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Commanding General,
AAF Materiel Command,
Reference: Dept. 57.
Wright Field, Dayton, Ohio.

Captain John Dickworth
1hb; Extension 3-0227

17 JUN 1944

Test Program for Nominal Grades 94/114 and
104/150 Fuels. Twenty-seventh Progress Report.

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Commanding General,
Army Air Forces,
Washington 25, D. C.

Att: AG/AS-M.M. & D. - Lt. Col. G. D. Gasser.

1. In conformance with your verbal request, the following information is the twenty-seventh progress report on action being taken in compliance with teletypes AFISMA-1-318 dated 8 December 1943, AFISMA-2B-473 dated 9 December 1943 and AFISMA-2B-1089 dated 4 March 1944, and in conformance with OTI-1509 dated 7 December 1943, Addendum 1 thereto dated 13 December 1943, Addendum 2 dated 21 February 1944 and Addendum 3 dated 7 March 1944, which have been issued covering this work.

2. P-47D Airplane Performance Tests at 70 In. Hg. Manifold Pressure.- Prior to completion of performance tests on P-47D airplane, a 7-1/2-hour War Emergency Rating test was satisfactorily completed at the Power Plant Laboratory at 70 In. Hg. manifold pressure, using water injection with No. 13 water jet. Since the engine was satisfactory in all respects at this power level, additional tests were scheduled by the Flight Section to include operation at 70 In. Hg. manifold pressure in order to determine increase in performance and to indicate whether or not accessory equipment operated satisfactorily. The results of these tests indicated a ten mile per hour increase in level speed flight to the critical altitude over and above operation at 65 In. Hg. manifold pressure with water injection. The critical altitude was reduced from 23,700 feet at 65 In. Hg. manifold pressure with water injection to 21,500 feet at 70 In. Hg. manifold pressure with water injection. True air speed at 21,500 feet with 70 In. Hg. manifold pressure and water injection was 445 miles per hour. The boost controls were not modified to give control up to 70 In. Hg. manifold pressure; therefore the airplane was flown with turbine and throttle control disconnected. Operation of the fuel pump and water pump appeared to be satisfactory at this power level. Information is available on which to base modification as to boost controls but will require different operating instructions than are presently specified for 65 In. Hg. manifold

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Commanding General, Army Air Forces, Att:
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pressure operation. Insofar as the Power Plant Laboratory is concerned, 70" hg. manifold pressure with water injection on R-2800 engines is satisfactory and could be released to Service. As pointed out above, however, different operating instructions would have to be issued in order to satisfactorily take advantage of the increased power. Recommendations relative to accomplishing the necessary modifications and preparing operating instructions for P-47D airplanes are requested in view of the fact that previous instructions and equipment have already been made available for operation at 66" hg. manifold pressure.

3. Installation of Equipment on B-29 Airplanes at Clovis, New Mexico.- Installation of detonation detection equipment on B-29 airplanes at Clovis has been completed. Tests have not as yet been carried out since clarification of priorities were required before operating personnel at Clovis would accomplish these tests. This clarification was requested from your office, as to the position of these tests relative to training schedule at Clovis, which it is understood has been done. Captain M. K. McLeod has proceeded to Clovis for the purpose of initiating and observing these tests.

4. Fuel Tests on B-24 Airplane at Hamilton Field.- The scheduled tests on the B-24J airplane at Hamilton Field have been more or less inactive due to lack of personnel in the Fourth Air Force. Captain Roger Lyon, Materiel Command Liaison Officer has been checked out on this airplane and is now acting as pilot for conducting experimental tests requested by the Materiel Command. At the present time mixture response curves are being determined on fuel 28-R, which is a base line for comparing all other experimental fuels.

5. Flight Service Tests on P-51B Airplane using V-1650-3 Engines.- One V-1650-3 engine has been installed in P-51B airplane at Vandalia, Ohio. It is expected that this airplane will start Service tests during the week of 19 June. A second engine has been run in and inspection is yet to be made, after which it will be installed in a second P-51B airplane.

6. Spark Plug Fouling Tests.- A considerable amount of engine time has been accumulated under conditions most conducive to spark plug fouling on the Allison V-1710 engine. Consistent spark plug fouling has been obtained under the following conditions:

- Alternate periods of 5 minutes operation at 2200 r.p.m. at 32" hg. manifold pressure and 5 minutes operation at 2000 r.p.m. at 32" hg. manifold pressure.
- Carburetor setting - automatic rich
- Coolant temperature - 250° F.
- Carburetor air temperature - 30° F.
- Total length of test - 15 hours.

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Captain John D. ...
Lab: Extension

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After establishing these conditions, on Fuel 28-R, another test was made using fuel 28-R to which had been added additional bromine to bring the amount of bromine to 1.5 x the theoretical amount necessary to properly scavenge the lead deposits. This test resulted in exceptionally clean spark plugs and is the first means found which reduces spark plug fouling by any significant amount. Experimental flight tests are planned on fuel containing additional bromine, after which, if as successful as laboratory bench tests, service tests may be necessary to substantiate this effect and to determine whether or not engine corrosion will be increased by the use of additional bromine. At the present time tests are planned on a P-51B airplane with additional bromine in the fuel and possibly on a P-63 airplane which has encountered serious spark plug fouling.

7. Installation of Detonation Detection Equipment at Douglas and at Egin Field.- Detonation detection equipment has been installed on C-54A-1 airplane at Douglas Aircraft. Fuel tests, however, have been held up due to carburetor trouble on this airplane. Captain M. E. McLeod will proceed from Clovis, New Mexico to Douglas to check into this trouble. Lt. Paul W. Pitzer, Materiel Command Liaison Officer has proceeded to Egin Field to supervise the installation of detonation detection equipment.

8. Tests on B-29 Airplanes at Boeing.- No further fuel tests have been conducted on the XB-29 airplane since water injection tests have the highest priority at the present time. Boeing will be instructed to include new fuel Grade 115/145 in their tests. Test programs have been forwarded to Boeing for B-29 fuel injection airplane and the B-17F airplanes.

For the Commanding General:

DON H. OBER
Captain, Air Corps
Asst. Technical Executive

20 JUN 1944

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