained by requisition from the control depot.

STOCK NO.	NOMENCLATURE	CLASS	SOURCE
8004-2546	Gage - Manifold pressure regulator cam lever minimum position.	18	AF Stock

By Command of Lieutenant General ARNOLD:

H. J. F. MILLER,
Major General, U.S.A.,
Commanding General, Air Service Command.



$$\frac{1}{2} \rho v_1^2 + P_1 = \frac{1}{2} \rho v_2^2 + P_2 = P_0$$

$$P_1 v_1 A_1 = P_2 v_2 A_2$$