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IGNITION & CARBURETION
RESEARCH
AT ARCTIC TEMPERATURES

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Object

1 The object of this program was to determine the effect of arctic temperature on the following:

- (a) Automotive ignition equipment
- (b) A gasoline engine equipped with a fuel injection system
- (c) A gasoline engine equipped with a carburetor

Resume

2 This project was a study of the performance of an automotive ignition system and a gasoline engine operating within an arctic, winter temperature range. The test program was divided into three sections designed to demonstrate the effect of low ambient temperature on (1) a battery ignition system, (2) a single-cylinder, Otto-cycle engine operated with a fuel injector in the intake manifold and (3) the same engine equipped with a float-type carburetor.

3 Eight commercially available spark plugs were subjected to four tests each to determine their relative performance at various operating conditions. The plugs were mounted in a bomb-type chamber and connected to a conventional ignition system for the first tests. With a primary voltage of four, nitrogen pressure was applied to the bomb until the spark plugs began to misfire. The plugs and coil were cooled through a temperature range of -65 to 30 °F. The procedure was similar in the second series of tests but the primary voltage was six and the temperature range was 100 to 500 °F. The coil temperature was not controlled but the ignition system was operated for approximately thirty minutes before each test to allow its temperature to become constant.

4 The third set of tests was included to show the primary voltage required for ignition in an engine of normal compression ratio. The nitrogen pressure was 100 psi and the primary voltage was increased until the plugs fired consistently. The temperature of the plugs ranged from -65 to 30 °F. The coil operated at normal temperature.

5 The results of these tests are shown on Data Sheet Nos. 1 to 8, Pages 71 to 78 and Curve Nos. 4 to 6, Pages 47 to 49. The spark plugs tested are listed in Table I, Page 24. Sketch No. 1, Page 33, and Photo Nos. 1 and 2, Pages 29 and 30, show details of the bomb and the arrangement of the testing equipment.

6 The fourth series of tests were conducted to determine the ability of the spark plugs, when cooled to about -65 °F, to ignite a combustible charge. The bomb was attached to a special head and mounted on a single-cylinder engine. While the engine was turned at cranking speed, it was supplied with a combustible mixture of fuel and air and a primary voltage of four. Each plug ignited the charge within a period of one minute's cranking. Although these tests seemed to offer some agreement with the third tests (starting requirement) they were considered inconclusive. Even though the plug was cold, the charge was probably much warmer since it was not refrigerated.

7 The effect of low ambient temperature on the combustion process of a gasoline engine was investigated by operating a Merz, single-cylinder, Otto-cycle engine in an arctic test cell. The refrigeration was supplied by a 15 ton, freon-brine system. Power was absorbed by an electric dynamometer located outside the test cell.

8 For the first group of engine tests, arctic grade fuel MIL - G - 3056, type C, was injected into the intake manifold toward the inlet valve with the engine operating at optimum conditions of speed, spark advance and mixture strength. (See Data Sheet Nos. 19 through 25, Pages 79 through 85, and Curve Nos. 7 through 9, Pages 50 through 52) Data was recorded at several combustion air temperatures. The program was expanded to include four engine speeds, four throttle settings and eight ambient air temperatures. The running schedule is presented in Table II, Page 25. A drawing of the intake manifold (No 20681) is included on Page 40. The results are shown by Data Sheet Nos. 26 to 39, Pages 86 through 99, and Curve Nos. 10 to 14, Pages 53 to 57.

9 The above test program was repeated while using an automotive type carburetor. The results of these tests are shown by Data Sheet Nos. 39 to 84, Pages 99 to 104, and Curve Nos. 15 to 25, Page 58 to 68. The difference in performance with the two fuel systems is shown by Curve Nos. 26 and 27, Pages 69 and 70. Included in Curve No. 26 is a motoring friction test to show the power required to drive the fuel injection system. (See Data Sheet Nos. 85 to 88, Pages 145 to 148)

10 The engine and test cell are shown in Photo Nos. 3 and 4, Pages 31 and 32. Sketch Nos. 2 to 11, Pages 34 to 43, show the details of the engine installation. The calibration of the

instruments is presented in Curve Nos. 1 to 3, Pages 44 to 46. The results of the engine inspection are presented in Table III, Page 28.

Conclusions and Recommendations

11 The performance of the ignition coil improved as its temperature was reduced. Although no tests were included to explain this phenomenon, it is assumed to be the result of the windings contracting with respect to each other and to the iron core. Additional research should be conducted to determine the basis for this oddity.

12 It is reasonable to believe, because of this peculiar function of the coil, that high performance engines operating in a hot climate would receive the lowest ignition voltage. Thus the mounting position of the coil should be chosen with great care until this problem has been eliminated. The coil should not be placed where it would be affected by either an engine-heating device or by the engine itself.

13 Spark plugs of higher heat range, especially those with smaller electrodes, have better performance characteristics. Although the tests were limited and the instrumentation was barely adequate, this trend is quite evident. Investigations to determine the optimum size, shape and material for electrodes would probably result in a substantial increase in performance. Perhaps plugs with platinum wire electrodes would be more appropriate for low temperature operation.

14 The performance of the spark plugs was better at higher temperatures during the tests in which the plugs were heated and the coil temperature remained constant. This would seem to be the result of expansion of the center electrode or distortion of the ground electrode. If the curve is extrapolated to the arctic winter temperature range it seems unlikely that any of the plugs would ignite the charge in the cylinder of a moderately high compression ratio engine. Plugs with the ground electrode beside the center electrode, instead of beneath it, may have more desirable temperature characteristics.

15 The performance of resistor-type plugs is inferior to that of the regular type. The main advantage of resistor plugs is in the reduction of radio interference, however, this method of shielding also reduces performance of an ignition system. Development of methods to reduce radio noise without impairing operation of the ignition equipment would overcome another serious impediment to engine research.

16 During all of the engine tests the power output increased as the combustion air temperature was reduced. This shows that, from the combustion standpoint, manifold heating devices are detrimental to engine performance. Since it is known that automotive type engines lose power as the manifold temperature is reduced, it must be assumed that this loss results entirely from improper distribution of the fuel.

17 Operating an automotive type engine with individual carburetors would eliminate the losses resulting from poor distribution of fuel. The loss in volumetric efficiency caused by a manifold heating device would also be reduced. Starting should be facilitated by this change because distribution during the choking process, and before the hot spot is heated, is bound to be very poor. The complications of this arrangement would be partially off-set by excluding the manifold heating device, which, to be efficient, must in itself be complex.

18 There is no advantage in the use of injection systems on automotive engines, except to improve distribution of fuel. Installation and maintenance costs are extremely high. The combustion process is impaired and the volumetric efficiency is reduced. These facts are substantiated by curve numbers 26 and 27. The power output was 30 percent less with fuel injection and the intake manifold was cooled as much as 40 degrees by fuel vaporization.

19 The metering characteristics of some carburetors are seriously changed by low temperatures. This results from contraction of the various parts. This would be one more reason for poor performance of engines in arctic regions.

20 Even though these engine tests provide many of the answers concerning the operation of gasoline engines in cold climates, the program that was originally planned should be completed. That is, the investigation should be extended to include multi-cylinder engines. A program of this kind would show the losses of a conventional installation. Also, practical methods for improving performance could be developed.

21 The two-stage, freon-brine refrigeration system is very satisfactory for low temperature research work. It is comparatively inexpensive and combines adequate capacity with minimum maintenance costs. The control system is very effective. Large changes in capacity are provided with very minute changes in temperature.

22 Separating the engine compartment from the remainder of the test cell is a very effective way of conducting work of

this type. Since all instruments and testing apparatus operate at normal temperature, many of the problems associated with low temperature testing are eliminated. Refrigeration demands are reduced to a minimum because the wall areas are small and, essentially, only the heat developed by the engine need be considered.

Description of Apparatus

23 IGNITION TESTS: The ignition tests were conducted in a special bench set-up consisting of a spark plug test bomb, electric motor-driven distributor, ignition coil, storage battery, battery charger, heating and cooling systems, a nitrogen tank and appropriate electrical equipment. The arrangement of this equipment is shown in Photo No. 2, Page 30. The electrical equipment was connected as shown in Sketch No. 1, Page 33. The construction of the bomb is shown in Photo No. 1, Page 29.

24 The spark plug test bomb consisted of an inner pocket into which a plug was screwed, plus an annular chamber through which a cooled, or a heated, liquid could be circulated. The entire assembly was insulated with crumpled aluminum and encased in a thin sheet-metal shell. The pressure in the spark plug pocket could be increased by admitting compressed nitrogen. A sensitive needle valve was provided to ensure accurate control of the pressure.

25 The automotive distributor was mounted on a steel base and connected directly to the shaft of an electric motor. Five of the six lobes on the breaker point cam were removed to reduce the number of ignition impulses to a frequency typical of a multi-cylinder engine, operating at idling speed. The centrifugal spark advance mechanism was rendered inoperative by wiring the fly-weights in one position. The points, condenser and other parts were standard.

26 The ignition coil was standard except for a thermocouple attached about half way up on the cylindrical portion of its case. Also, the case was wrapped tightly with copper tubing through which coolant could be circulated for temperature control.

27 A six volt, automotive battery supplied the current for the ignition system. This unit was kept fully charged by a motor-generator set with adjustable output. The voltage was adjusted with a rheostat between the distributor and battery.

28 The energy supplied to the ignition system was read on a conventional direct-current voltmeter and ammeter. The maximum instantaneous values of primary and secondary voltage were determined by measuring the trace on a cathode-ray oscillograph. The oscillograph was connected directly to the leads of the coil for the primary voltage trace. The secondary voltage trace was obtained from a calibrated pick-up surrounding the high-tension lead. In this case the oscilloscope was calibrated from a similar pick-up mounted on a special calibration unit having a known output. The calibration unit consisted of an automotive ignition coil, fed by 400 cycle alternating current at approximately 130 volts. The output of this unit was determined with a vacuum tube volt-meter capable of indicating voltages up to 10,000 RMS. For the primary voltage the scope was calibrated on the 110 volt, 60 cycle alternating current supply. All of this equipment was connected to the scope as required by a special switch box.

29 The spark plug bomb and ignition coil were cooled to arctic temperatures by pumping chilled gasoline to these units. The gasoline was cooled in a tank by spraying it over crushed, dry ice. An aircraft fuel pump and an electric motor provided circulation. This entire apparatus was insulated to minimize heat transfer and condensation.

30 The low temperature starting tests were conducted on a battery charging unit consisting of a single-cylinder engine directly coupled to a direct current, compound wound generator. The cylinder head was replaced with a steel plate on which the spark plug bomb was mounted. The volume of the bomb and special head provided a compression ratio equal to that of the original engine.

31 Temperature was indicated by iron-constantan thermocouples connected to potentiometers that were calibrated in degrees Fahrenheit. Since the arctic temperatures are lower than the calibrated range of these instruments, their values were determined by connecting the thermocouples in reverse polarity. Assuming the potentiometer reading as negative and adding twice the room temperature gave the correct temperature.

32 ENGINE TESTS: The tests to demonstrate the effect of arctic temperature on the combustion process of a gasoline engine were conducted on a special, single-cylinder engine connected to a cradle-type dynamometer. (See Photo No. 3, Page 31) The engine was mounted in an insulated box, which also housed refrigeration coils and circulating blowers. (See Photo No. 4,

Page 32, and Sketch No. 2, Page 34) Refrigeration was supplied by a plant having a rated capacity of 15 tons at -65 °F. (See Sketch No. 7, Page 39)

33 The research engine was developed primarily for detonation testing of extremely high quality fuels. The construction is very heavy, considering that the displaced volume is only 17.6 cubic inches. The liquid cooled, combustion chamber is of the hemispheric type, both valves being sodium cooled. Several cams were available for this engine and a pair providing valve timing typical of current automotive engines was selected. Cooling was provided by circulating arctic grade antifreeze, solution C, through an automotive radiator inside the insulated box: circulation being accomplished with a centrifugal pump, driven from the crankshaft. (See Sketch No. 4, Page 36) The coolant temperature was controlled by an automotive thermostat mounted in the coolant outlet on the cylinder head.

34 The lubrication system of the engine is of the wet-sump type. An oil pump in the cam compartment provided circulation. The temperature may be increased with an electric heater attached to the crankcase.

35 Fuel was supplied to the engine by two separate systems: fuel injection and carburetion. (See Sketch No. 6, Page 38) A special intake manifold was fabricated to support a carburetor and a fuel injection nozzle. (See Sketch No. 8, Page 40) The injection pump was driven at half crank-shaft speed from an accessory drive on the rear of the engine. Fuel was supplied by admitting compressed nitrogen to the storage barrel. The flow was indicated by a Fischer and Porter Flowrator. Fuel could be supplied at will to either system by valves located on the control panel.

36 The flow of fuel through the carburetor was regulated by turning the adjustable, main jet, needle valve with a hydraulic control. All other flow circuits in the carburetor were plugged off. This special system was required because of the very high vapor pressure of the arctic grade fuel.

37 The delivery of the injection pump was adjusted by moving the control rack with a remote hydraulic control. A special surge pot, consisting of two chambers separated by a diaphragm, was connected to the pump inlet. (See Sketch No. 11, Page 43) The fuel flowed through the lower chamber and the

nitrogen pressure from the barrel was applied to the upper chamber. Since the diaphragm had a large area with respect to the fuel inlet, the pressure surges were essentially removed.

38 The combustion air was drawn from inside the insulated box. (See Sketch No. 5, Page 37) After flowing through a measuring orifice and a surge chamber, the temperature could be increased by an electric heater, mounted on the carburetor inlet. (See Sketches No. 9 and 10, Pages 41 and 42) The airflow was indicated by a slant gage mounted on the control bench. The throttle position was adjusted with a hydraulic control, also mounted on the control bench.

39 Ignition was provided by a conventional automotive system. The distributor used in the spark plug tests was driven from the rear of the injection pump. This unit was rotated with a hydraulic control to vary the spark advance. The spark advance was indicated by a Strobotac-Strobolux system triggered by a pick-up on the high-tension ignition wire and flashing on the graduated fly-wheel.

40 The General Electric, 5 horse-power dynamometer was connected to the engine by a short truck-type drive shaft equipped with Spicer universal joints. The dynamometer control switches and resistors were mounted in a panel beside the control bench. Engine speed was indicated by the Strobotac, used also for indicating spark advance. The dynamometer was originally equipped with a balancing beam for indicating torque. Since a remote indicator is necessary in this test cell, a Shaevitz transformer and spring were attached to the beam. When alternating current was supplied to the transformer, the output read on a vacuum tube voltmeter, gave a linear indication of beam position and consequently dynamometer torque. (See Sketch No. 3, Page 35)

41 The insulated box was assembled in six sections. The top, bottom and ends were bolted together while the two sides were removeable. The side nearest to the control bench was mounted on castors to enable the box to be opened with ease and provide access to the engine. This side also contained an insulated observation window. All joints between the various sections were sealed with strips of sponge rubber. The sides were held securely in place by refrigerator-door type locks. Each panel was built up of seven layers of aluminum foil separated by wooden strips 3/4 inches thick. Each assembly was encased in 1/4 inch marine plywood.

42 The engine was mounted in the box on a machined steel plate supported by an angle iron frame. The refrigeration coils were mounted vertically behind the engine and formed a partition across the box except for a space of approximately 1 foot at the top. Four centrifugal fans, belt driven by an external five horse-power, direct current motor, were mounted on a false ceiling connecting with the upper surface of the coils. Thus cooling air was forced downward over the engine, drawn through the coils and returned to the blowers by flowing upward between the coils and the rear panel of the box.

43 The two stage refrigeration system is of the freon-brine type, using Freon 22 as the refrigerant. (See Sketch No. 7, Page 39) The gas is compressed in a rotary compressor, driven by a 60 horse-power motor. Further compression takes place in a twelve cylinder, reciprocating unit, powered by a 75 horse-power motor. Lubricating oil is separated from the gas as it flows toward the condenser. The flow of liquid freon is controlled by float switches in a vertical receiver beneath the condenser. The switches operate solenoid valves ahead of hand regulated expansion valves. The liquid freon is sub-cooled in a direct expansion liquid cooler and an oil still.

44 Both expansion valves discharge into a pump receiver of about 300 gallons capacity, located in the attic space above the test cell. After the receiver is cold it, and a stand pipe twelve inches in diameter extending from the receiver to the floor of the test cell, are filled with liquid refrigerant. This liquid is forced through the coils and back to the receiver by a centrifugal pump. The temperature in the box is controlled by heating the freon brine with hot gas taken from the discharge of the reciprocating compressor. An electronic air-operated controller, connected to a thermocouple in the box regulates the flow of hot gas by operating a diaphragm type valve.

45 The temperature at fourteen points on the engine and associated systems were read by iron-constantan thermocouples connected to a precision-type electronic potentiometer. Pressures were read on U-tube manometers or bourdon tube-type gages.

46 The specifications of the equipment and instruments are given under "List of Apparatus and Equipment".

Description of Tests

47 IGNITION: For the first group of ignition tests, chilled gasoline was circulated through the spark plug bomb and

the copper tubing surrounding the coil until these units were cooled to about -65 °F. With the primary voltage maintained at 4, the nitrogen pressure was increased until the plug misfired occasionally. After recording all data, the plug and coil were allowed to warm up approximately 15° and the data was again recorded. This process was continued until a temperature of 30° was obtained. This particular primary voltage was selected because it seems typical of the battery voltage available while cranking an engine in an arctic region.

48 Eight different spark plugs were tested in the manner described above. They represented the hottest and coldest types recommended for use in commercial engines by three separate manufacturers. Both regular and resistor plugs by one manufacturer were included. The electrode gaps were carefully set at .025 inch with the exception of the resistor plugs. These were set at .040 inch, according to the manufacturer's recommendation. The manufacturers, model numbers, gaps and electrode diameters are listed in Table I, Page 24.

49 Each plug was again tested in the above temperature range at a constant bomb pressure of 100 psi. In this case the primary voltage was increased until the plug fired steadily. The coil was not cooled but the ignition system was operated for at least thirty minutes to allow its temperature to become steady. These tests were included to show the minimum battery voltage required to start an engine of normal compression ratio.

50 Constant primary voltage tests, similar to those described in paragraph 47 were made while heating the plugs through a temperature range of about 100 to 500 °F. The primary voltage was 6 because the cranking load would be less in warm weather. The coil temperature was not controlled but was allowed to become steady prior to starting each test.

51 In the last series of ignition tests, the bomb was attached to a special cylinder head and mounted on the battery charger engine. The four volt battery potential was applied to the ignition coil through breaker points at the end of the crankshaft. With the spark plug cooled to approximately -70 °F, the engine was cranked using the generator as a motor. After cranking for several minutes with a rich mixture, the charge would be ignited. The engine seemed to fire about every fourth revolution and would not develop enough power to maintain constant speed. Although all eight plugs were tested in this

manner, the difference in performance was negligible. These tests were considered inconclusive because the combustion chamber shape was very poor. With the volume of the bomb and the pipe leading to it constituting the major portion of the combustion chamber, the scavenging of the chamber was very limited.

52 The object of the engine test program being to determine the effect of inlet charge temperature on power output, variable carburetor air temperature tests were made according to the schedule presented in Table II, Page 25. The speeds are 100, 80, 60 and 40 percent of the speed that provides maximum torque. This speed was found to be 2000 RPM by a full throttle constant mixture ratio test. (See Curve No. 7, Page 50)

53 All test runs were made with .08 fuel/air ratio, the mixture that gave maximum power. This was determined by a constant speed, variable mixture ratio test. (See Curve No. 8, Page 51)

54 The spark advance was set at 30 °BTDC for all of the fuel injection runs and for the higher speed carburetion runs. The setting was reduced to 20° at 1200 RPM and 10° at 800 RPM because the detonation became serious. The 30° spark advance gave maximum power as shown by Curve No. 9, Page 52 .

55 A piston providing a compression ratio of 6.78:1 was used during the entire program. A limited number of pistons for different ratios were on hand but this seemed to be optimum for this engine-fuel combination. The optimum compression ratio is considered to be the highest that may be utilized without encountering serious detonation. This theory is based on the fact that the efficiency of an Otto-cycle engine increases as the compression ratio increases, according to the relation

$$E = 1 - \frac{1}{r^{(n-1)}} \quad .$$

56 With the engine operating at 2000 RPM, using the fuel injection system, .08 fuel/air ratio and 30° spark advance, and with an ambient temperature of 80 °F, a complete record of all data was made. The carburetor air was then heated approximately 25° and a second record of data was obtained. This process was continued until the carburetor air temperature, on the last setting, was at least 100 °F hotter than the ambient temperature.

57 Similar test runs were made at the reduced speeds stated and ambient temperatures according to the schedule. Some

of the ambient temperature ranges and most of the part throttle runs were omitted in an effort to find the condition where manifold heat became beneficial to combustion. Since manifold heat never increased the power output, even when the ambient temperature was -65 °F, it seemed unnecessary to make the tests at the intermediate conditions. It also appeared reasonable that part throttle heat requirements would be less than full throttle requirements, thus the part throttle runs could be safely omitted. This reasoning was substantiated by a part-throttle test at the lowest ambient temperature. (See Curve No. 14, Page 57)

58 The tests of engine performance with carburetion were made in the manner described above, however, tests were completed employing all ambient temperatures specified. At -65 °F, runs were made at all four throttle settings.

59 It was noted during the above program that the engine developed more power when operated with carburetion than with fuel injection. A motoring test was made at 2000 RPM, while varying the ambient temperature, to determine the amount of power required to drive the injection system. During this test the fuel air ratio was controlled at .08. The nozzle was allowed to discharge into a separate container to prevent disturbing the lubrication of the cylinder.

60 The cylinder and connecting rod were removed for inspection at the end of the test program. The condition of each major part is listed in Table 3, Page 28 .

Discussion

61 IGNITION TESTS: The primary purpose of this program was to collect factual information concerning the operation of gasoline engines at extremely low temperatures. These data were to be used as a guide for planning future research programs, once the specific problems were isolated. A great amount of work has been done on ignition systems but in very few, if any, of these projects was the effect of low temperature the primary interest. In fact, a relatively small amount of investigation has been conducted on engines operating in low ambient temperatures. Test cells with adequate space and sufficient cooling for arctic research are comparatively few. Thus, the demand for such a unit far surpasses the supply. This situation prevents the primary function of basic research in so far as contracts of this type are usually extended as the problems occur.

62 The importance of the effect of temperature on an ignition system became evident almost as soon as the tests were started. It was impossible to obtain reproducible data on a spark plug mounted in the test bomb without carefully controlling the temperature of the ignition coil. As shown by Reading Nos. 33, 42, 60, 61 and 62 on the A C - 86 plug (See Log Sheet No. 2, Page 72) the performance of the ignition system is affected nearly as much by the coil temperature as by the spark plug temperature. Three conclusions may be stated after analyzing these data:

(a) Raising the coil temperature reduces the limiting pressure whether the plug is hot or cold
(b) Lowering the plug temperature decreases the limiting spark plug pressure
(c) The loss in limiting pressure due to cold plug conditions may be nearly offset by lowering the coil temperature to that of the plug

63 As a result of these findings, the remaining tests were conducted with either the coil being cooled along with the plug or only after the coil had been in operation long enough for its temperature to become constant.

64 The performance of five of the spark plugs, as indicated by the constant voltage, variable pressure tests, was nearly equal over the low temperature range. The Auto-lite B - 9 and the Champion C - 8 were well above average and the Auto-lite Resistor plug BR - 8 was below average. This trend was evident during the high temperature tests although the difference in performance is less outstanding. A further indication of the higher efficiency of the C - 8 and B - 9 plugs is given by the constant pressure tests. These two plugs required the lowest primary voltage and amperage. The resistor type plugs required a high voltage, probably higher than the battery would supply while cranking an engine in cold weather.

65 The spark plugs for the higher temperature range seem to give improved performance. This results largely from the diameter of the center electrode. These electrodes varied from .085 to .125 inch. The plugs having higher performance had the smallest electrodes. This effect is especially noticeable in the Champion plugs. The C - 6 has .125 inch electrode and about average performance. The C - 8 has .097 diameter and high performance.

66 During the first spark plug test (constant primary voltage, variable nitrogen pressure, arctic temperature range) the average nitrogen pressure increased from about 100 psi at 60° to about 170 psi at -60 °F. The trend was reversed on the high temperature test. This results from cooling the ignition coil in the first test but allowing it to operate at constant temperature in the latter test. This shows the importance of coil temperature. The requirement at the spark plug is increasing as the temperature is reduced, but cooling the coil more than compensates for it. Further evidence of this trend is shown by the constant pressure test. The coil must be supplied with increasing voltage as the temperature is reduced.

67 ENGINE TESTS: Adding heat to the combustion air reduced the power output during all of the test runs. This, of course, indicates that manifold heat is not necessary for good combustion in an otto-cycle engine. Since it is a well known fact that automotive type engines do lose power as mixture temperature is lowered, it must be assumed that this phenomenon is the result of poor distribution of fuel and air in the intake manifold.

68 The observed horsepower of the engine was as much as 30 percent higher when the fuel was admitted through the carburetor. This is shown when the full throttle points at 2000 RPM are plotted against ambient temperature. (See Curve No. 26, Page 69) This is not the result of the power required to drive the injection pump. As the friction horse-power curves show, only about .1 horse-power is required by this system. The loss seems to be the result of inadequate mixing of the fuel and air, although the nozzle pressure was set at 1750 psi and the injection process started when the inlet valve was wide open.

69 The engine was much less efficient when operated with fuel injection. This is shown by the indicated specific air and fuel consumption curves. Part of this may be attributed to reduced volumetric efficiency since the manifold temperature is not reduced by vaporization of the fuel. With carburetion the manifold was cooled as much as 40° below the ambient temperature. (See Curve No. 27, Page 70)

70 Further evidence of the non-homogenous mixture in the cylinder is the fact that detonation was less severe with fuel injection. The last portion of charge to burn was either so rich or so lean that detonation was suppressed.

71 The observed indicated horse-power was corrected to standard temperature and pressure according to the expression agreed upon by the Society of Automotive Engineers:

$$HP_c = HP_o \frac{29.92}{P_a} \sqrt{\frac{T_a}{520}}$$

These curves are also presented on Curve No. 26, Page 69. The corrected horse-power rises as the ambient temperature is reduced until it reaches a maximum at about -40 °F. At lower temperatures the correct horse-power becomes less. The rise in power seems to be the result of the friction in the intake manifold. The decrease results from overcooling the combustion chamber and cylinder wall. The coolant leaving the cylinder head was held at essentially the same temperature by the thermostat, but it entered the water jacket at ambient temperature.

72 During the engine tests, several difficulties arose while the ambient temperature was being lowered. Little difficulty was experienced during the running of the fuel-injection tests. The hydraulic controls were the only source of trouble and when Univis P - 38 hydraulic oil was obtained, this difficulty was eliminated. However, thermal contraction of carburetor parts caused serious difficulties. The carburetor was supplied with a main jet needle valve of steel and a supporting insert of brass. As the insert was screwed into position, the die-cast carburetor body was stretched slightly. Cooling of the carburetor relieved the stress in the insert, and since the needle valve was supported by the insert, the effective opening changed greatly.

73 After the test runs were completed the engine was dis-assembled for inspection. Carbon deposits on the piston and combustion chamber wall were medium to heavy. None of the parts were worn excessively but the cylinder wall, connecting rod and exhaust valve seat were pitted.

LIST OF APPARATUS AND INSTRUMENTS

74 Spark Plug Test Bomb

Reference: Photo No. 1, Page 29

75 Distributor and Driving Motor

Distributor: Manufacturer - Autolite Electric Co.
Model - IGS-4103-A, 8C277268
Modifications:
(a) Removed five cam lobes
(b) Removed vacuum spark advance mechanism
(c) Locked fly-weights of centrifugal spark advance mechanism

Driving Motor: Manufacturer - Montgomery Ward
Speed - 1725 RPM
Horse-power rating - 1/4
Voltage - 110 AC
Model No. - DPA6004

76 Ignition Coil

Manufacturer - Autolite Electric Co.
Model No. - IG-6V3U

77 Battery

Manufacturer - Sears, Roebuck and Co.
Model - 46
Voltage - 6.3

78 Battery Charger

Motor: Manufacturer - Baldor Electric Co.
Horse-Power - 1
Voltage - 110-220

Generators: Manufacturer - Autolite Electric Co.
Model No. - GCJ4802-A-U
Quantity - 2

Voltage Control: Variable Resistor - 25 ohm
Excitation - 28 volt DC, Laboratory System

79 Cooling Equipment

Tank: Special - Laboratory
Size - 10-1/2" x 11" x 17"

Pump: Manufacturer - Pesco
Model No. - 2P27G

Driving Motor: Manufacturer - Montgomery Ward
Model No.' - DP 6005 - 9820
Speed - 1750
Voltage - 110-220
Horse-Power - 1/3

Cooling Medium:
Type - Gasoline

Refrigerant :
Type - Dry Ice

80 Heating System

Heater: Manufacturer - Hevi Duty Electric Co.
Type - M-2012
Capacity - 1400 watts
Voltage - 115-230
Medium: Type - Glycerine

81 Nitrogen

Supplier - Air Reduction Co.
Type - W P

82 Direct Current Ammeter

Manufacturer - Weidenhoff, Inc.
Range - 0-10, 0-50, 0-200, 0-1000

83 Direct Current Voltmeter

Manufacturer - Weidenhoff, Inc.
Range - 0-10, 0-20, 0-50

84 Oscillograph

Manufacturer - Allen B. Dumont Labs.
Type - 208-13
Serial Number - 5382

85 Alternating Current Voltmeter

Manufacturer - R C A
Model No. - WV - 73A
Range - .01-.025-1.-2.5-10-25-100-250-1000

86 Temperature Indicator (Coil)

Manufacturer - Lewis Engineering
Model No. - 14PO
Serial No. - 175
Range - -20 to +500 °F, 400 to 1800 °F
Thermocouple - IC

87 Temperature Indicator (Spark Plug Gasket)

Manufacturer - Leeds & Northrup
Serial No. - 486961
Range - 0 to 450 °F, 400 to 800 °F
Thermocouple - IC

88 High Voltage Calibrator

Reference: Drawing No. 20650, Page 33

Coil: Manufacturer - Autolite Electric Co.
Model No. - IG-6V3U

Resistor: Manufacturer - Unknown
Type - Nichrome Wire
Rating - 1000 W

Output: 6700 VRMS when supplied with 131 V 400 cps

Calibration Meter: Manufacturer - Ballentine
Model No. - 300
Serial No. - 5994 with 100:1 multiplier No. 993
Range - 0 to 10,000 volts

Pickup: 20 turns, 1/8" brass rod, 5/16 ID

89 Switch Box

Reference: Drawing No. 20650, Page 33

90 Primary Voltage Resistor

Manufacturer - Ohmite

91 Pressure Gage

Manufacturer - National Cylinder Gas
Model No. - None
Range - 0 to 400 psi

92 Spark Plugs Tested

Auto-Lite:	Manufacturer - Autolite Electric Models - B5, B9, BR4, BR8
A. C.:	Manufacturer - A. C. Spark Plug Div. (General Motors) Models - 83, 86
Champion:	Manufacturer - Champion Spark Plug Co. Models - No. 6 commercial, No. 8 commercial
Gap Settings:	See Table I, Page 24

93 Engine for Ignition Tests

"Tiny Tim":
Manufacturer - Continental Motors
Bore - 1.75"
Stroke - 1.75"
Number of Cylinders - 1
Valve Arrangement - L
Compression Ratio - 4
Special Cylinder Head - See Drawing No. 5202, Page 29
Cooling-Air

94 Engine for Combustion Research

Manufacturer - Merz
Serial No. - 11
Number of Cylinders - 1
Bore - 2.625"
Stroke - 3.250"
Valve Arrangement - Overhead
Cooling - Liquid
See Photo No. 3, Page 31

95 Fuel System for Merz Engine

Injection System: Manufacturer - Bosch

Pump:	Manufacturer - Bosch Model - APEIB70P30073 Serial No. - 138104
Nozzle:	Manufacturer - Bosch Model - AKB8078
Transfer Pump:	Manufacturer - Bosch Model - AFPK22N
Carburetor:	Manufacturer - Zenith Model - 10355
Fuel:	Specification - MIL-G 3056 Type - C Vapor Pressure - 12-14 psi
Supply:	Barrel - See Sketch No. 6, Page 33 Source of Pressure - Nitrogen
Flow-Rator:	Manufacturer - Fischer & Porter Serial No. - J11-2997 Calibration Curve - See Curve No. 2, Page 45
Surge Chamber:	See Drawing No. 20737, Page 43
Controls:	Manufacturer - Sperry Products Model - EIEI-A Hydraulic Fluid - Univis P-38, Std. Oil

96 Cooling System

Radiator:	Manufacturer - Plymouth
Pump:	Manufacturer - Crosley
Thermostat:	Manufacturer - Crosley
Coolant:	Arctic Grade Anti-Freeze, Solution C
Layout:	See Sketch No. 4, Page 35

97 Combustion Air System

Layout: See Sketch No. 5, Page 37

Orifice: See Sketch No. 9, Page 41

Surge Drum: Dimensions - 16" x 24"

Heater: See Sketch No. 10, Page 42

Manifold: See Sketch No. 8, Page 40

Slant Gage: Manufacturer - Ellison
Model - Inclined, Vertical Draft Gage

Orifice Calibration: See Curve No. 1, Page 44

98 Insulated Test Cell

Reference: See Sketch No. 2, Page 34

99 Circulating Fans

Government Surplus
Size - 12" dia

Motor: Manufacturer - Louis Allis
Type - 5 HP D.C., 1750 RPM

100 Refrigeration System

Layout: See Sketch No. 7, Page 39

Main Compressor: Manufacturer - York Corporation
Model - F3129-5DE
Series - VW
Motor - Allis Chalmers - 75 HP,
9-5128-1118-620E-1-1

Rotary Compressor: Manufacturer - Allis Chalmers
Alterations - by York Corporation
Serial No. - 1788
Motor - Allis Chalmers - 60 HP,
9-5128-1069-620D-1-3

Oil Separator: Manufacturer - Acme Industries, Inc.
Serial No. - 51-3-369

Condenser:	Manufacturer - Acme Industries, Inc. Model No. - 51-3-6158
Control Receiver:	Manufacturer - Richard M. Armstrong Serial No. - 2030
Float Switches:	Manufacturer - Alco Valve Co. Type - J 5 R
Expansion Valves:	Manufacturer - Alco Valve Co. (1) Type M 330, 3/4" (2) Type M 620, 1/2"
Oil Still:	Special - Laboratory Size - 1-1/2" x 2-1/2", 20' long
Pump Receiver:	Manufacturer - Richard M. Armstrong Serial No. - 2029
Stand Pipe:	Special - Laboratory Size - 12" x 12'
Circulating Pump:	Manufacturer - Buffalo Pumps, Inc. Model - 4-CS Motor - Westinghouse, 5 HP, 3PH, 5105
Coils:	Manufacturer - Bush Manufacturing (1) C 36.8.8-24 Q, Right Hand (2) C 36.8.8-24 Q, Left Hand Arrangement - Parallel
Liquid Cooler:	Manufacturer - York Corporation Serial No. - 27457
Expansion Valve:	Manufacturer - Sporlan Valve Co. Type - MVC
Oil Receiver:	Manufacturer - York Corporation Serial No. - 20303
Oil Reservoir:	Manufacturer - Richard M. Armstrong Serial No. - 2031
Control Valve:	Manufacturer - Hammel Dahl Co. Serial No. - 515703 Figure No.-3834S Size - 1/2"

Automatic Temperature Controller:
Manufacturer - Minneapolis Honeywell
Model - 152P13P-63-11
Serial No. - 319065
Calibration - -100 to +120 °F (IC)

101 Temperature Indicator

Manufacturer: Minneapolis Honeywell
Model No. - 156X63P48
Serial No. - 666354
Calibration - -100 to +1600 °F (IC)

102 Dynamometer

Manufacturer - General Electric Co.
Model - TLC - 6
Serial No. - 1540296
Capacity - 5 HP Motoring

103 Engine Coupling

Manufacturer - Spicer Company
Universal Joints - Sleeve Yoke 4-3-98X,
Journal & Bearing 5-15X,
Slip Joint w/Flange Yoke 1501-14X

104 Speed and Spark Advance Indicator

Strobotac:
Manufacturer - General Radio Co.
Model - 631-B
Serial No. - 5163

Strobolux:
Manufacturer - General Radio Co.
Model - 648-A
Serial No. - 567

105 Torque Indicator

Special - Laboratory
Type - See Sketch No. 3, Page 35

Pickup:
Manufacturer - Schaevitz Engineering Co.
Type No. - 18-L
Serial No. - 102

Indicator:
(Vacuum Tube Voltmeter)
Manufacturer - RCA
Model - WV-73A
Calibration - See Curve No. 3, Page 46

TABLE I

MANUFACTURER	NUMBER	GAP	CENTER ELECTRODE DIA
A C Spark Plug Div.	83	.025	.122
A C Spark Plug Div.	86	.025	.124
Auto-Lite Electric Co.	B5	.025	.085
Auto-Lite Electric Co.	39	.025	.085
Auto-Lite Electric Co.	BR 4	.040	.125
Auto-Lite Electric Co.	BR 9	.040	.125
Champion Spark Plug Co.	C	.025	.124
Champion Spark Plug Co.	8 C	.025	.097

TABLE II

GROUP A Determine Operating Conditions

Conditions: Arctic Fuel, fuel injection, 20 °SA, ambient temperature, wide open throttle

(1) Purpose: Find maximum torque speed
Procedure: Set 1200 RPM and .080 fuel air ratio: Repeat at 1400, 1600, 1800, 2000 and 2400 RPM

(2) Purpose: Find best power fuel air ratio
Procedure: Set maximum torque speed and .06 F/A: Repeat at .065, .070, .075, .080, .085 and .090 F/A

(3) Purpose: Find optimum spark advance
Procedure: Set maximum torque speed, best power mixture and 0° spark advance: Repeat at 5, 10, 15, 20, 25, 30, 35, 40 °BTDC

GROUP B Select Optimum Compression Ratio

Conditions: Arctic Fuel, fuel injection, maximum torque speed (2000 RPM), optimum spark advance (30°), compression ratio 6.78:1

(1) Purpose: Find detonation limit
Procedure: Vary fuel air ratio .05 to .10 at full throttle: Load down to 300 RPM at .08 F/A

(2) Purpose: Find detonation limit with 7.23:1 compression ratio
Procedure: Repeat part B-1, avoid excessive detonation

GROUP C-1 Determine Optimum Heat Supplied to Manifold

Conditions: Arctic Fuel, fuel injection, .08 F/A 30° SA, 6.78:1 compression ratio

Purpose: Find best power air temperature
Procedure: Set speed, F/A, spark advance, room air temperature: Record power: Increase carburetor air temperature in 4 steps of approximately 25 °F each

RUN NO.	RPM	THROTTLE SETTING
1	2000	4/4
2	2000	3/4 *
3	2000	2/4 *
4	2000	1/4 *
5	1600	4/4
6	1600	3/4 *
7	1600	2/4 *
8	1600	1/4 *
9	1200	4/4
10	1200	3/4 *
11	1200	2/4 *
12	1200	1/4 *
13	800	4/4
14	800	3/4 *
15	800	2/4 *
16	800	1/4 *

GROUP	C-2	Repeat C-1 with ambient temperature of 32 °F (made 1, 5, 9, 13)
GROUP	C-3	Repeat C-1 with ambient temperature of 0 °F (made 1, 5,9,13)
GROUP	C-4	Repeat C-1 with ambient temperature of -15 °F (made 1, 5, 9, 13)
GROUP	C-5	Repeat C-1 with ambient temperature of -30 °F (made 1, 5, 9, 13)
GROUP	C-6	Repeat C-1 with ambient temperature of -45 °F (made 1, 5, 9, 13)
GROUP	C-7	Repeat C-1 with ambient temperature of -55 °F (made 1, 5, 9, 13)
GROUP	C-8	Repeat C-1 with ambient temperature of -65 °F (made 1, 2, 5, 9, 13)
GROUP	D-1	Repeat C-1 using carburetor (made 1, 5, 9, 13, 15) **
GROUP	D-2	Repeat C-2 using carburetor (made 1, 5, 9, 13)
GROUP	D-3	Repeat C-3 using carburetor (made 1, 5, 9, 13)
GROUP	D-4	Repeat C-4 using carburetor (made 1, 5, 9, 13)

---

*These runs omitted when adding heat at full throttle did not increase power output

**Reduced SA to 20° at 1200 and 10° at 800 because of detonation

GROUP D-5 Repeat C-5 using carburetor (made 1, 5, 9, 13)

GROUP D-6 Repeat C-6 using carburetor (made 1, 5, 9, 13)

GROUP D-7 Repeat C-7 using carburetor (made 1, 5, 9, 13)

GROUP D-8 Repeat C-8 using carburetor (made all 16 runs)

GROUP E Friction

Conditions: Constant speed, full throttle, varying ambient temperature

Purpose: Motoring friction with and without fuel injection

Procedure: Set 2000 RPM, full throttle, .08 F/A with injector removed and manifold plugged: Repeat at zero F/A: Repeat both settings at 20, 0, -15, -30, -45, -55 and -65 °Room Temperature

TABLE III

INSPECTION RECORD OF MERZ ENGINE

Date: 19 December 1952
Inspected by: V. C. Currens
Compression ratio: 6.78:1

PART		CONDITION	
Rocker Arm Shafts		Good	
Rocker Arm Needle Bearings		Good	
Piston Pin		Good	
Piston Bores		Good	
Connecting Rod (small end)		Good*	
Connecting Rod (large end)		Good*	
Cylinder Bore:	Top	Good	
	Center	Pitted Slightly	
	Bottom	Ground	
Combustion Chamber		Good	
Intake Valve Seat		Good	
Exhaust Valve Seat		Good	
Piston:	General	Good	
	Crown	Good	
	Top Land	Good	
	2nd Land	Good	
	3rd Land	Good	
	4th Land	Good	
	5th Land	Good	
	6th Land	Good	
	Skirt	Good	
	Inside	Good	
Valve Gear & Valves		Intake: Good	Exhaust: Good
	Guide	Good	Good
	Push rod	Good	Good
	Rocker	Good	Good
	Spring (inner)	Good	Good
	Spring (outer)	Good	Good
	Washer (Upper)	Good	Good
	Washer (Lower)	Good	Good
	Thrust	Good	Good
	Adjusting Screw	Good	Good
	Valve Stem	Good	Good
	Valve Head	Good	Poor*

---

*Cylinder and piston assembly condition "Good" with the exception of exhaust valve which showed considerable pitting on face. Also the connecting rod showed signs of rusting and pitting on the I section. Carbon deposits were medium to heavy and no parts showed excessive wear. The piston rings were all free and in good condition.

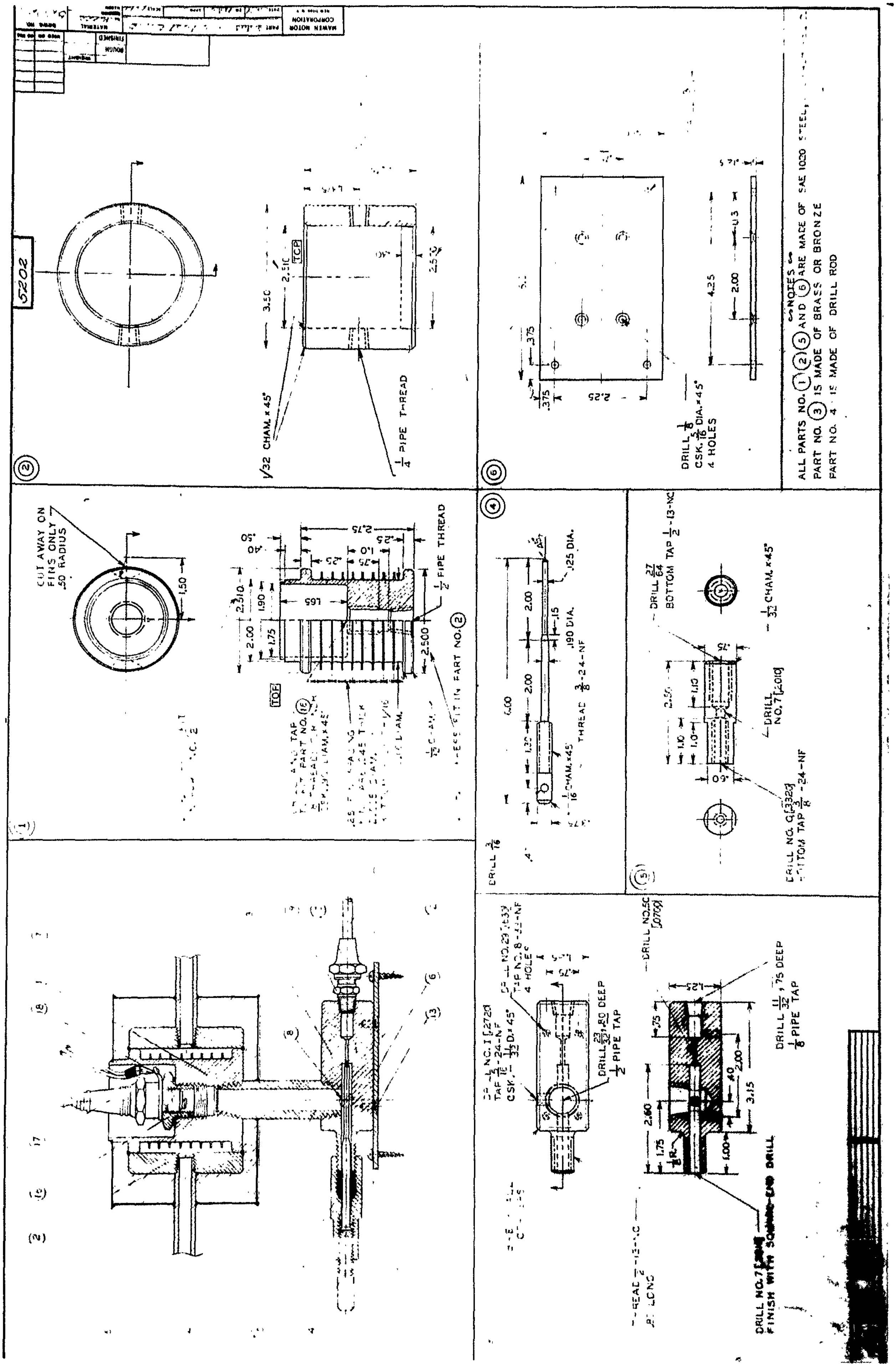

5202
②
1/32 CHAM.×45°
1/4 PIPE THREAD
3.50
2.510
TOP
.40
2.500
⑥
DRILL 1/8
CSK. 5/16 DIA.×45°
4 HOLES
.375
.375
2.25
4.25
2.00
1.13
NOTES
ALL PARTS NO. ① ② ⑤ AND ⑥ ARE MADE OF SAE 1020 STEEL,
PART NO. ③ IS MADE OF BRASS OR BRONZE
PART NO. 4 IS MADE OF DRILL ROD
CUT AWAY ON FINS ONLY .50 RADIUS
1.50
2.75
.50
.40
.25
.75
1.0
.25
2.310
1.90
1.65
2.00
1.75
1/2 PIPE THREAD
2.500
PRESS FIT IN PART NO. ②
TOP
①
④
DRILL 3/16
6.00
2.00
2.00
1.30
.125 DIA.
.15
.190 DIA.
THREAD 3/8-24-NF
1/16 CHAM.×45°
.375
⑤
DRILL 27/64
BOTTOM TAP 1/2-13-NC
1/32 CHAM.×45°
.75
2.50
1.10
1.10
1.0
.60
DRILL NO. 7 [.2010]
DRILL NO. Q [.3320]
BOTTOM TAP 3/8-24-NF
DRILL NO. 1 [.2720]
TAP 5/16-24-NF
CSK. 11/32 D.×45°
DRILL NO. 29 [.1360]
TAP NO. 8-32-NF
4 HOLES
DRILL 23/32, .80 DEEP
1/2 PIPE TAP
DRILL NO. 50 [.0700]
DRILL 11/32, .75 DEEP
1/8 PIPE TAP
.25
.75
2.00
.40
3.15
2.60
1.75
1/8 R
1.00
DRILL NO. 7 [.2010]
FINISH WITH SQUARE-END DRILL
THREAD 1/2-13-NC
(2)
(16)
(17)
(18)
(8)
(6)
(13)

PHOTO 2

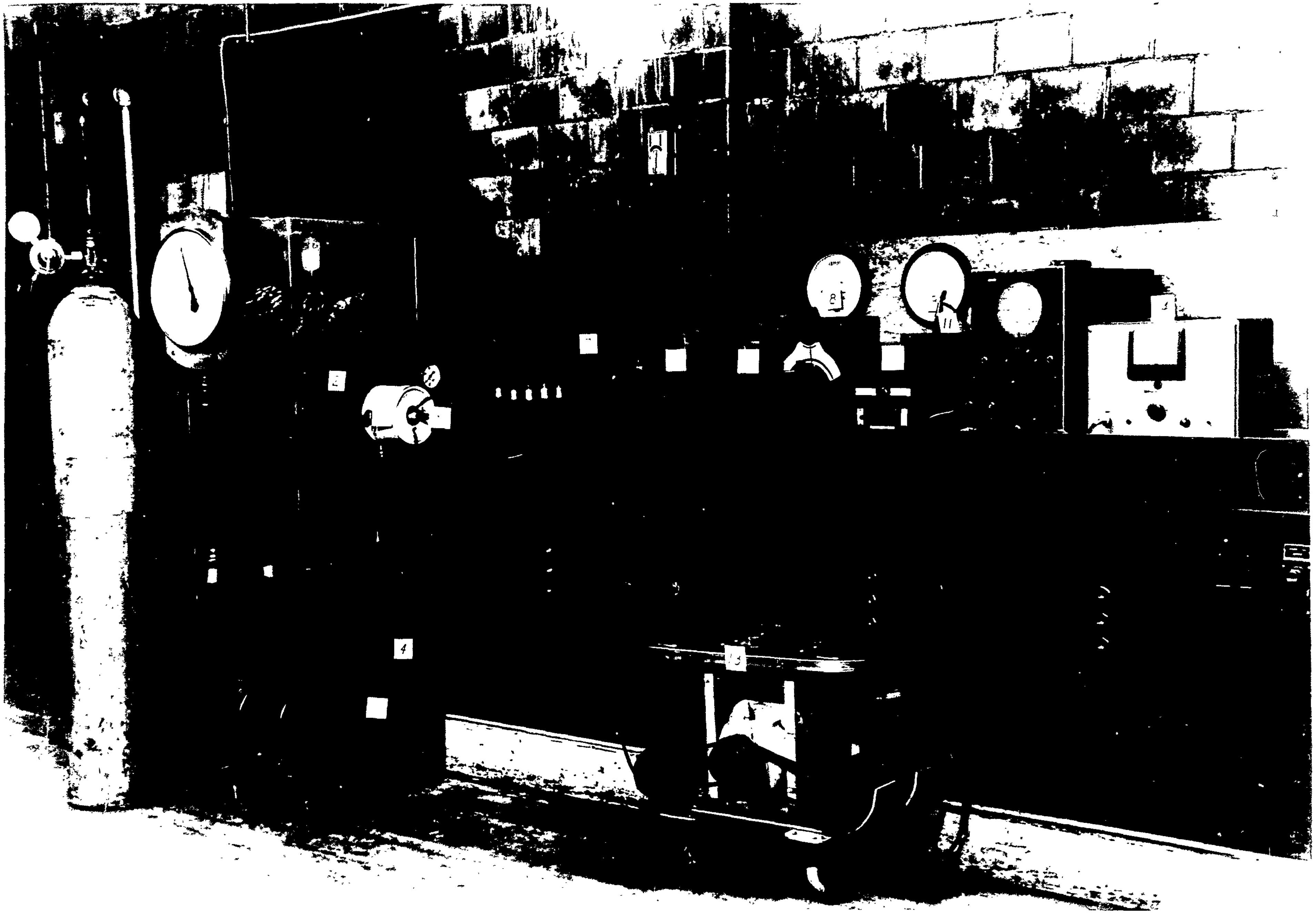


PHOTO 3

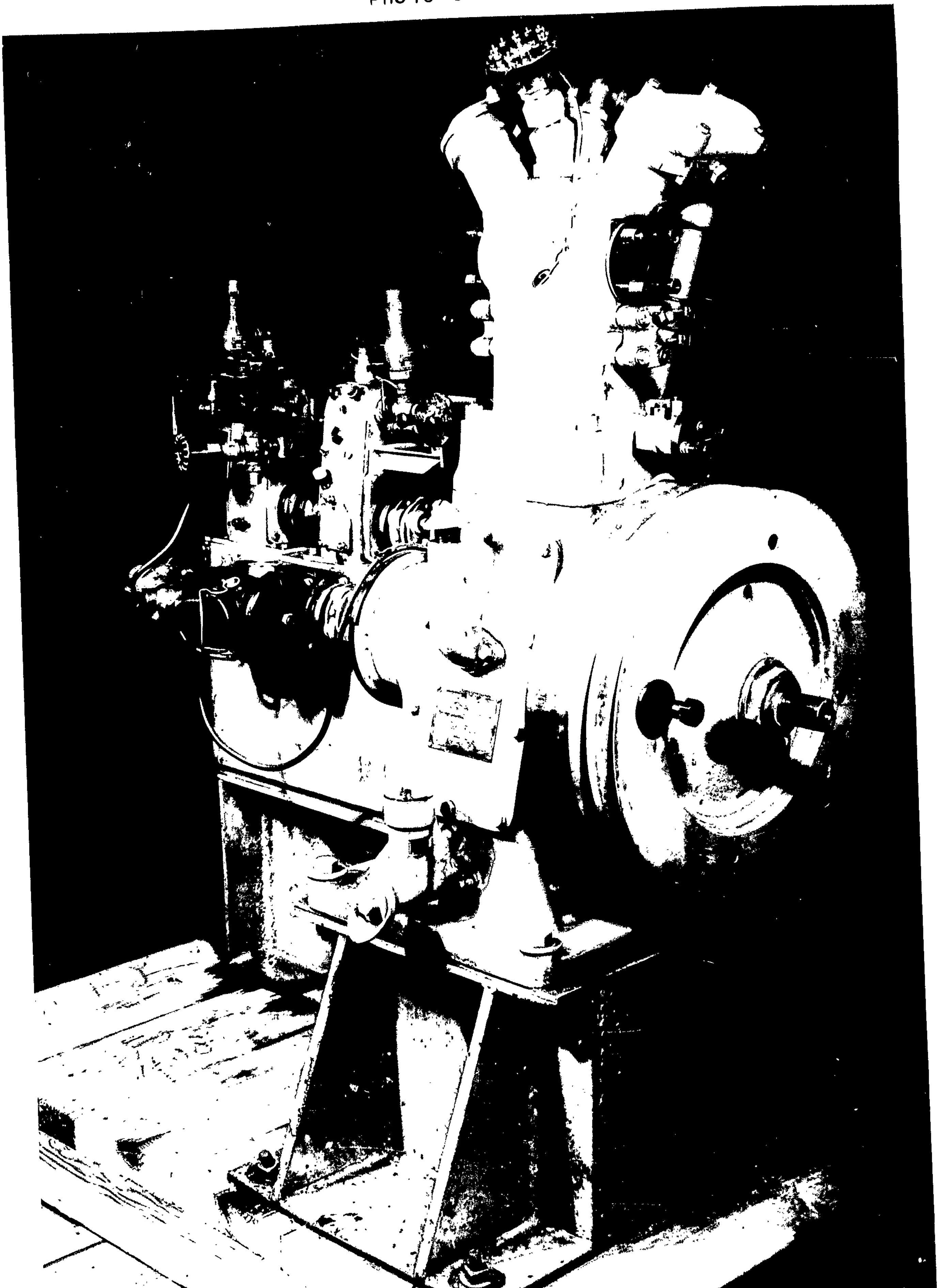
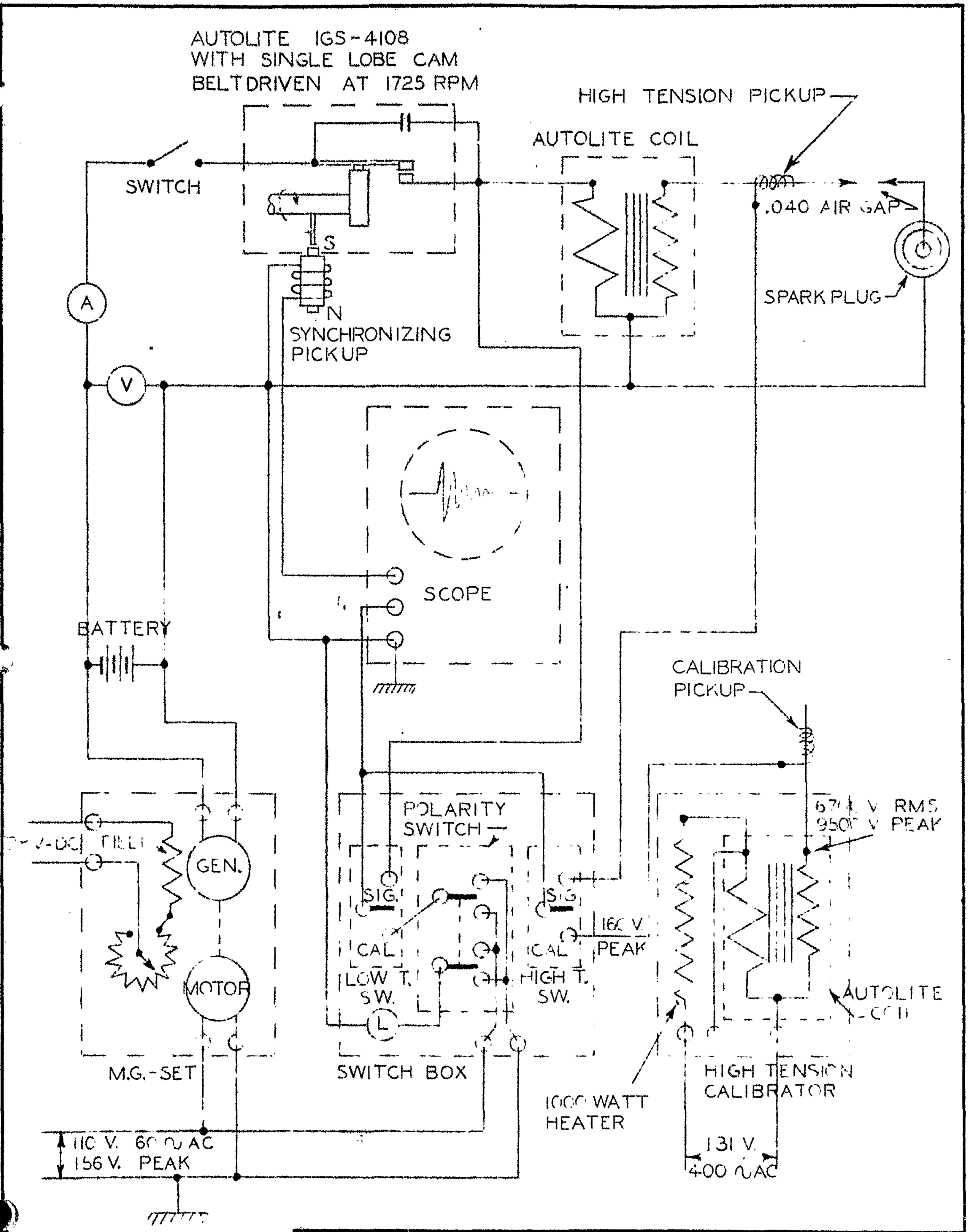


PHOTO 4

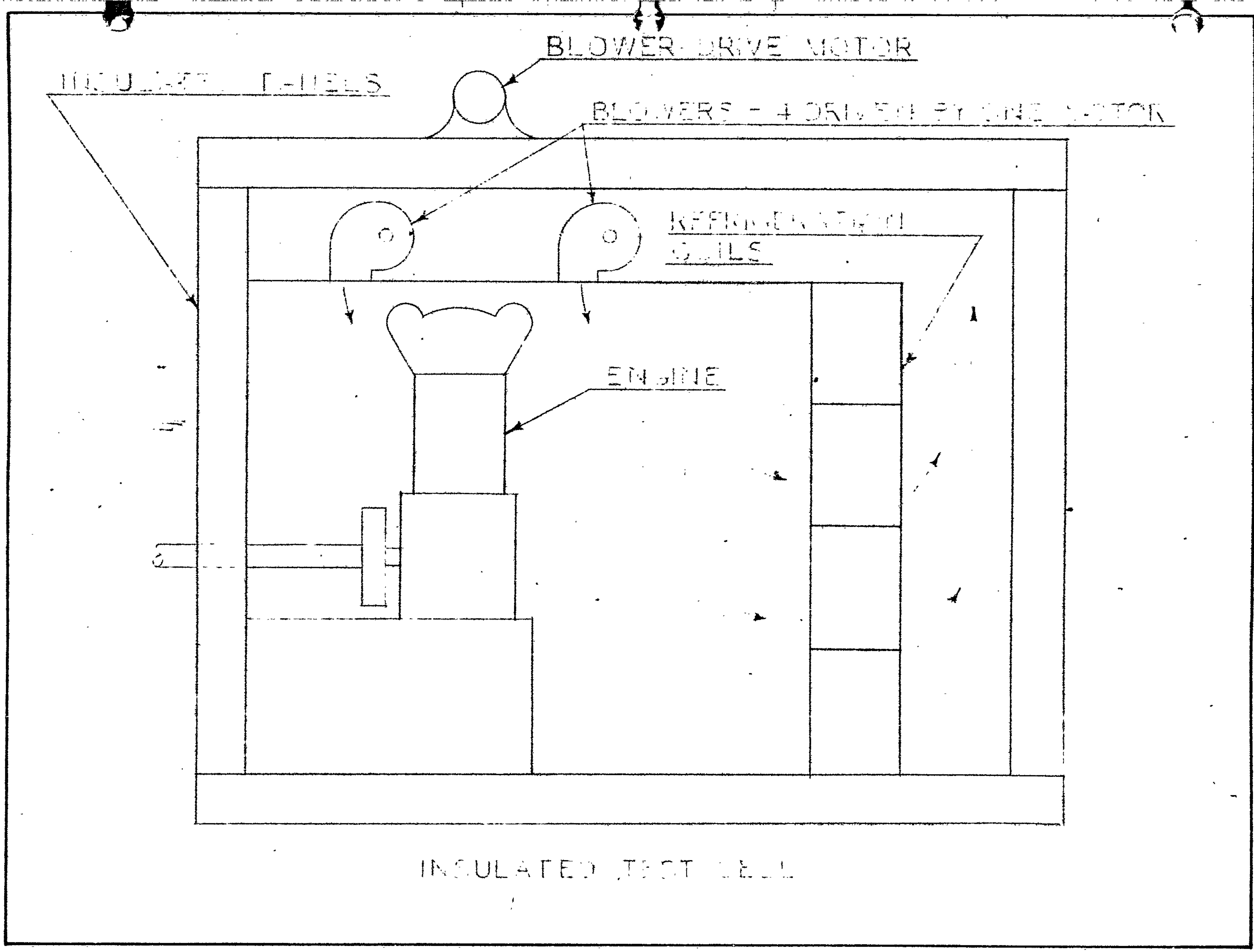


PART WIRING DIAGRAM
SPARK PLUG · BOMB TEST

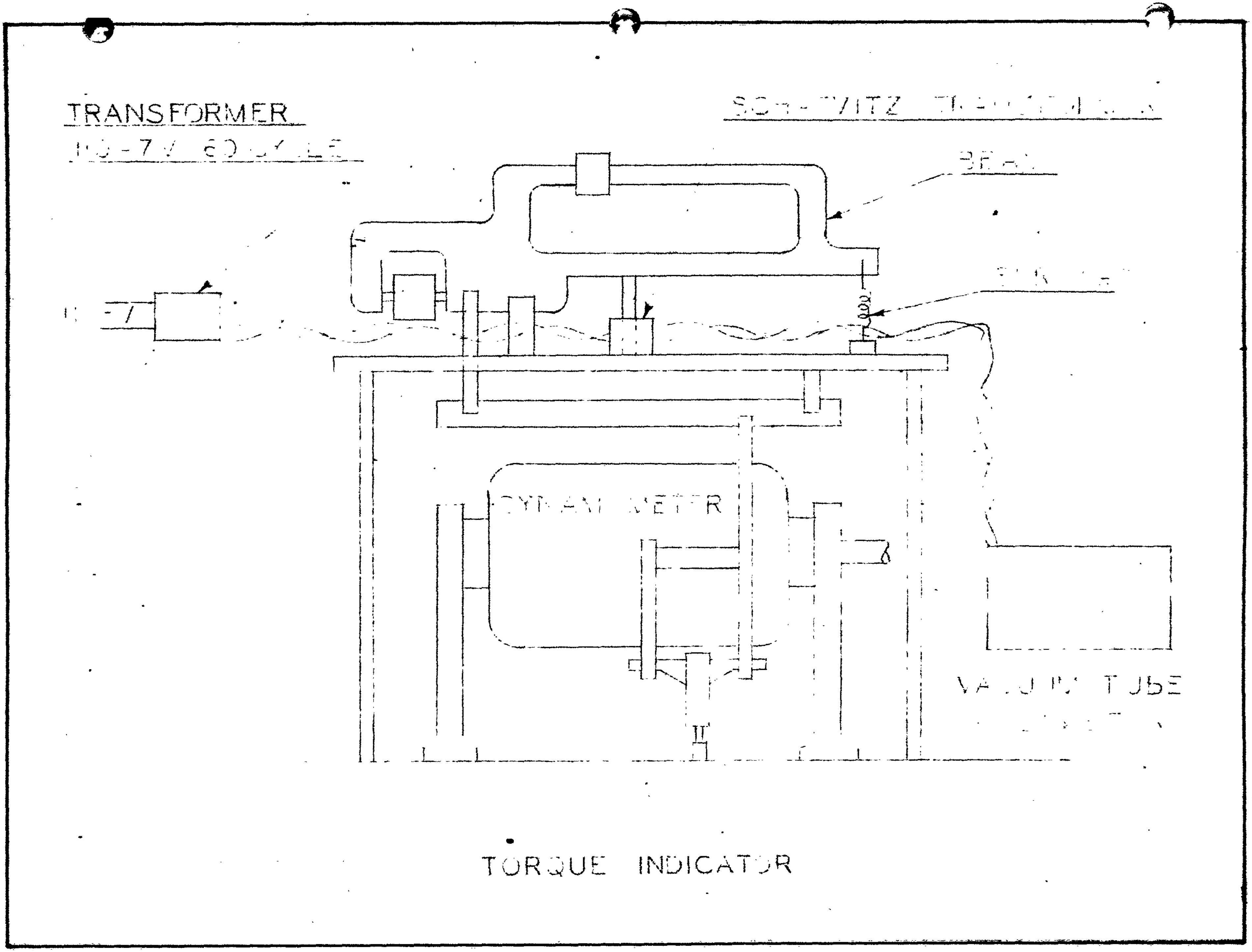
DATE 2-28-51 **DR.** W.K.G. **APPR.** **SCALE** NONE

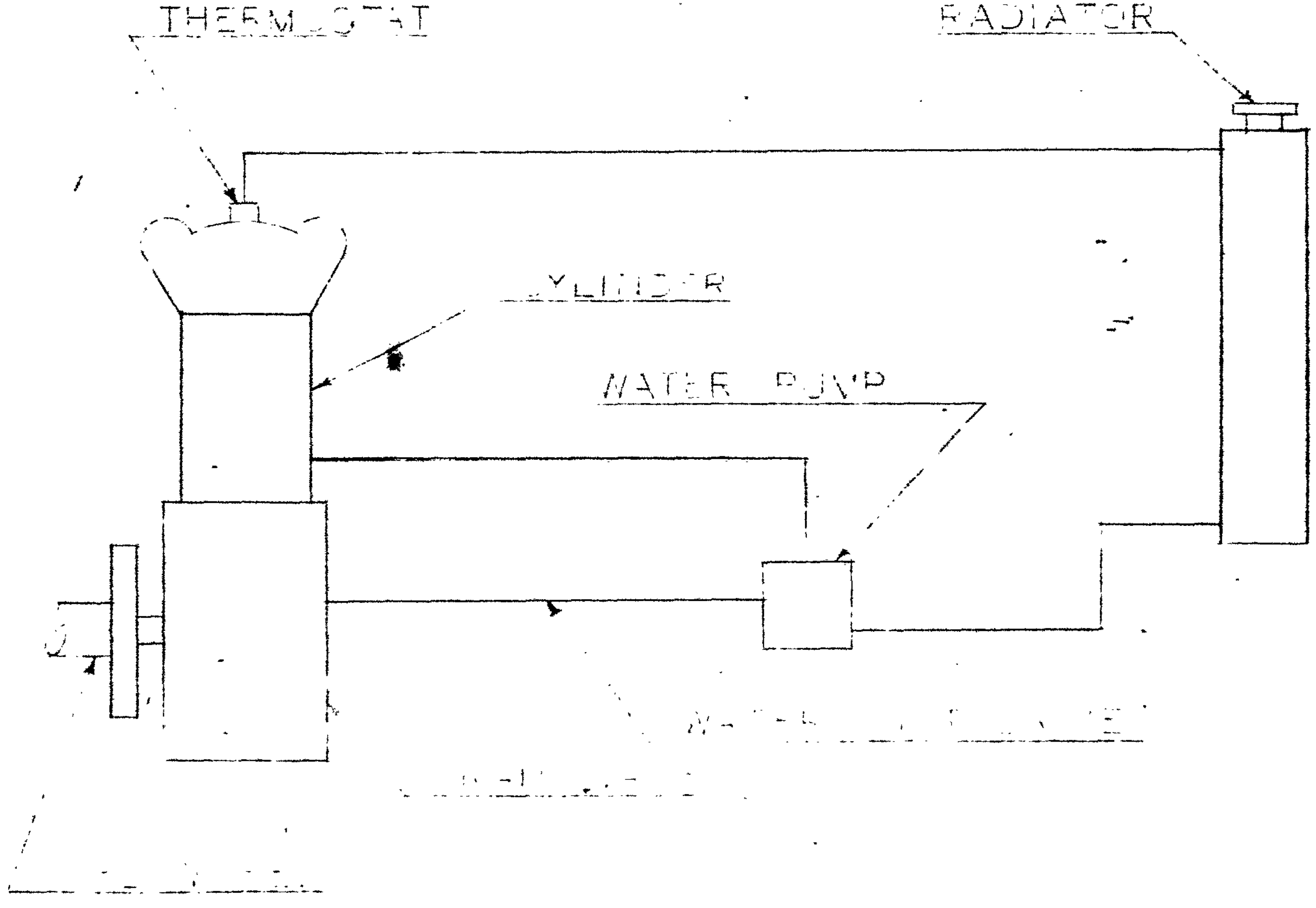
DRWG. NO. 20650

Sketch No. 2

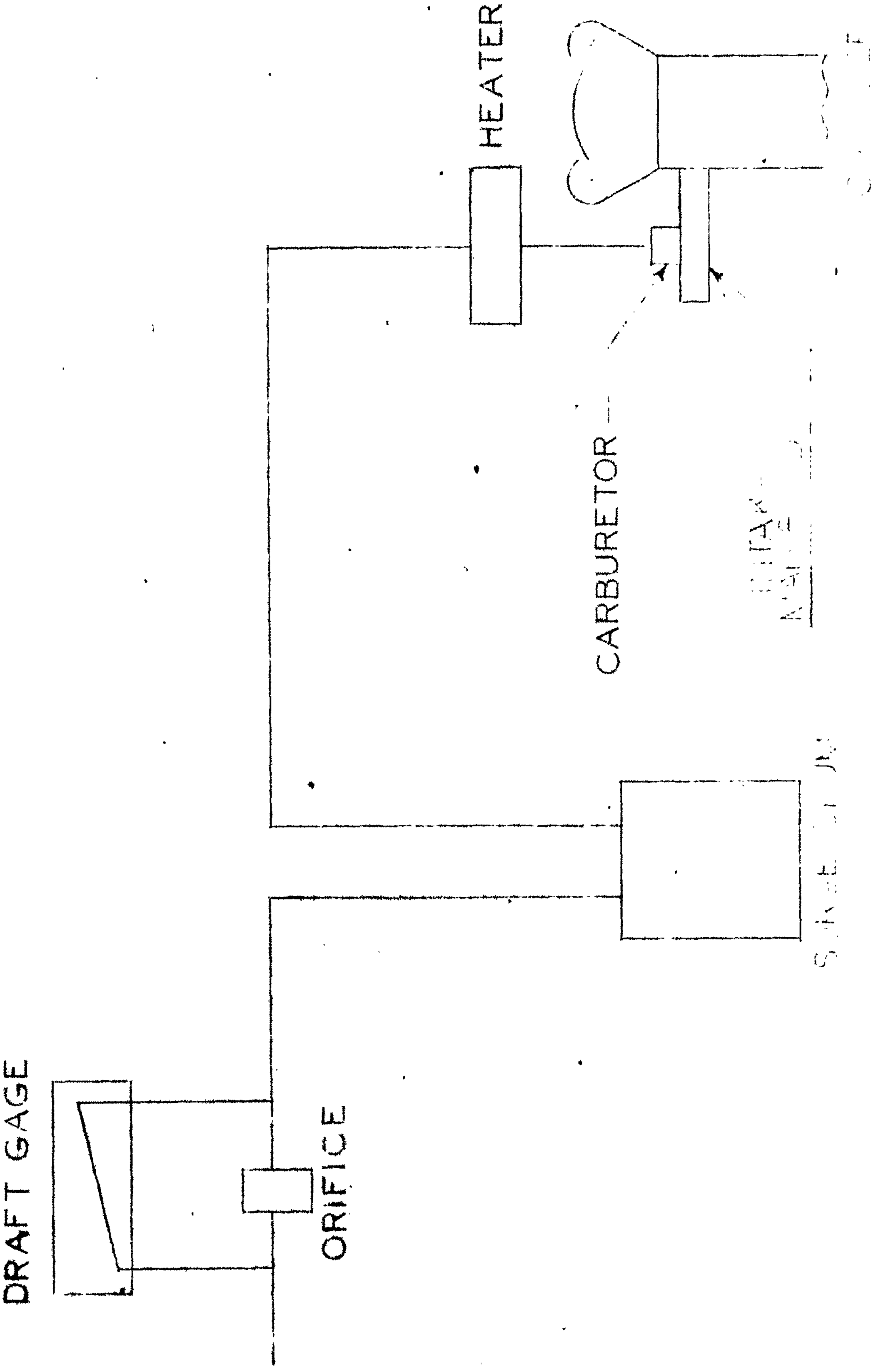

BLOWER DRIVE MOTOR
INSULATED PANELS
BLOWERS - 4 DRIVEN BY ONE MOTOR
REFRIGERATION COILS
ENGINE
INSULATED TEST CELL

Sketch No. 3


TRANSFORMER
110-7V 60 CYCLE
SCHWITZ
BEAM
DYNAMOMETER
VACUUM TUBE
TORQUE INDICATOR

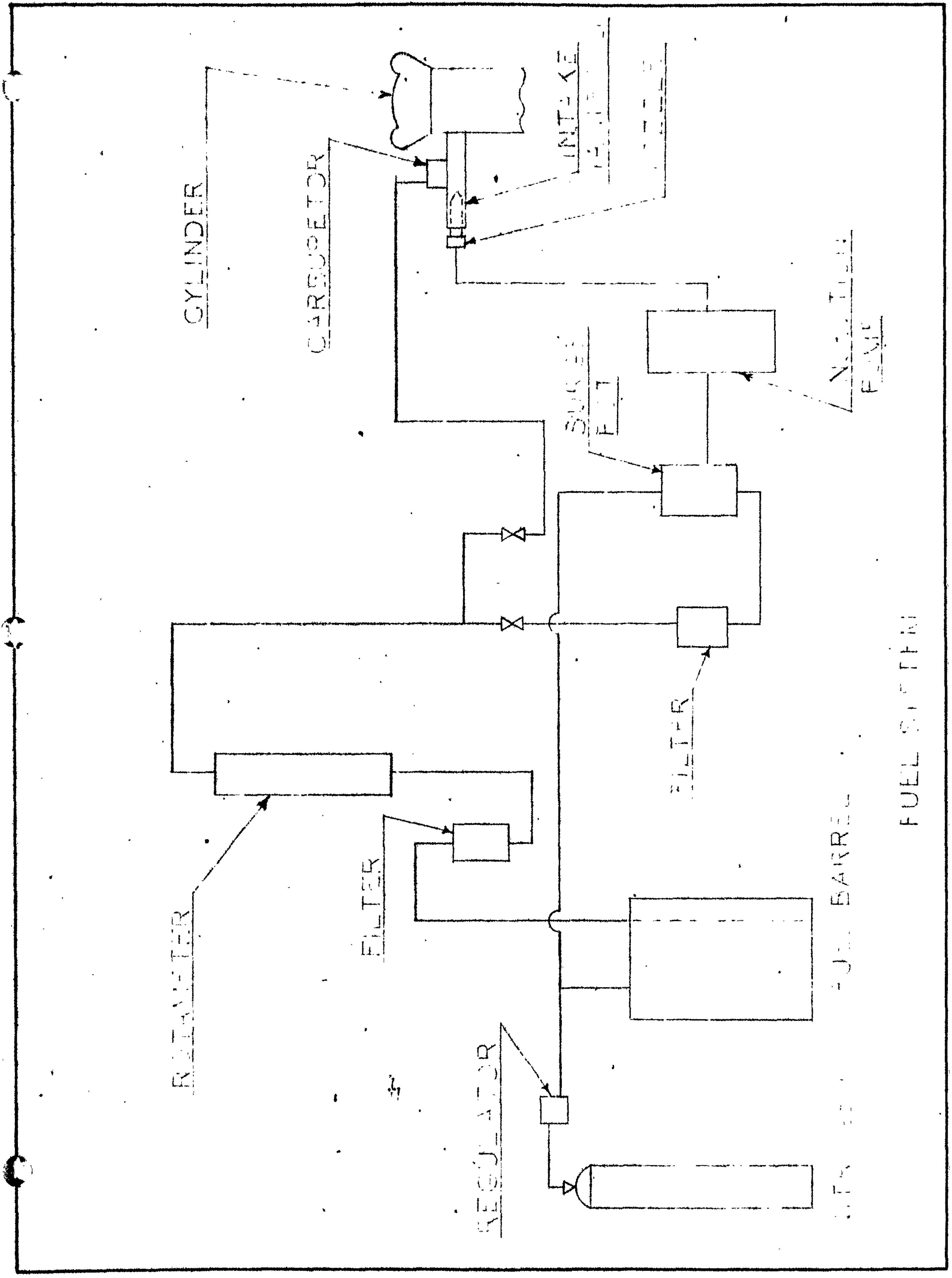

THERMOSTAT
RADIATOR
CYLINDER
WATER PUMP

Sketch No. 5



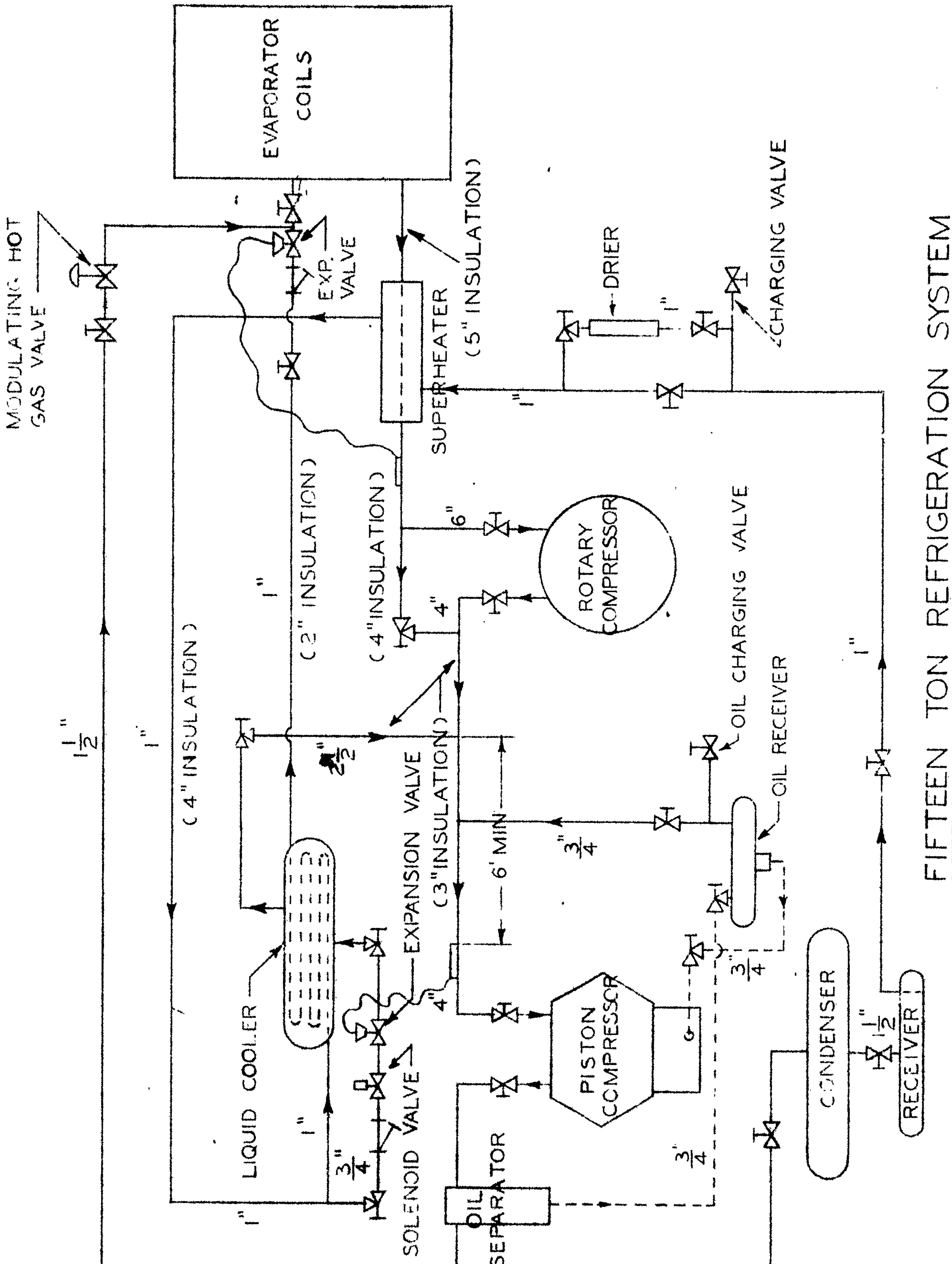
COMBUSTION AIR SYSTEM

Sketch No. 6

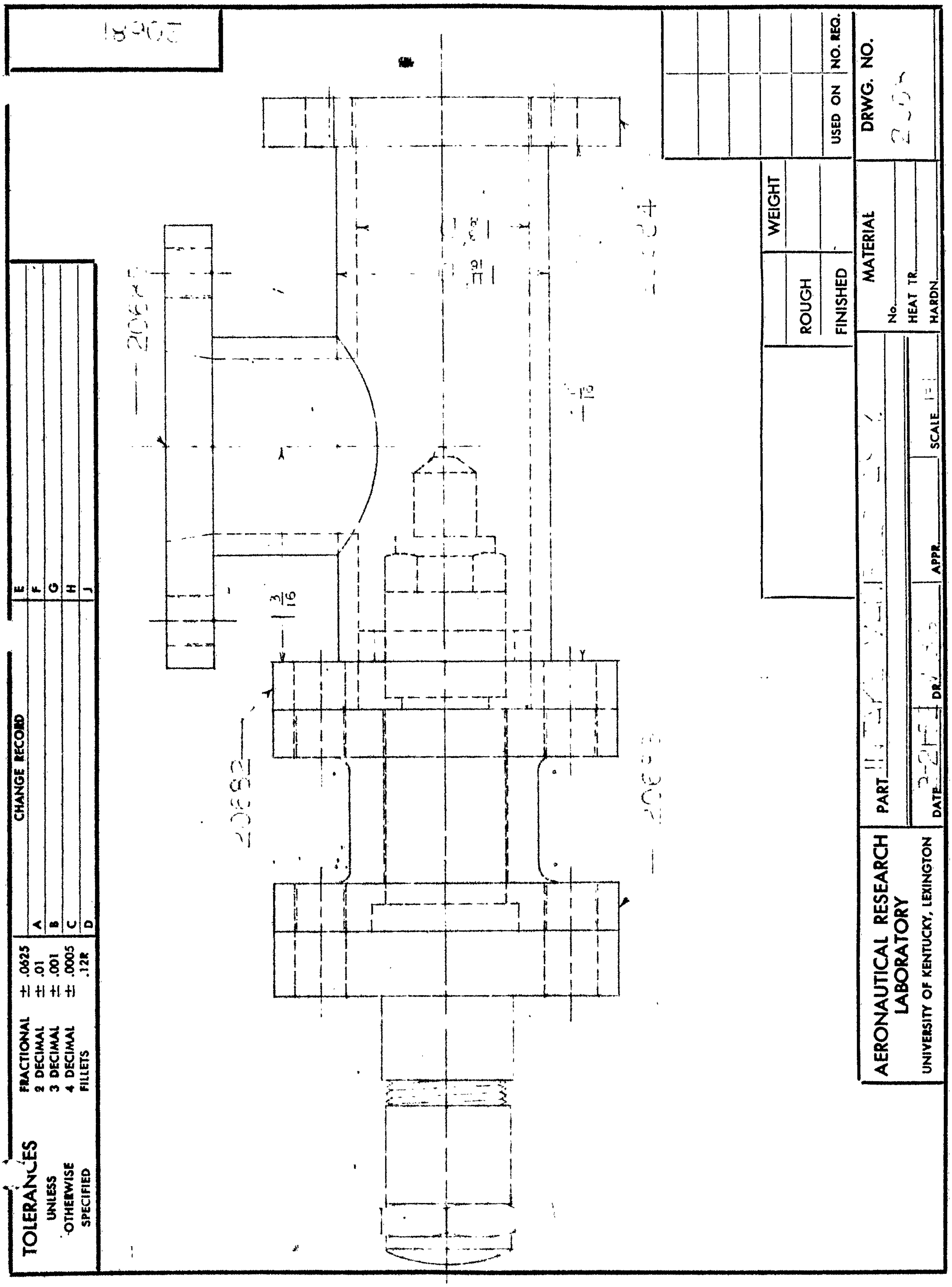


FUEL SYSTEM

Sketch No. 7



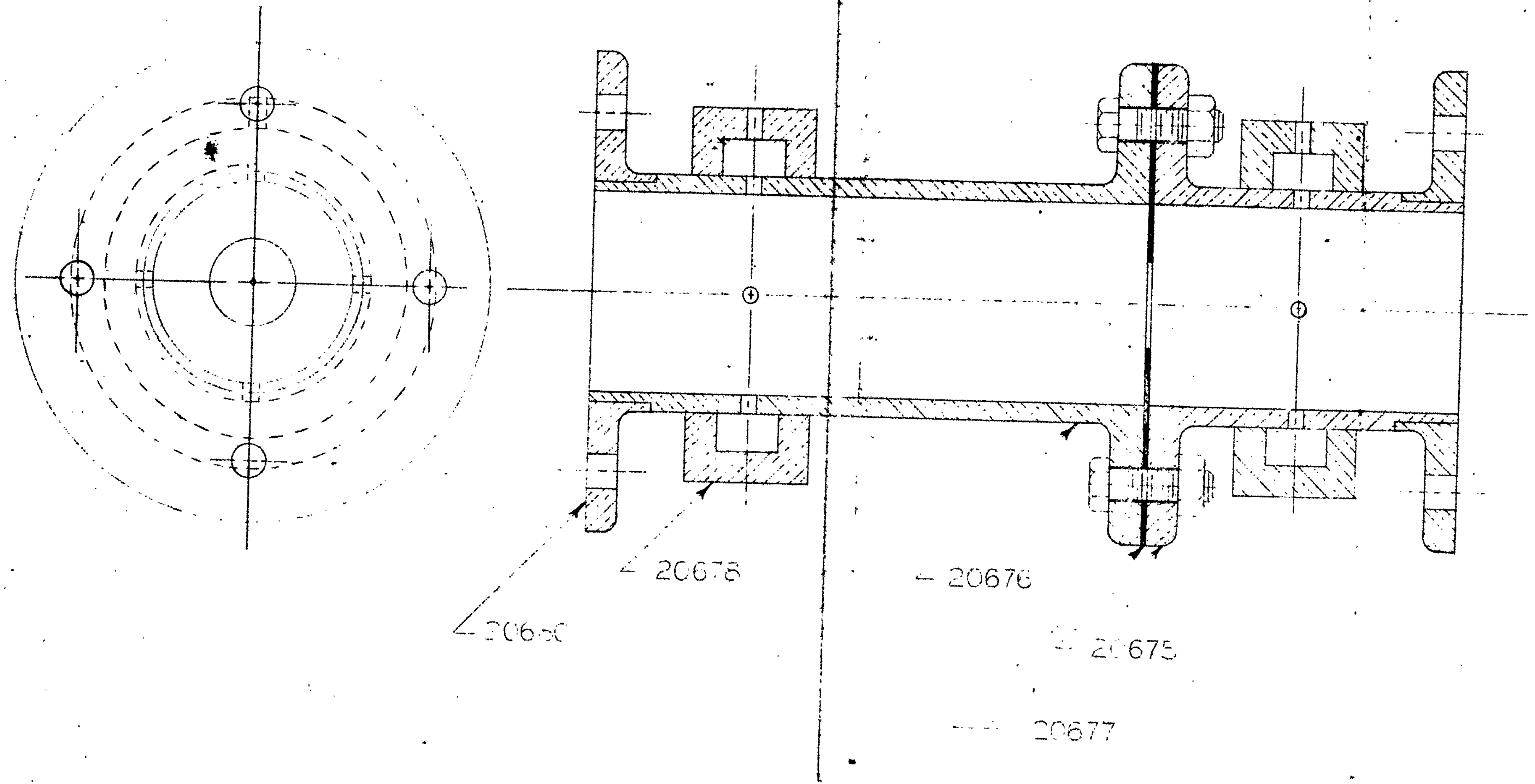
FIFTEEN TON REFRIGERATION SYSTEM



Post No. 173 P.T.M. Geo. G. Feiter

Sketch No. 9

3419



FINISHED	
ROUGH	
WEIGHT	

USED ON	NO. REQ.

AERONAUTICAL RESEARCH LABORATORY
UNIVERSITY OF KENTUCKY, LEXINGTON
PART ORIFICE ASSEMBLY
DATE 7-53 DR. [illegible] APPR. SCALE FULL
MATERIAL
No.
HEAT TR.
HARDN.
DRWG. NO. 3419

LERANCES UNLESS OTHERWISE SPECIFIED			CHANGE RECORD		
FRACTIONAL	± .0625	A		E	
2 DECIMAL	± .01	B		F	
3 DECIMAL	± .001	C		G	
4 DECIMAL	± .0005	D		H	
FILLETS	.12R			J	

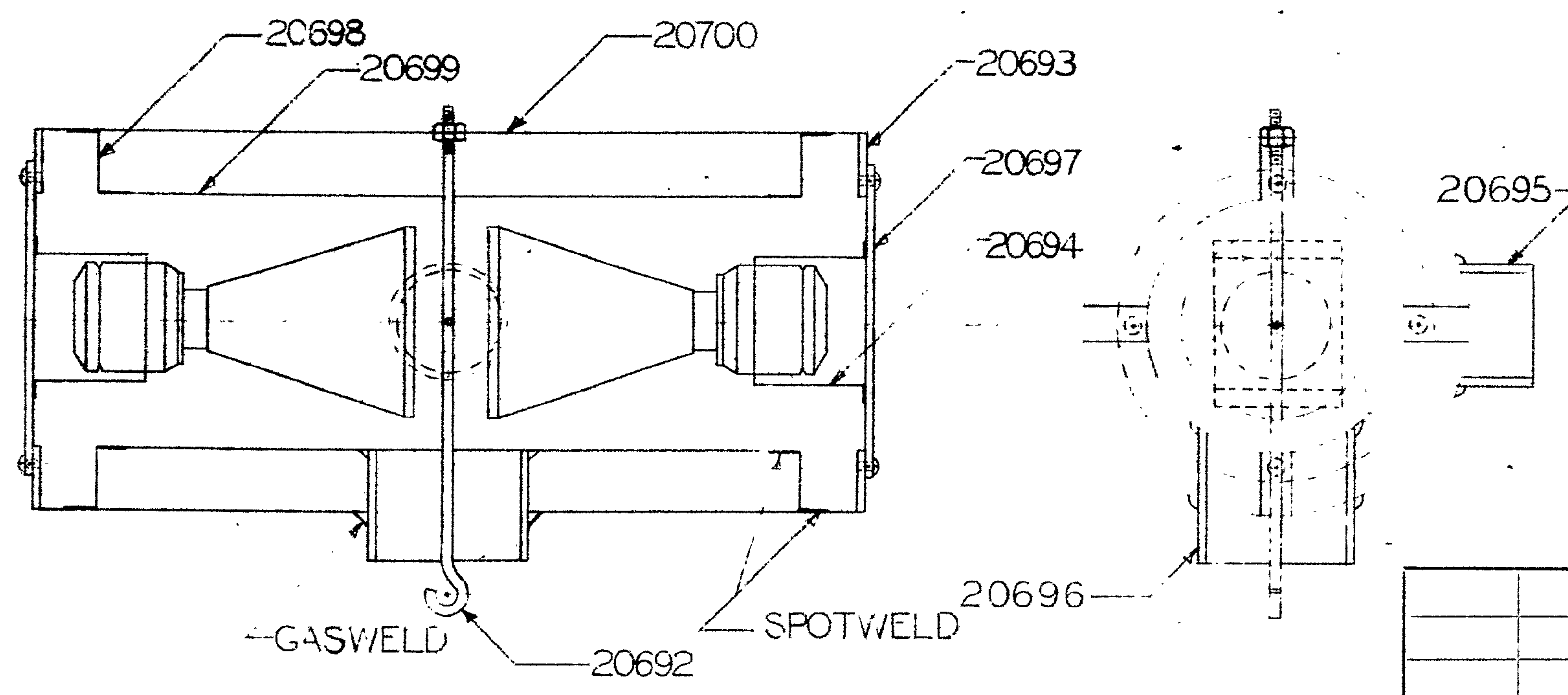
No. 173 P.T.M. Geo. G. Fetter

TOLERANCES UNLESS OTHERWISE SPECIFIED		
	FRACTIONAL	± .0625
	2 DECIMAL	± .01
	3 DECIMAL	± .001
	4 DECIMAL	± .0005
	FILLETS	.12R

CHANGE RECORD	
A	E
B	F
C	G
D	H
	J

20691

Sketch No. 10



	WEIGHT	USED ON	NO. REQ.
ROUGH			
FINISHED			

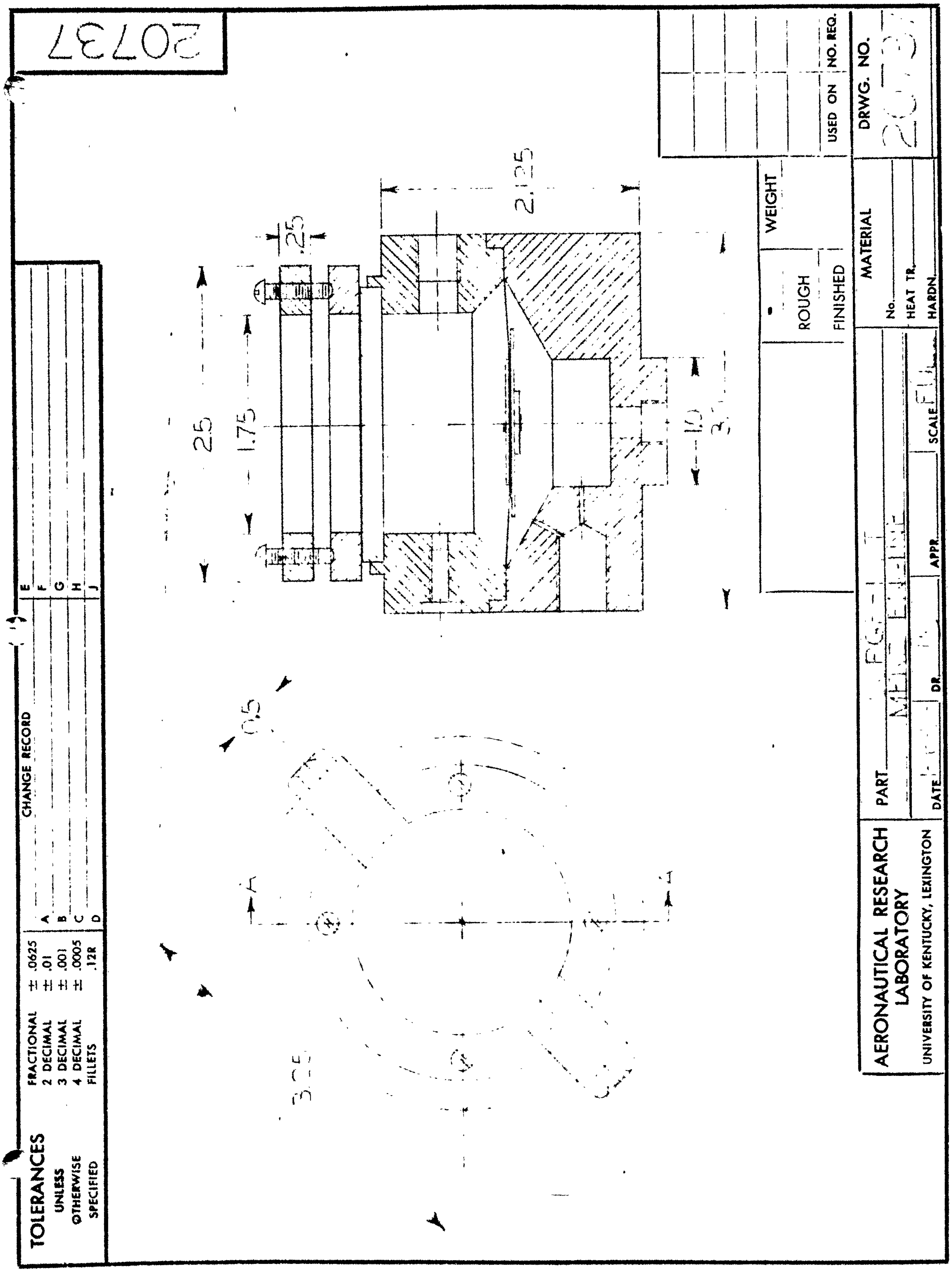
AERONAUTICAL RESEARCH LABORATORY
UNIVERSITY OF KENTUCKY, LEXINGTON

PART CARBURETOR AIR-HEATER
DATE 5-6-52 DR. H.M. APPR. SCALE 3-1"

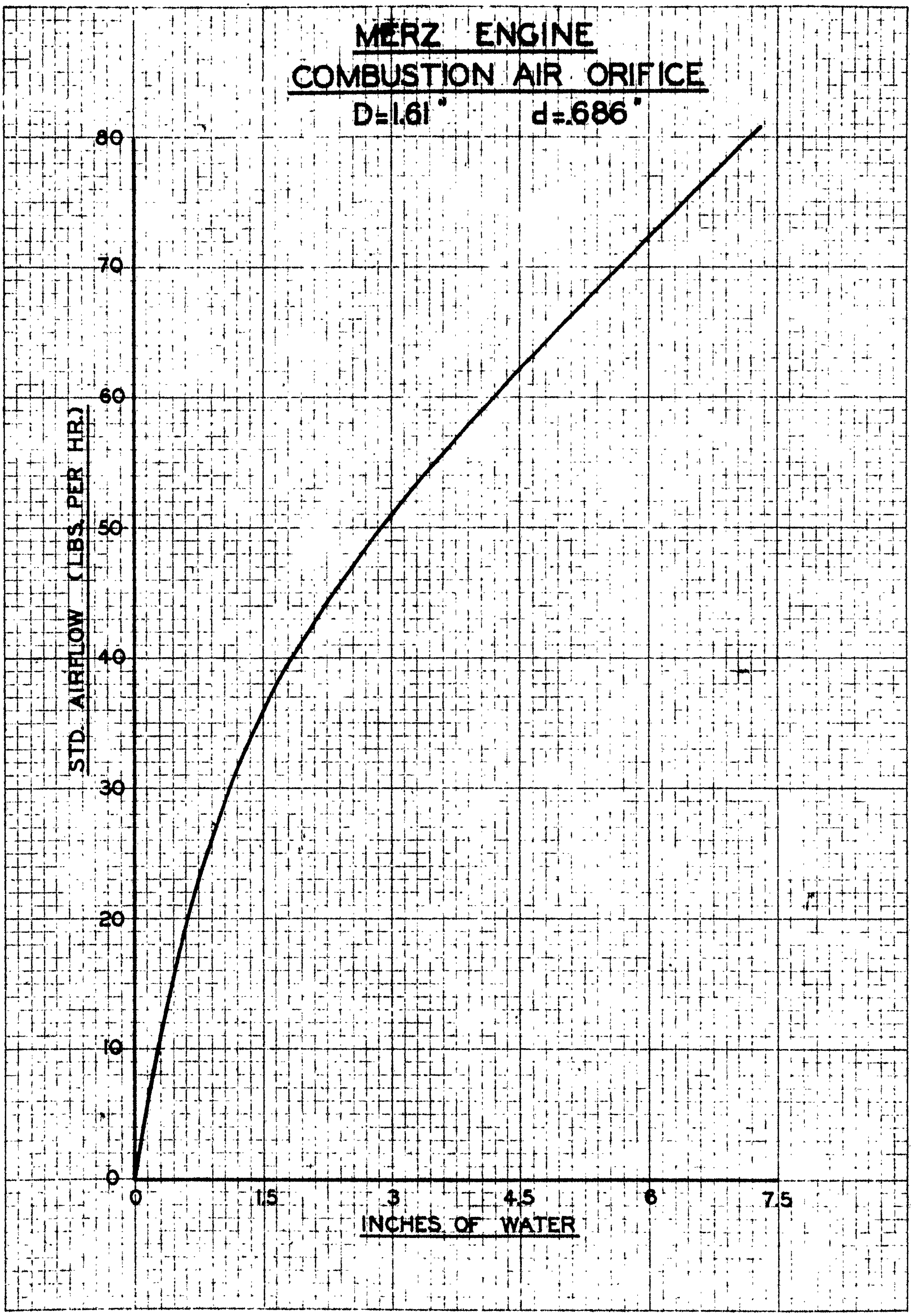
MATERIAL
No.
HEAT TR.
HARDN.

DRWG. NO. 20691

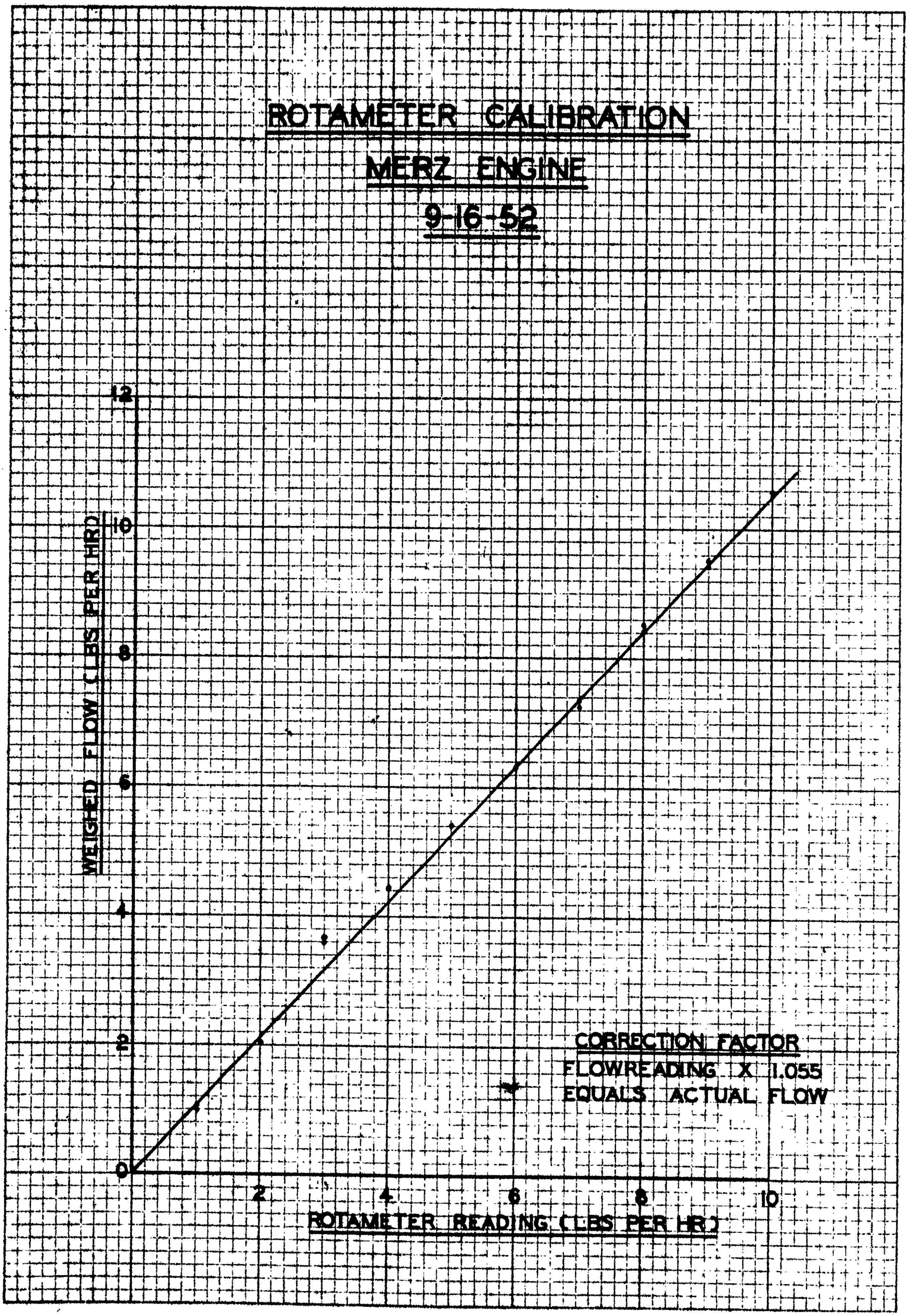
Post No. 173 P.T.M. Geo. G. Fetter


20737
2.125
.25
2.5
1.75
1.0
.05
A
A
TOLERANCES
UNLESS
OTHERWISE
SPECIFIED
FRACTIONAL ± .0625
2 DECIMAL ± .01
3 DECIMAL ± .001
4 DECIMAL ± .0005
FILLETS .12R
CHANGE RECORD
A B C D E F G H J
USED ON
NO. REQ.
DRWG. NO.
WEIGHT
ROUGH
FINISHED
MATERIAL
No.
HEAT TR.
HARDN.
PART FG-1
SCALE FULL
DATE
DR.
APPR.
AERONAUTICAL RESEARCH LABORATORY
UNIVERSITY OF KENTUCKY, LEXINGTON
Post No. 173 P.T.M. Geo G Feller

Curve No. 1



MERZ ENGINE
COMBUSTION AIR ORIFICE
D=1.61" d=.686"

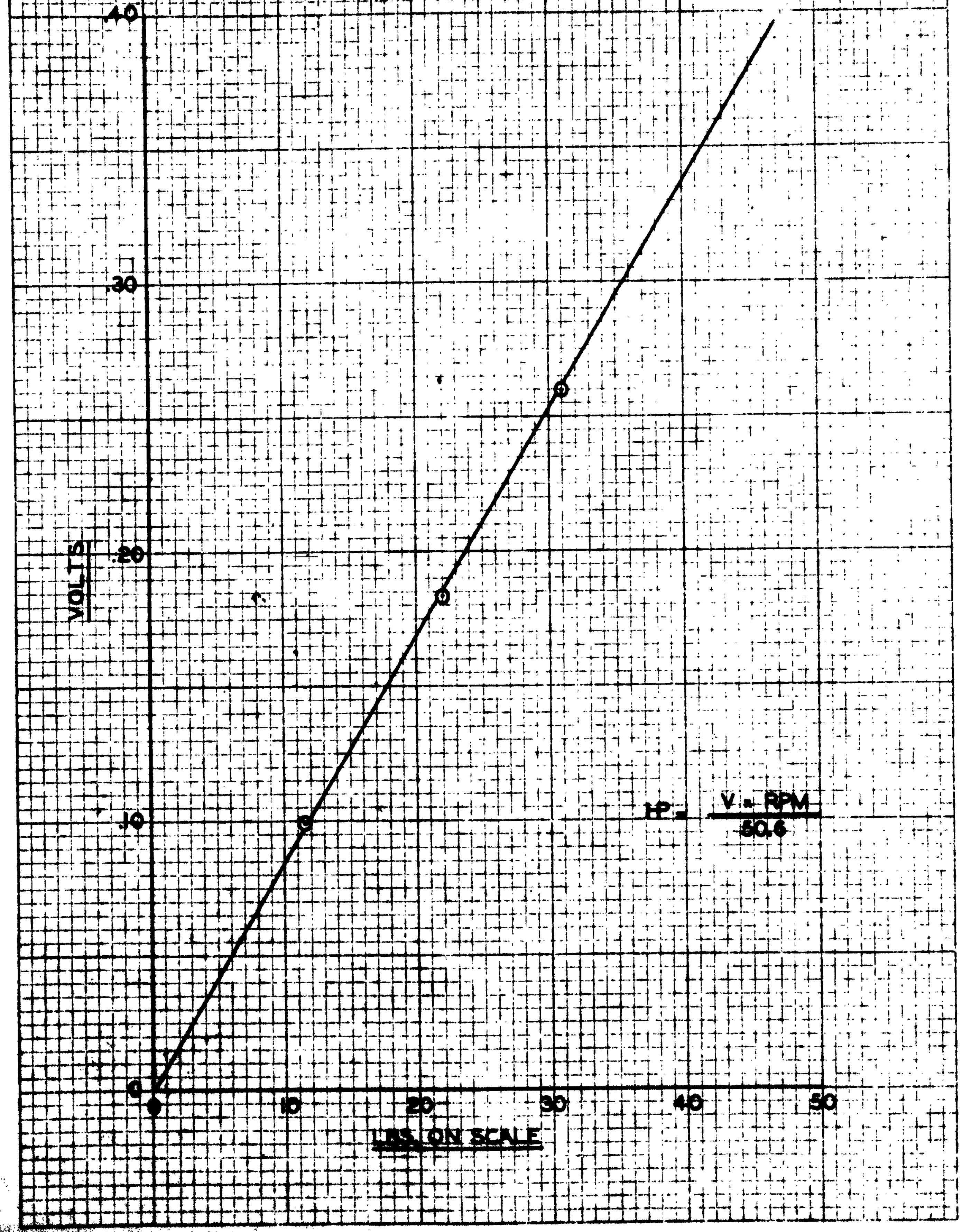


ROTAMETER CALIBRATION
MERZ ENGINE
9-16-52

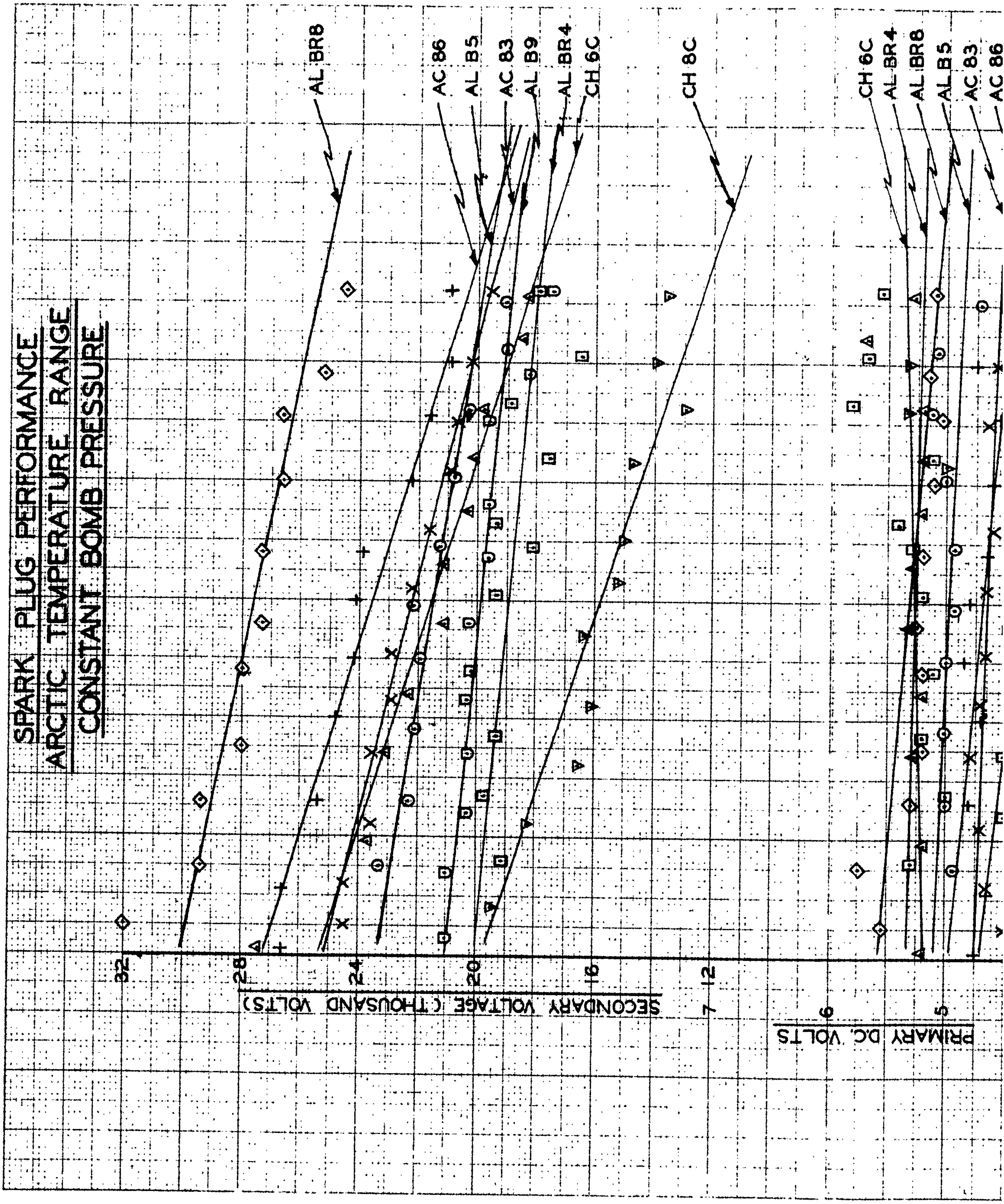
CORRECTION FACTOR
FLOWREADING X 1.055
EQUALS ACTUAL FLOW

Curve No. 5

TORQUE INDICATOR CALIBRATION MERZ ENGINE

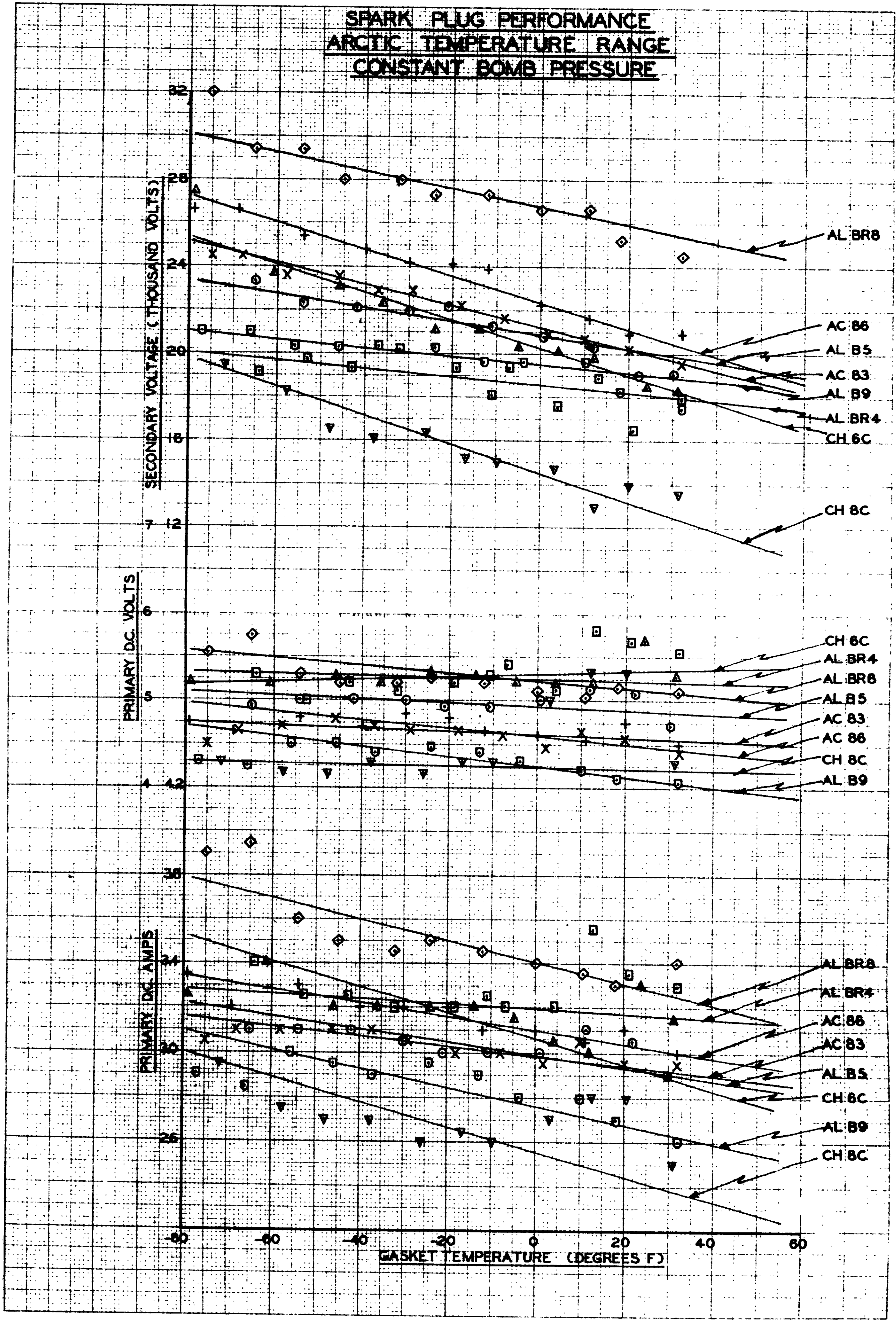


Curve No. 5



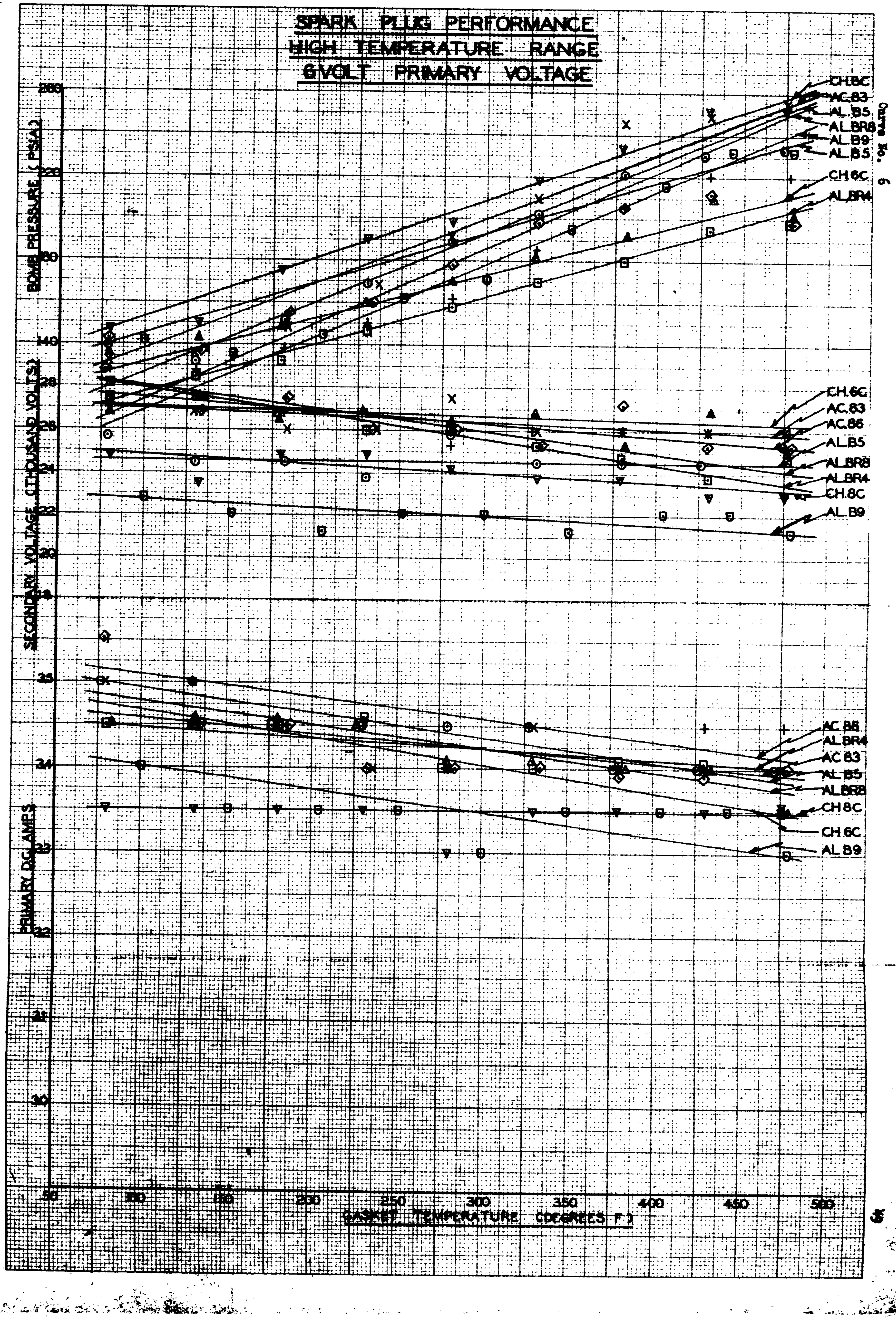
SPARK PLUG PERFORMANCE
ARCTIC TEMPERATURE RANGE
CONSTANT BOMB PRESSURE

SPARK PLUG PERFORMANCE
ARCTIC TEMPERATURE RANGE
CONSTANT BOMB PRESSURE

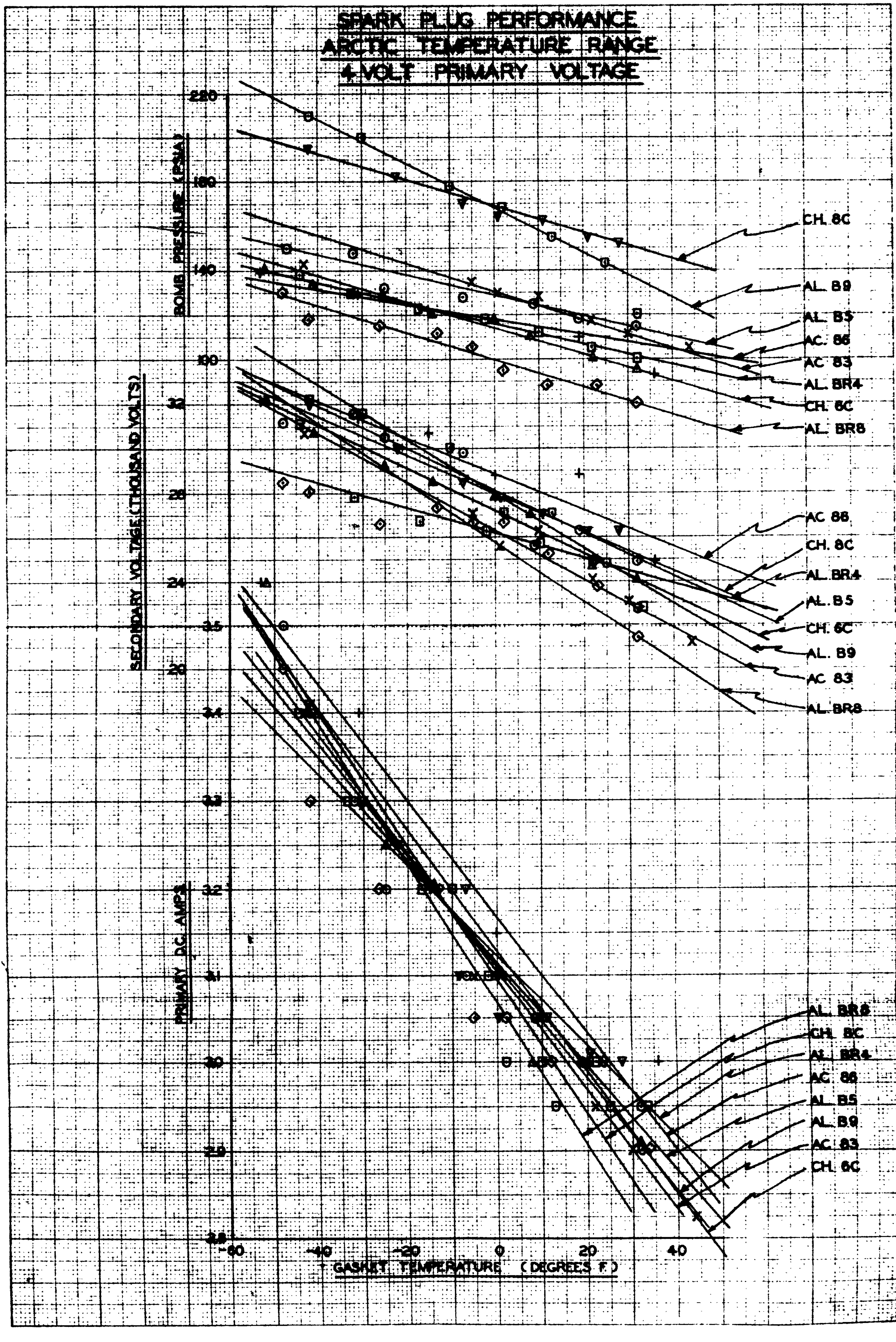


Curve No. 5

SPARK PLUG PERFORMANCE
HIGH TEMPERATURE RANGE
6VOLT PRIMARY VOLTAGE

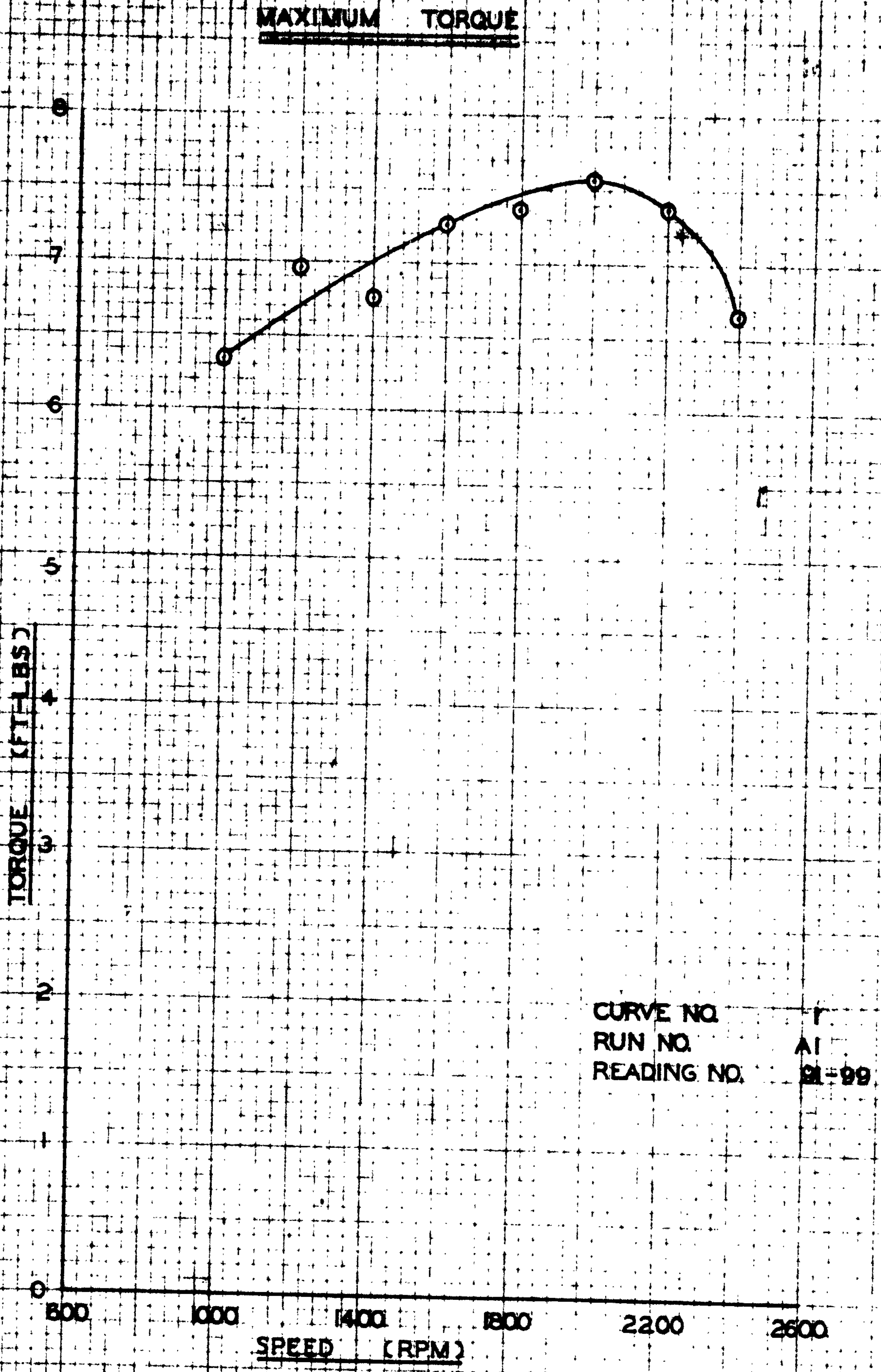


Curve No. 4

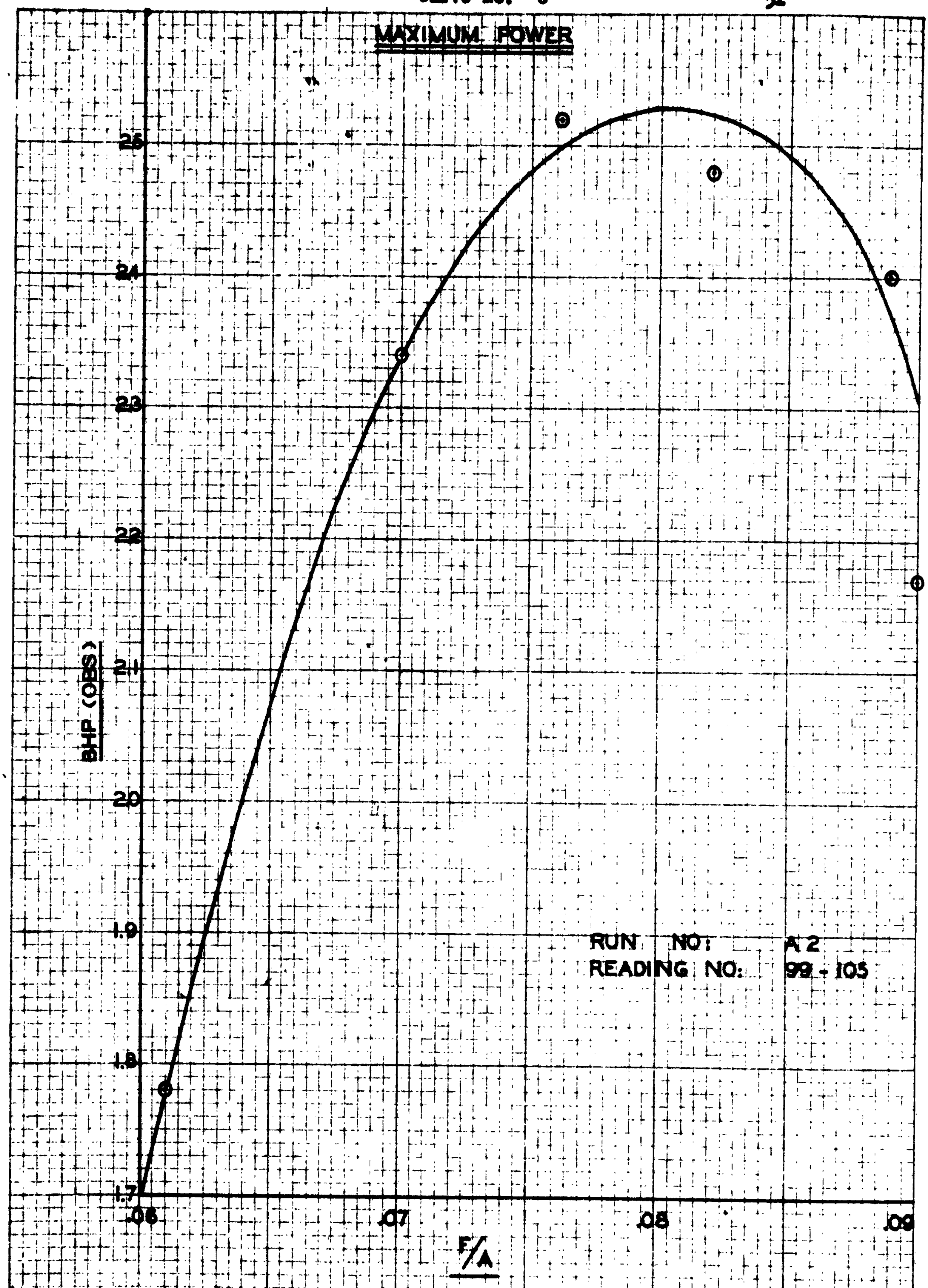


SPARK PLUG PERFORMANCE
ARCTIC TEMPERATURE RANGE
4 VOLT PRIMARY VOLTAGE

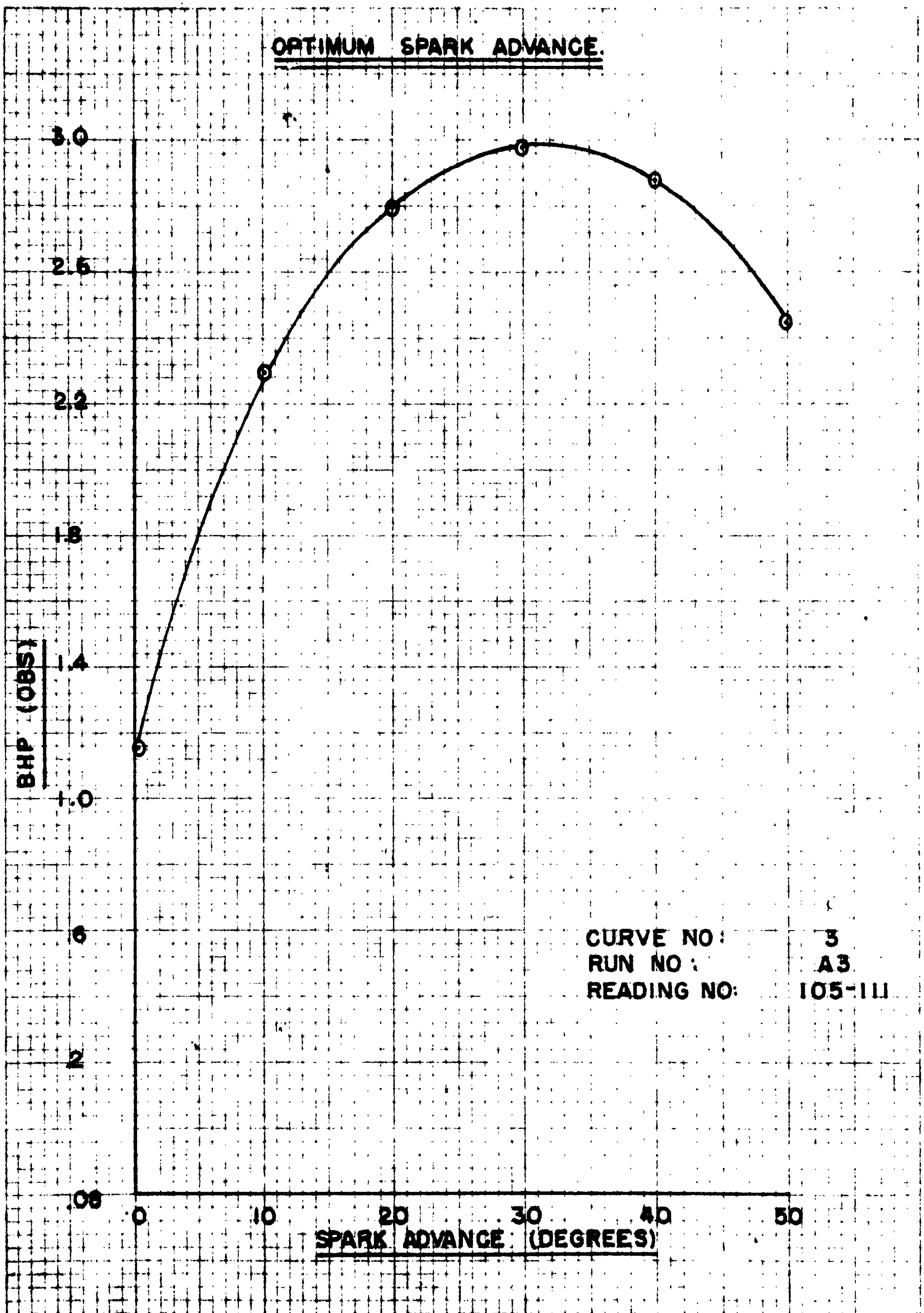
Curve No. 7


MAXIMUM TORQUE
8
7
6
5
4
3
2
1
0
TORQUE (FT-LBS)
800
1000
1400
1800
2200
2600
SPEED (RPM)
CURVE NO. 7
RUN NO. A1
READING NO. 91-99

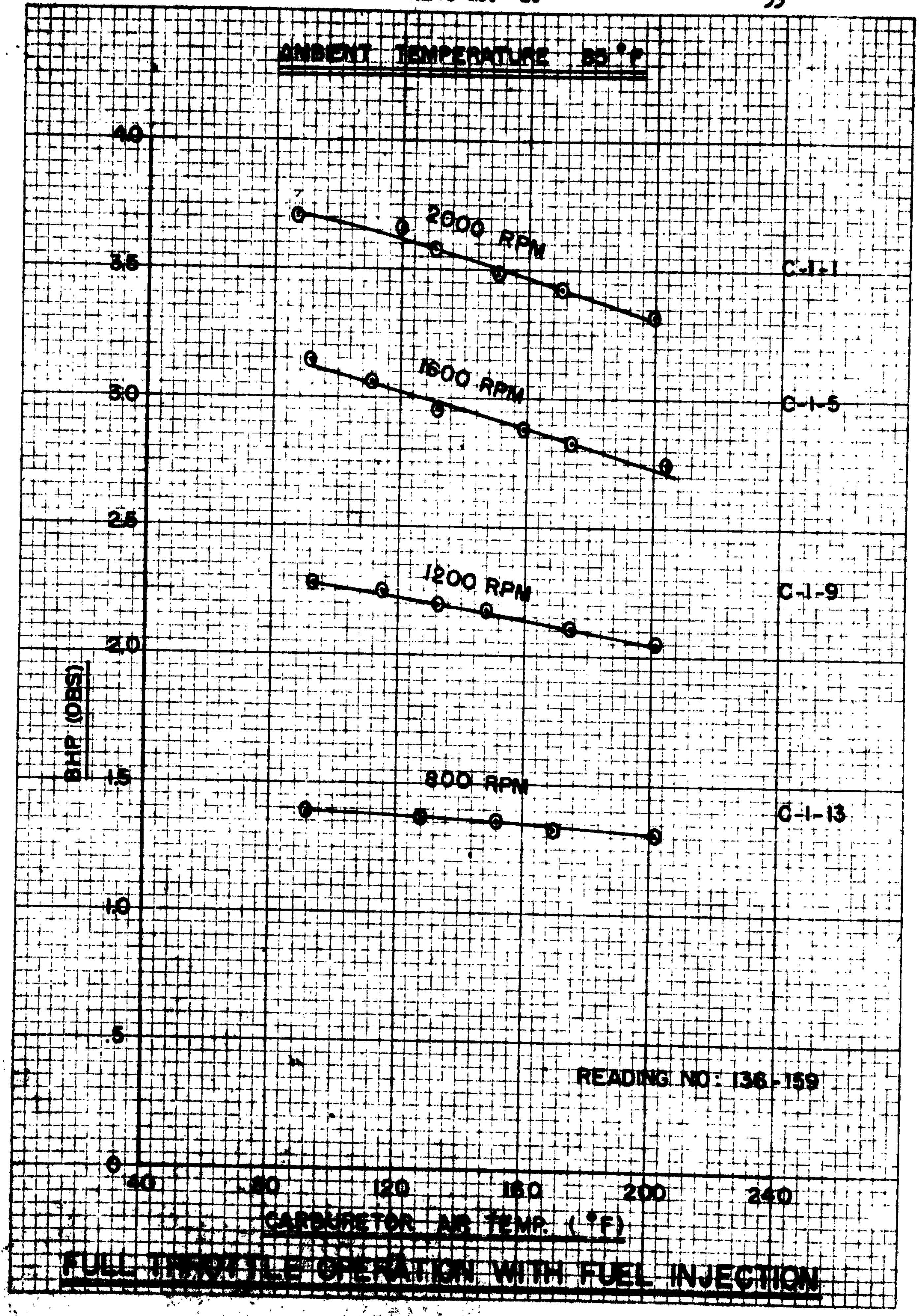
Curve No. 8


MAXIMUM POWER
BHP (OBS)
25
24
23
22
21
2.0
1.9
1.8
1.7
.06
.07
.08
.09
F/A
RUN NO: A 2
READING NO: 99 - 105

Curve No. 9


OPTIMUM SPARK ADVANCE.
3.0
2.6
2.2
1.8
1.4
1.0
.6
.2
.08
BHP (OBS)
0
10
20
30
40
50
SPARK ADVANCE (DEGREES)
CURVE NO: 3
RUN NO: A3
READING NO: 105-111

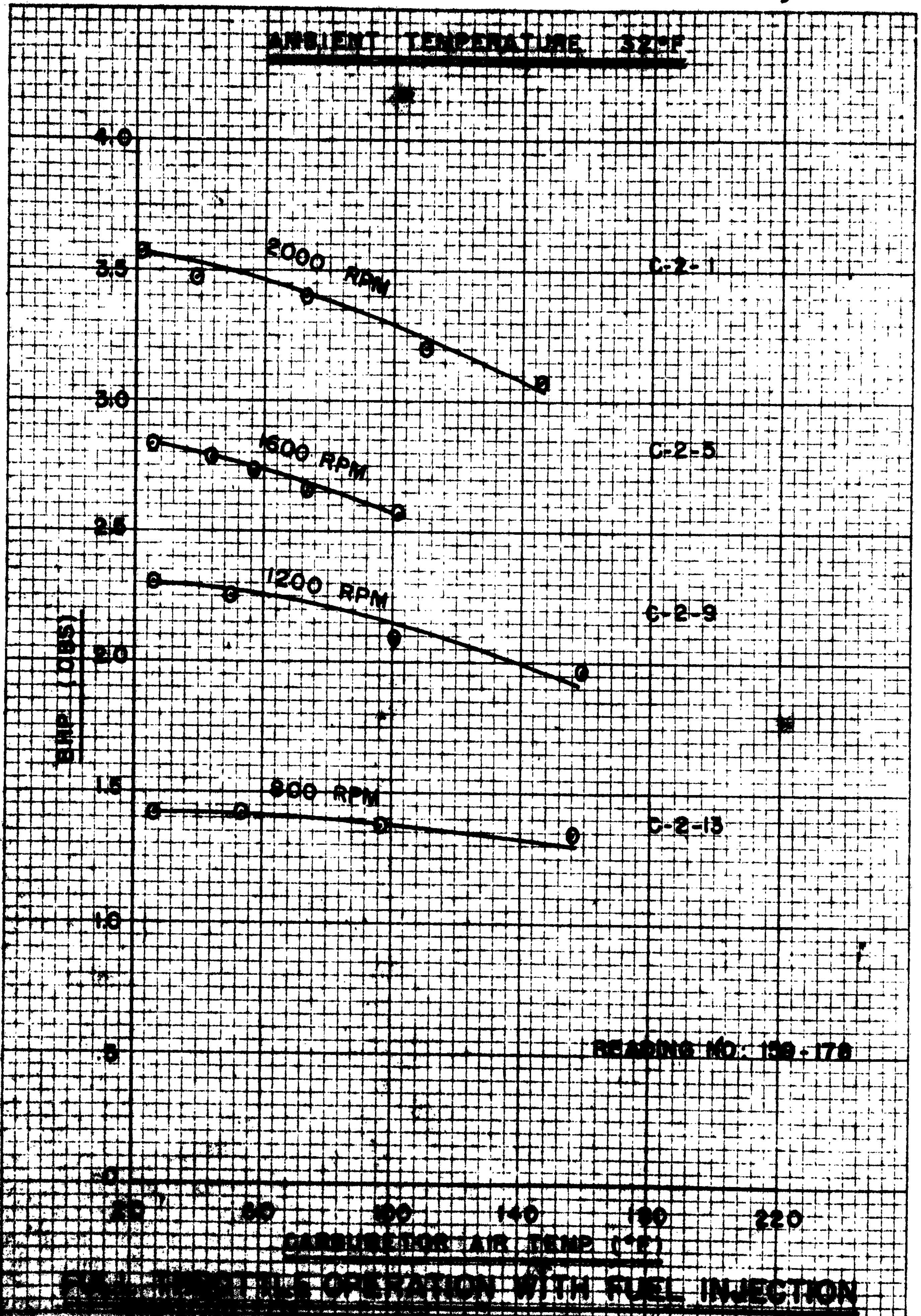
Curve No. 10



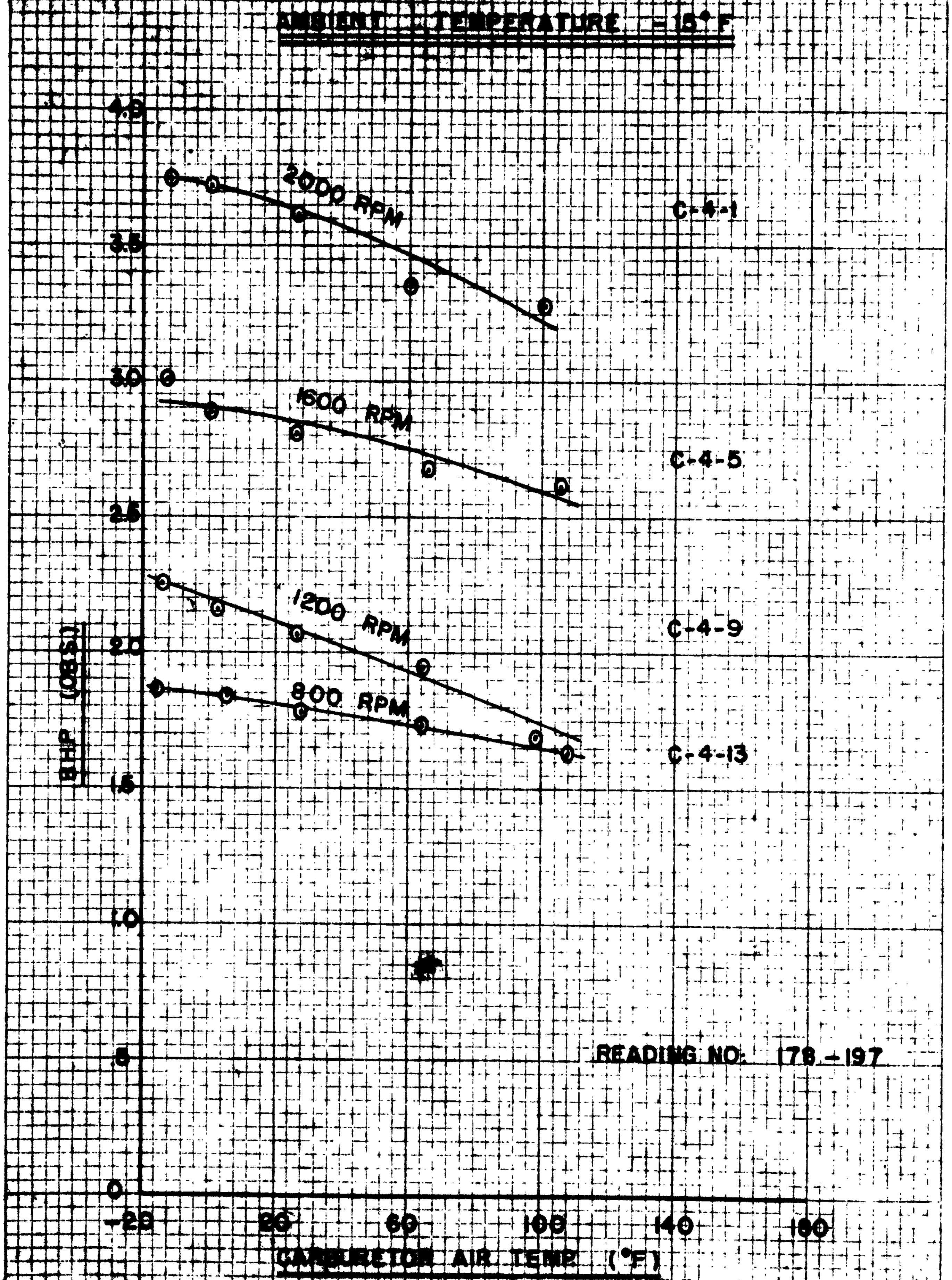
AMBIENT TEMPERATURE 85 °F

FULL THROTTLE OPERATION WITH FUEL INJECTION

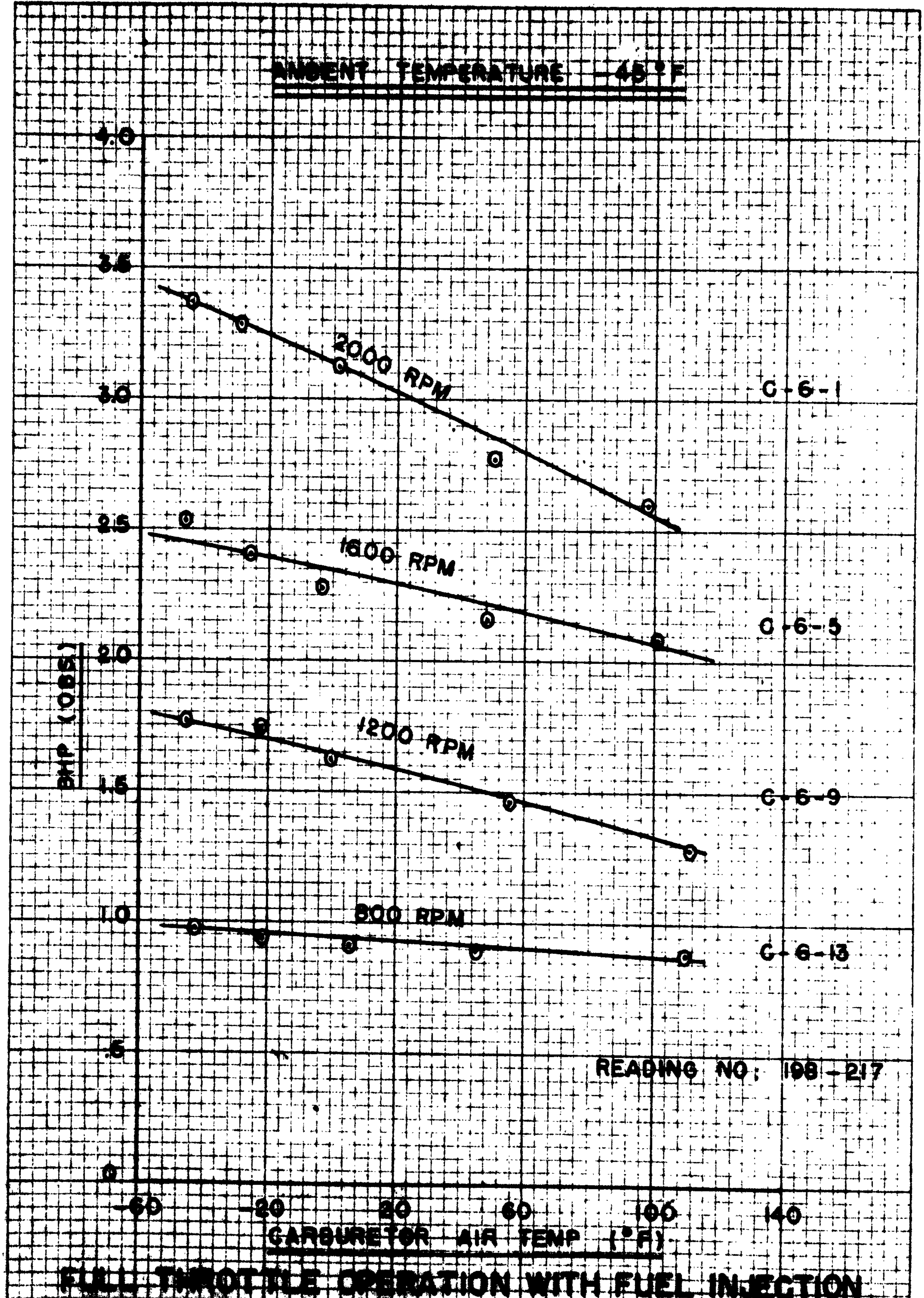
AMBIENT TEMPERATURE 32°F



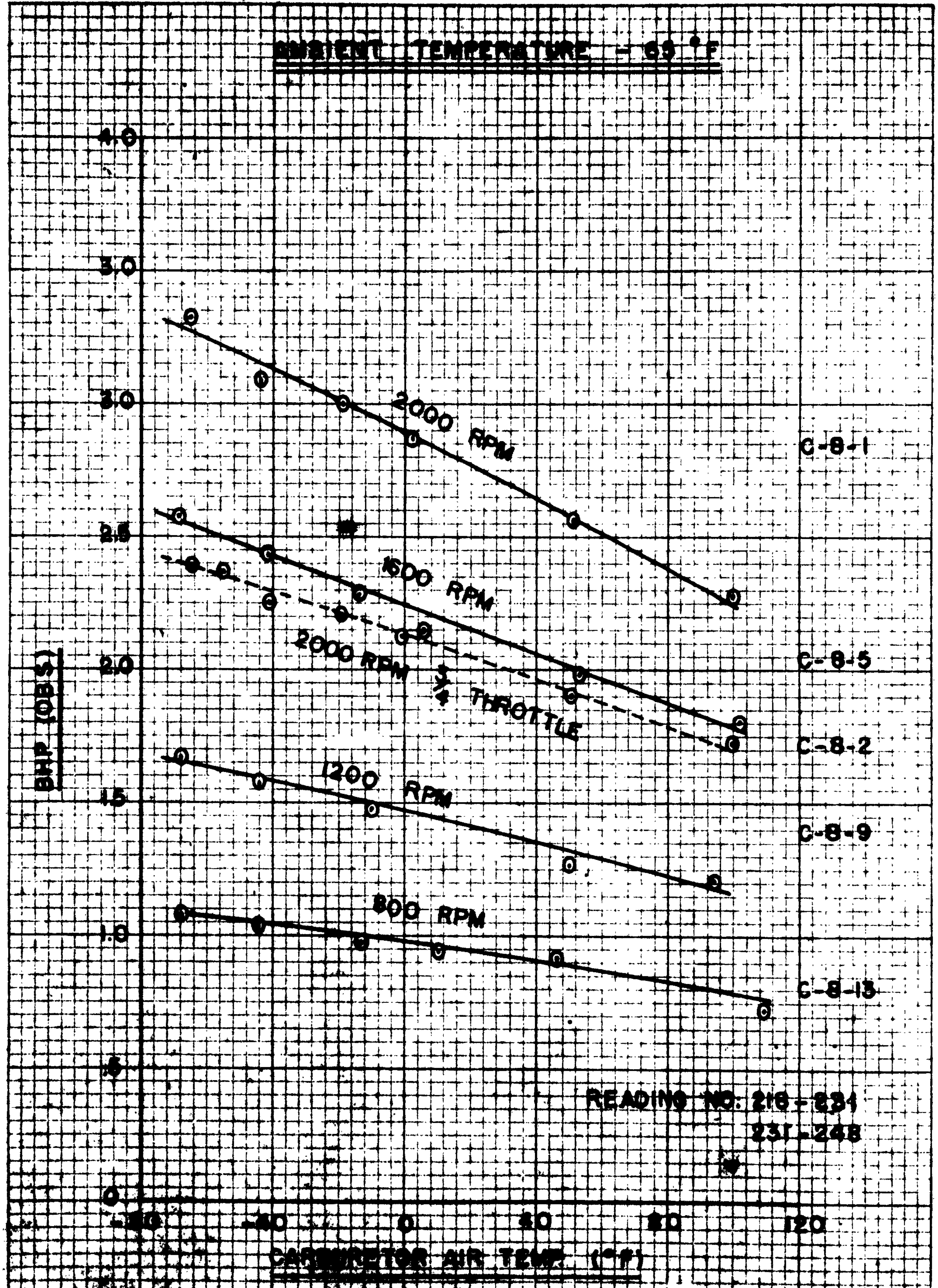
FULL THROTTLE OPERATION WITH FUEL INJECTION



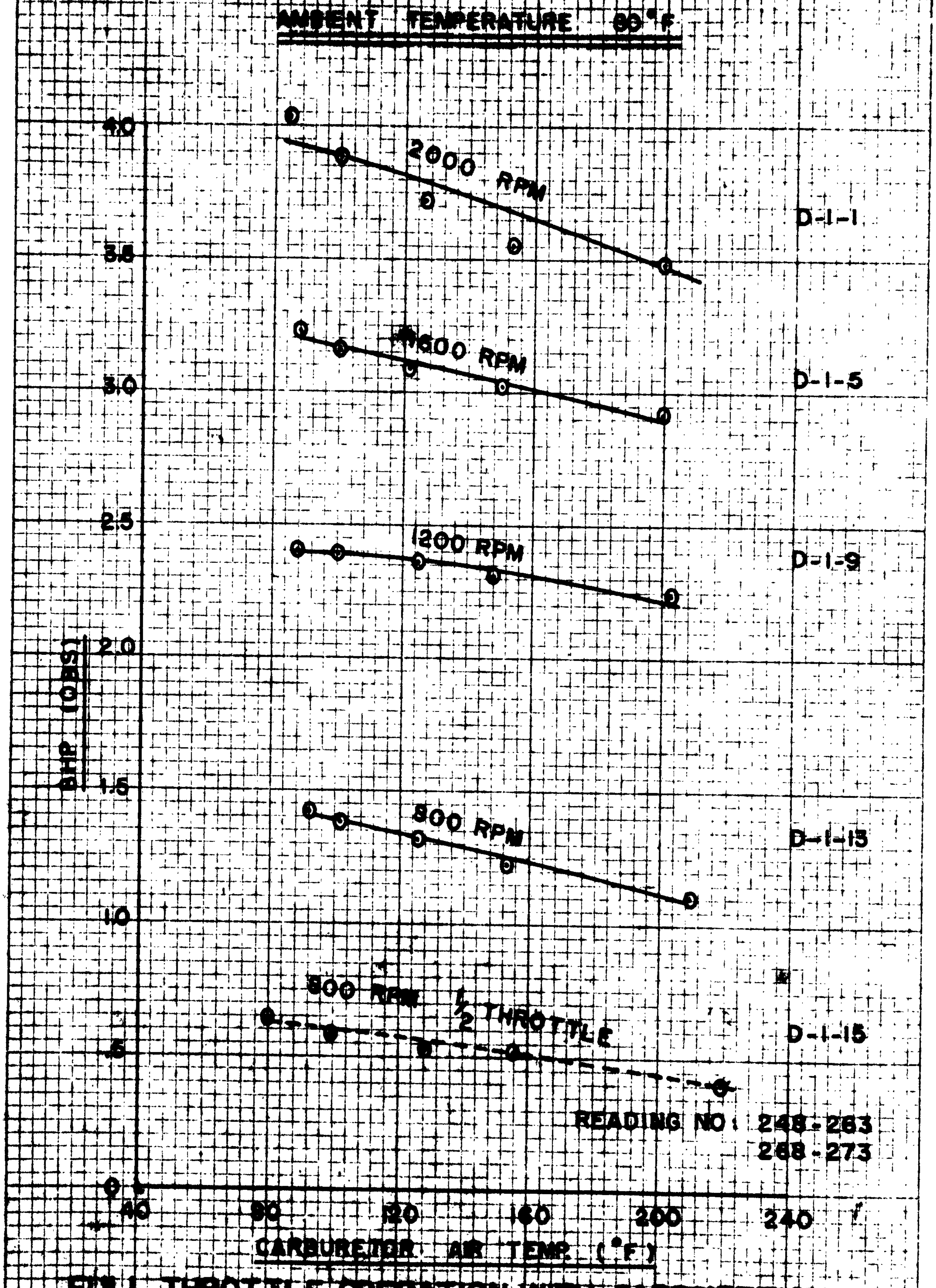
FULL THROTTLE OPERATION WITH FUEL INJECTION



FULL THROTTLE OPERATION WITH FUEL INJECTION

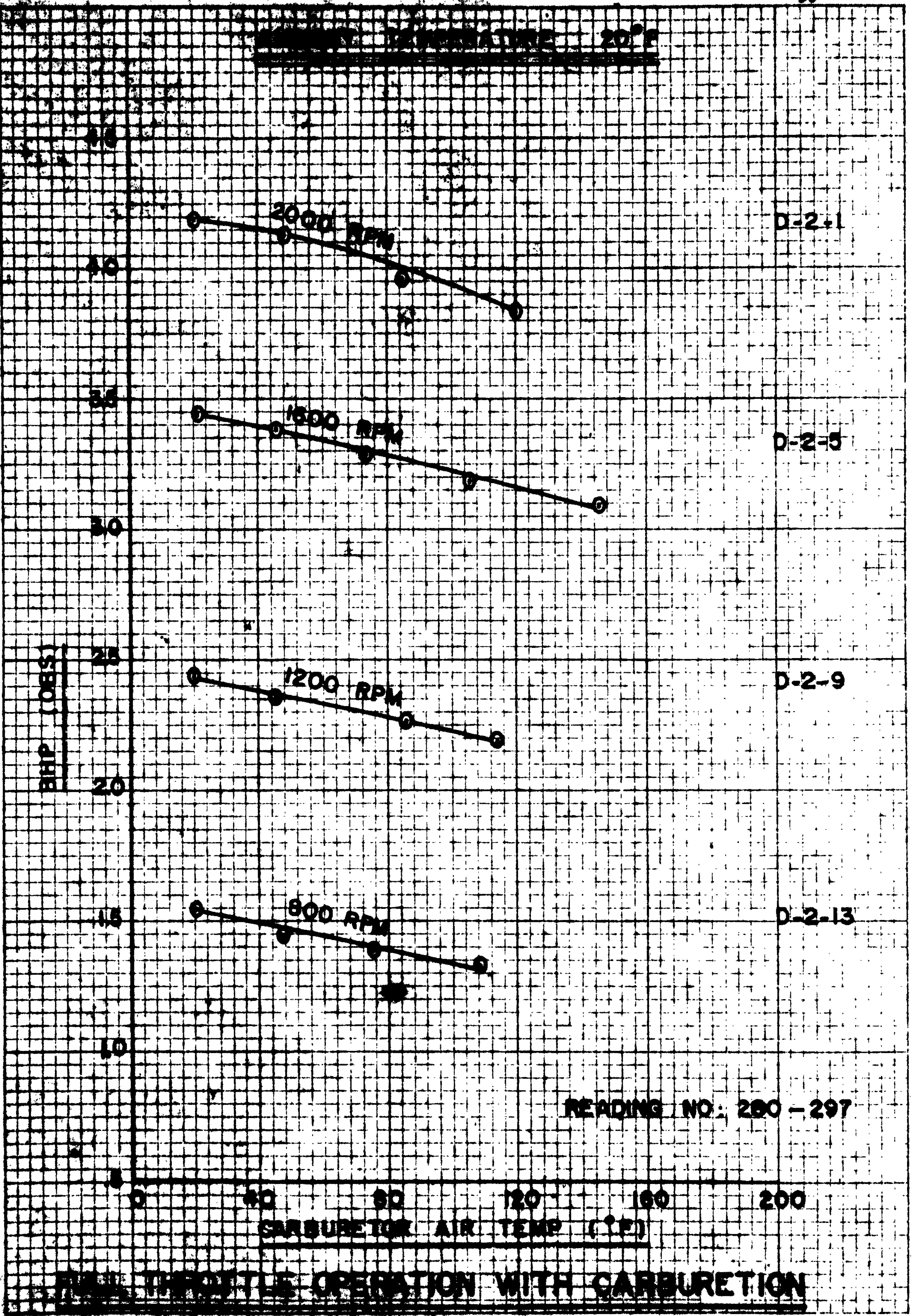


FULL THROTTLE OPERATION WITH FUEL INJECTION

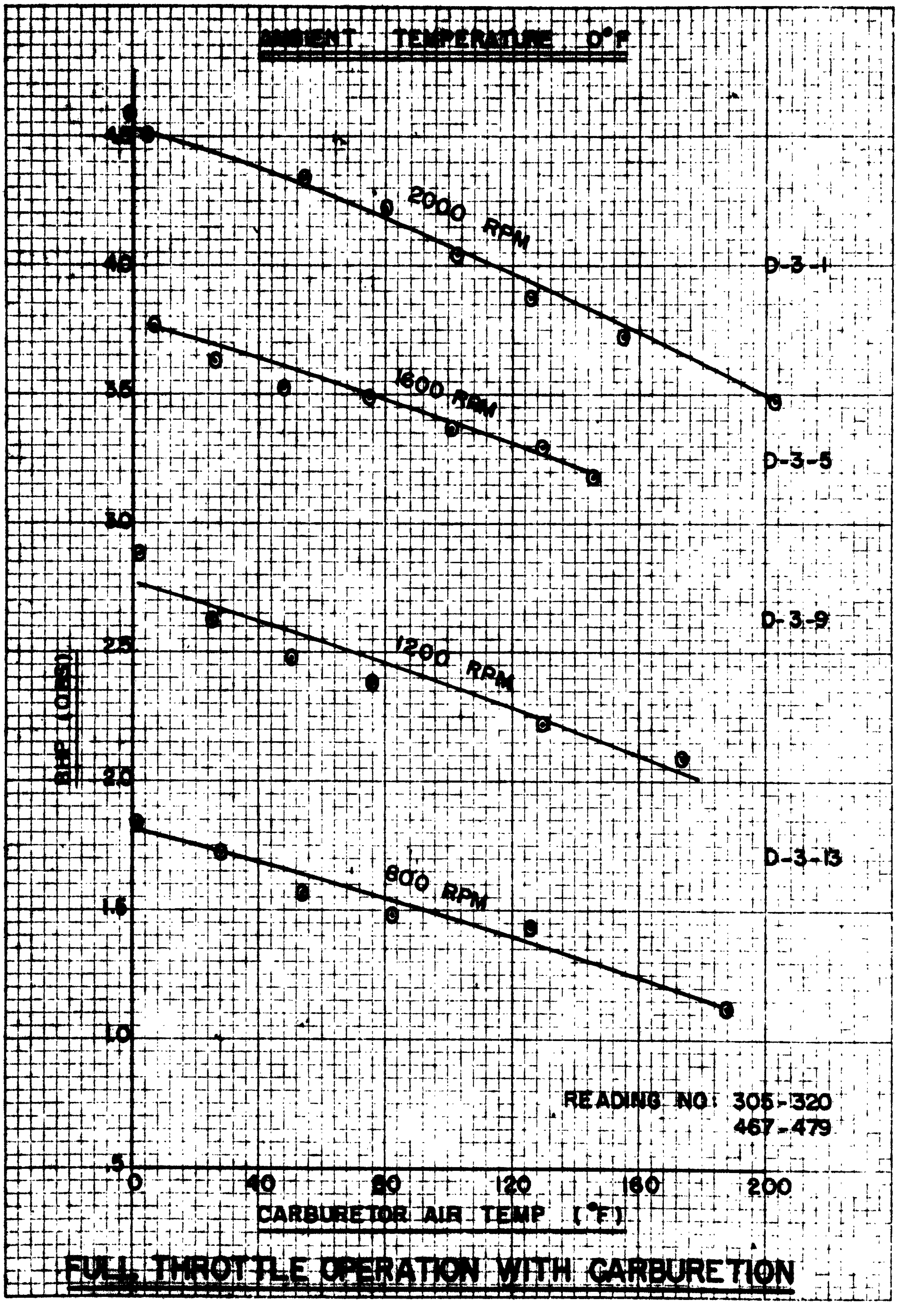


AMBIENT TEMPERATURE 80 °F

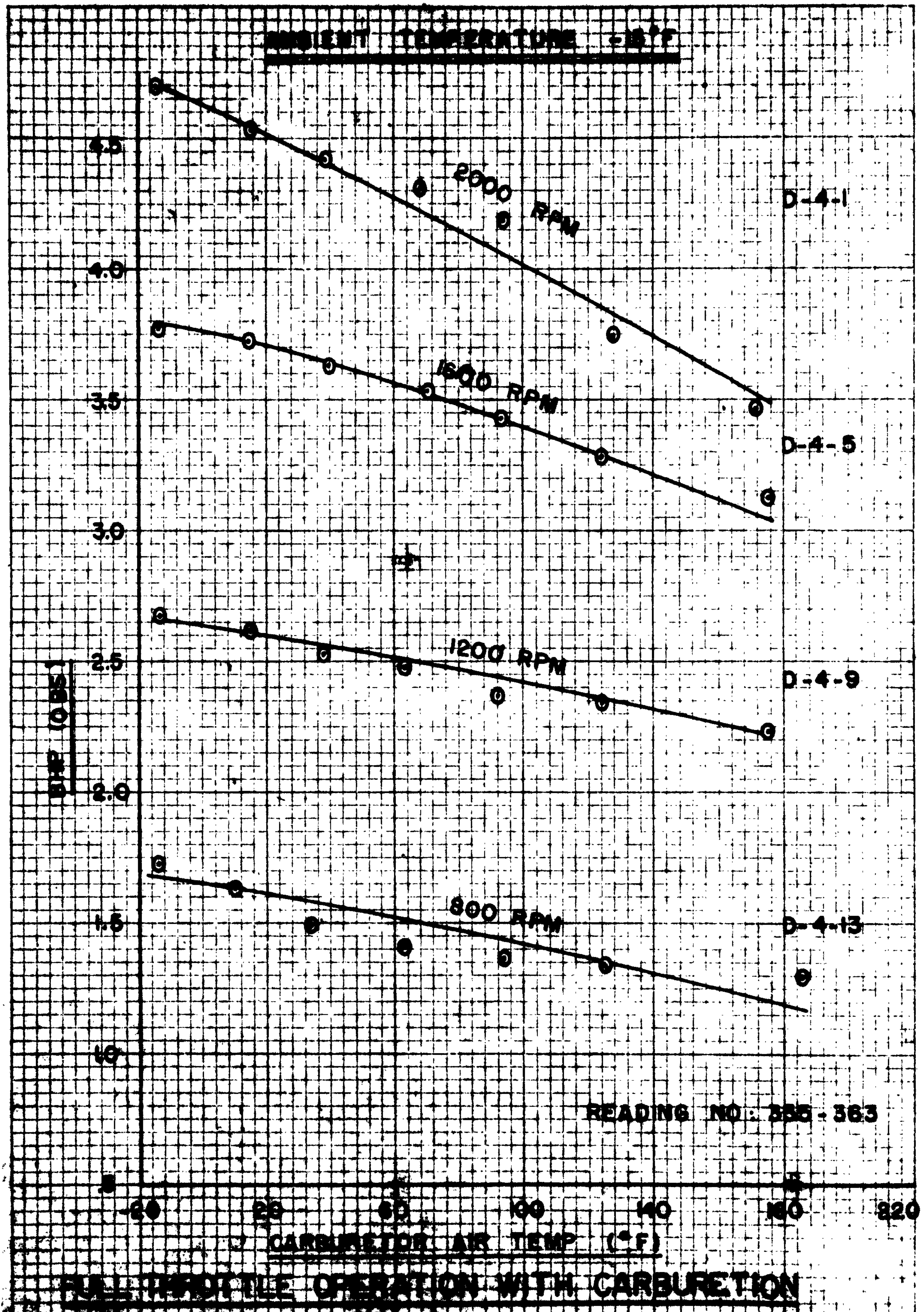
FULL THROTTLE OPERATION WITH CARBURETION



FULL THROTTLE OPERATION WITH CARBURETION

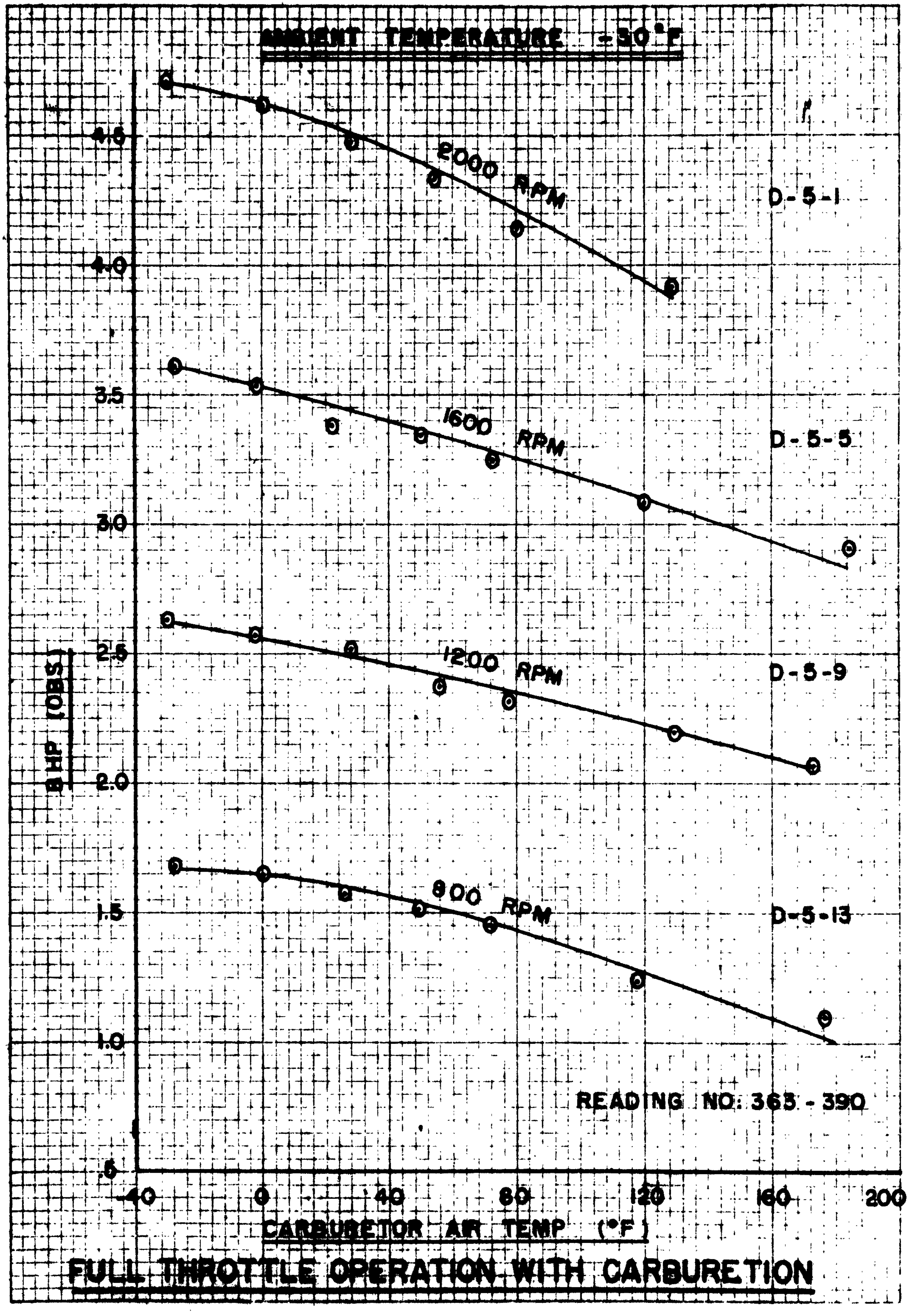


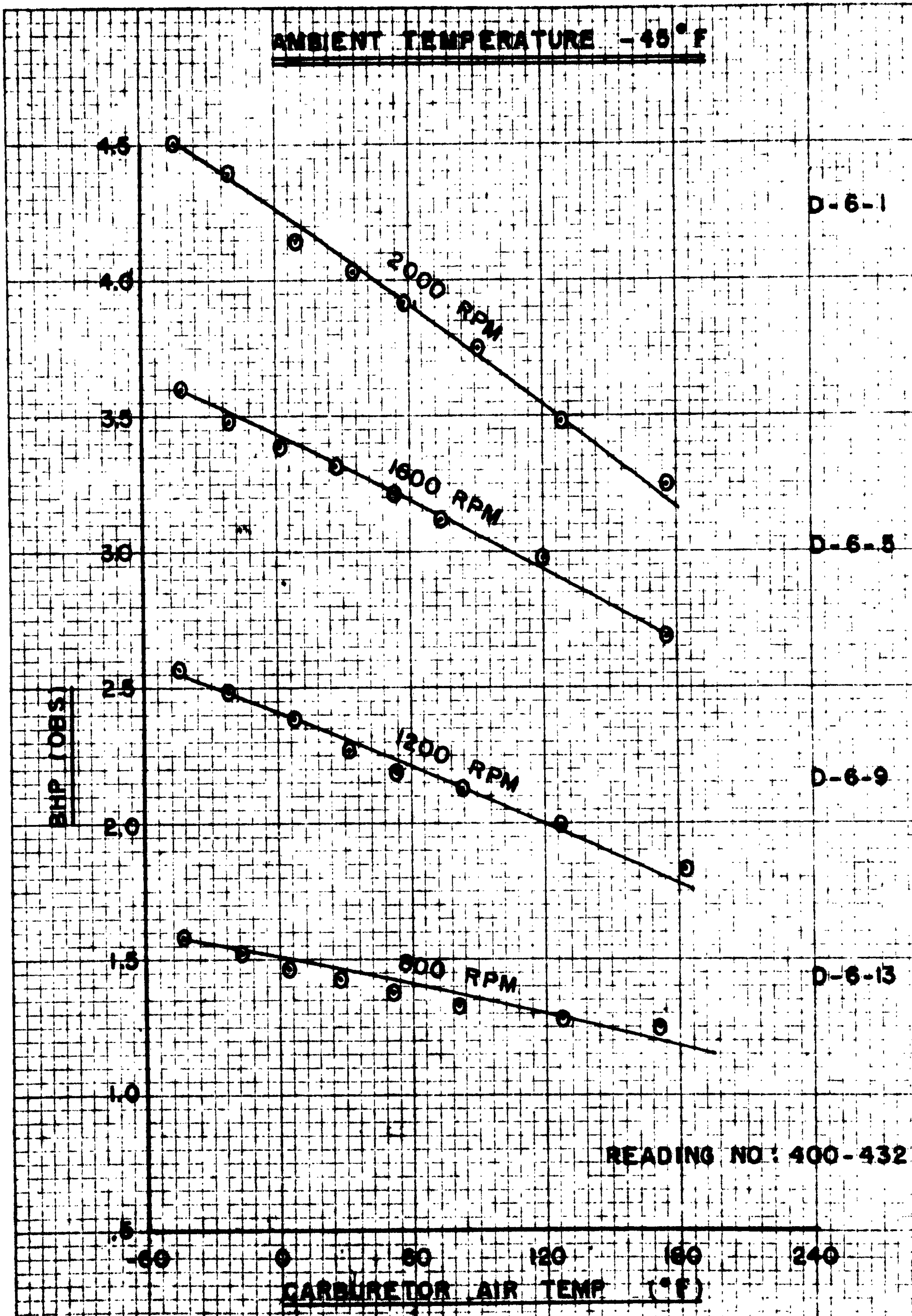
FULL THROTTLE OPERATION WITH CARBURETION



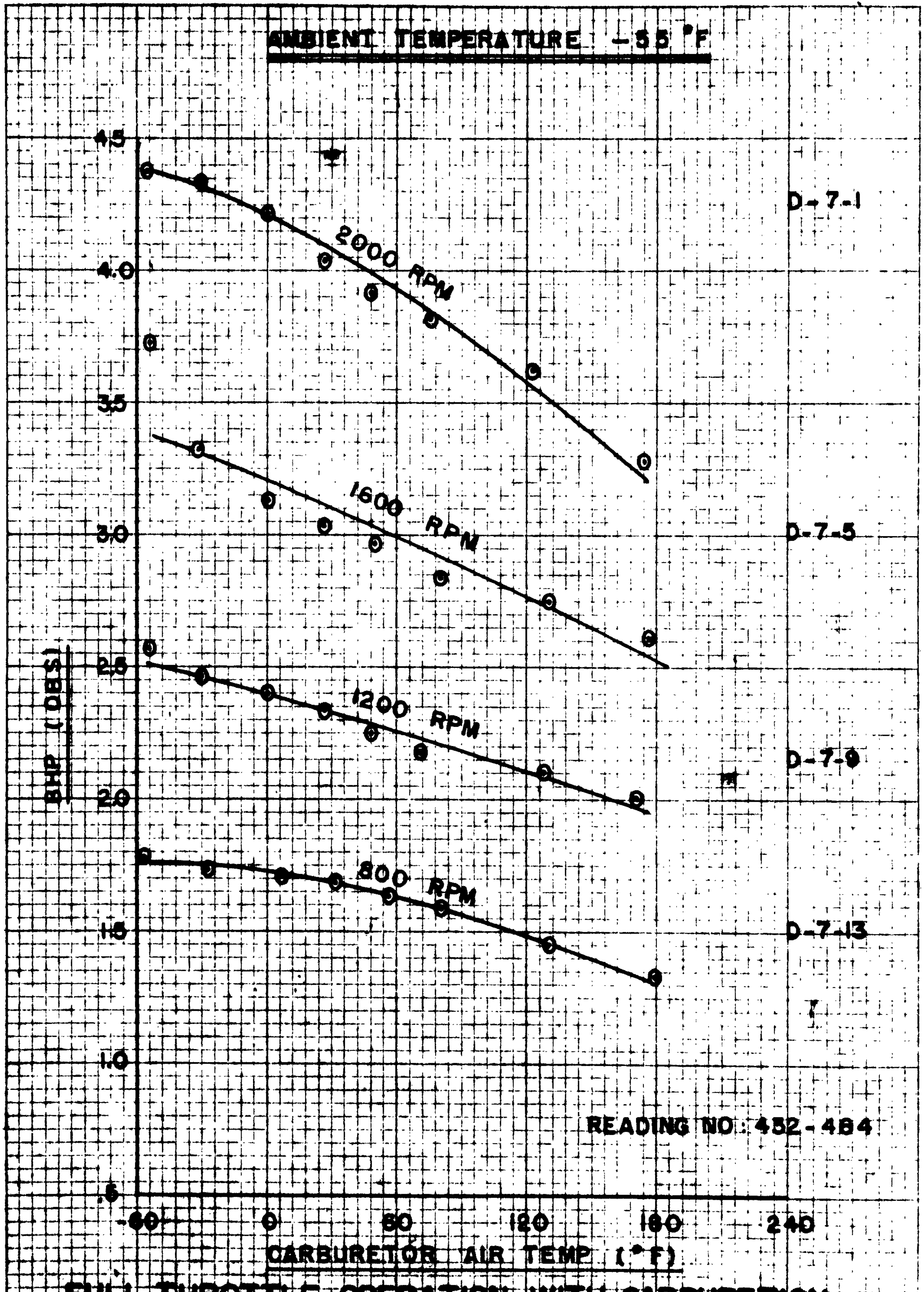
FULL THROTTLE OPERATION WITH CARBURETION

Curve No. 19


AMBIENT TEMPERATURE -30°F
2000 RPM
D-5-1
1600 RPM
D-5-5
1200 RPM
D-5-9
800 RPM
D-5-13
BHP (OBS)
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
.5
-40
0
40
80
120
160
200
CARBURETOR AIR TEMP (°F)
READING NO: 363 - 390
FULL THROTTLE OPERATION WITH CARBURETION

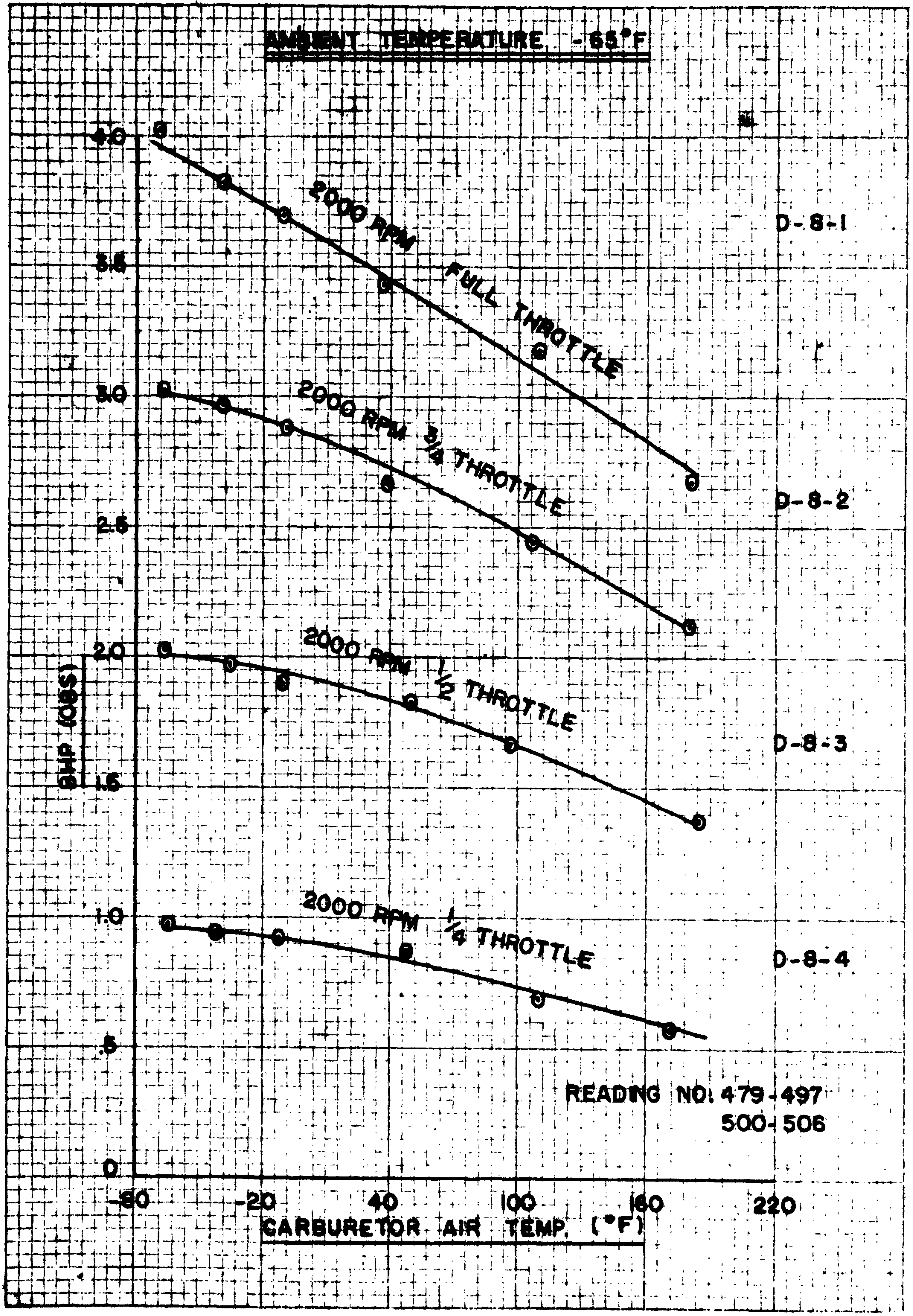


FULL THROTTLE OPERATION WITH CARBURETION

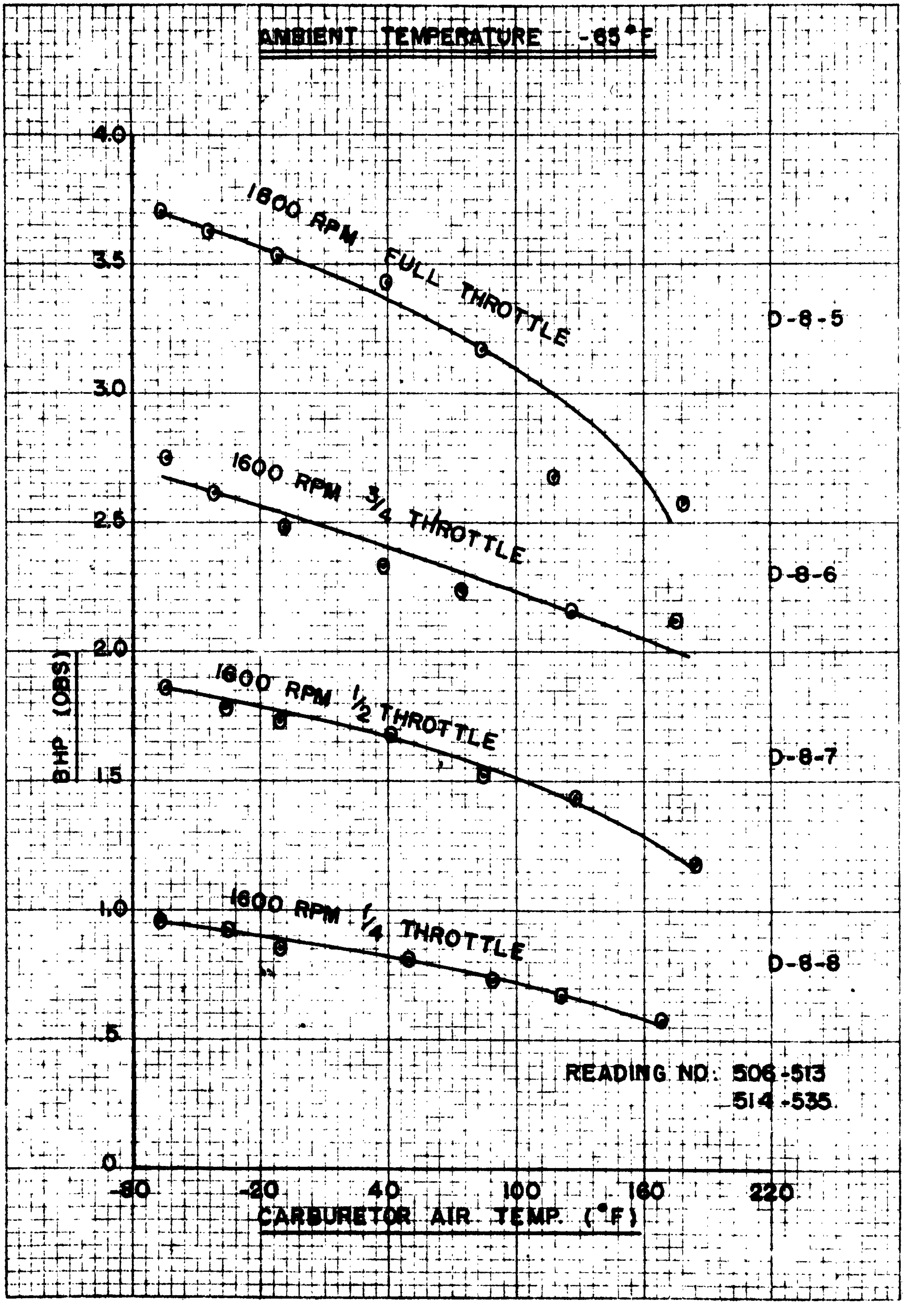


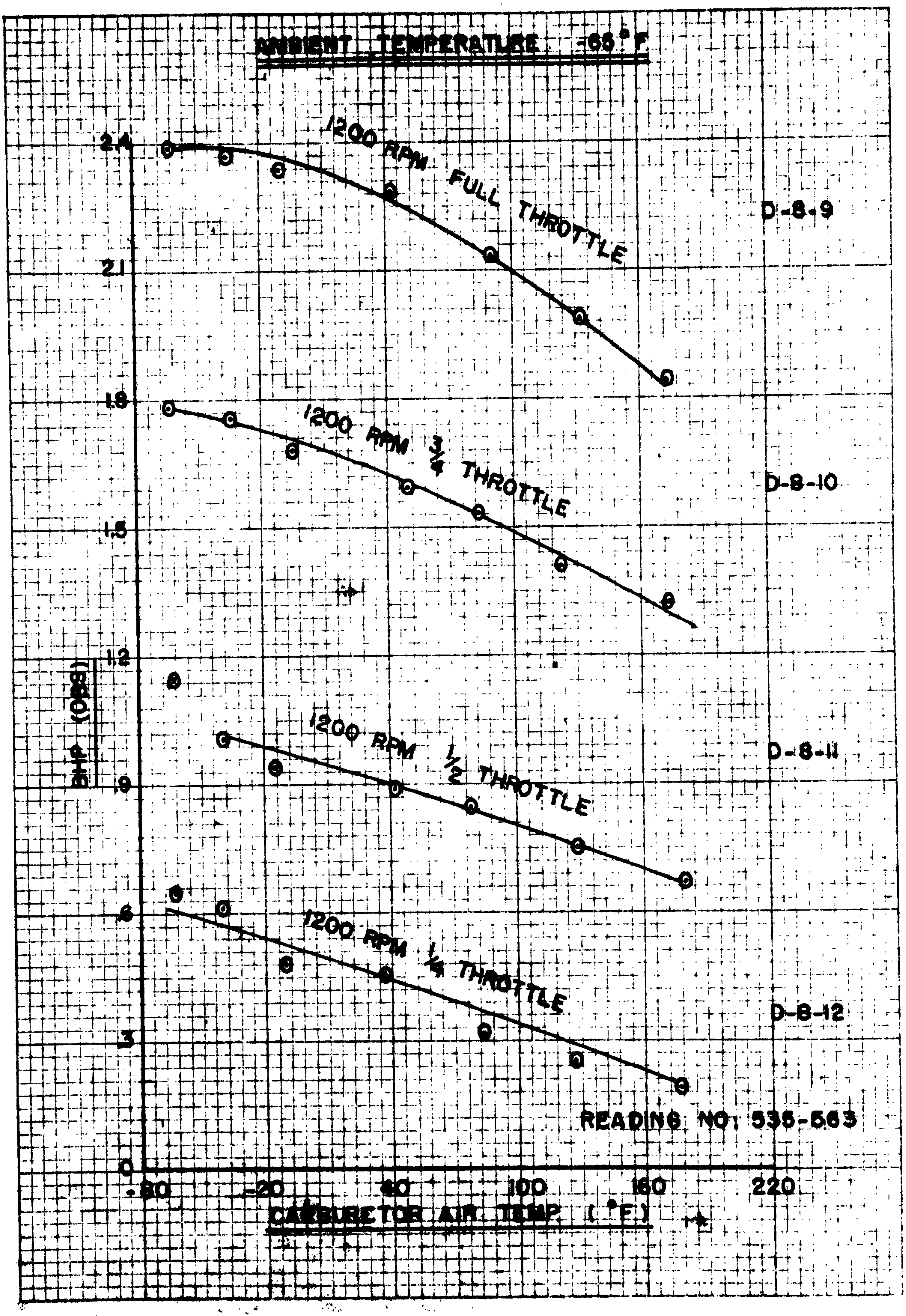
FULL THROTTLE OPERATION WITH CARBURETION

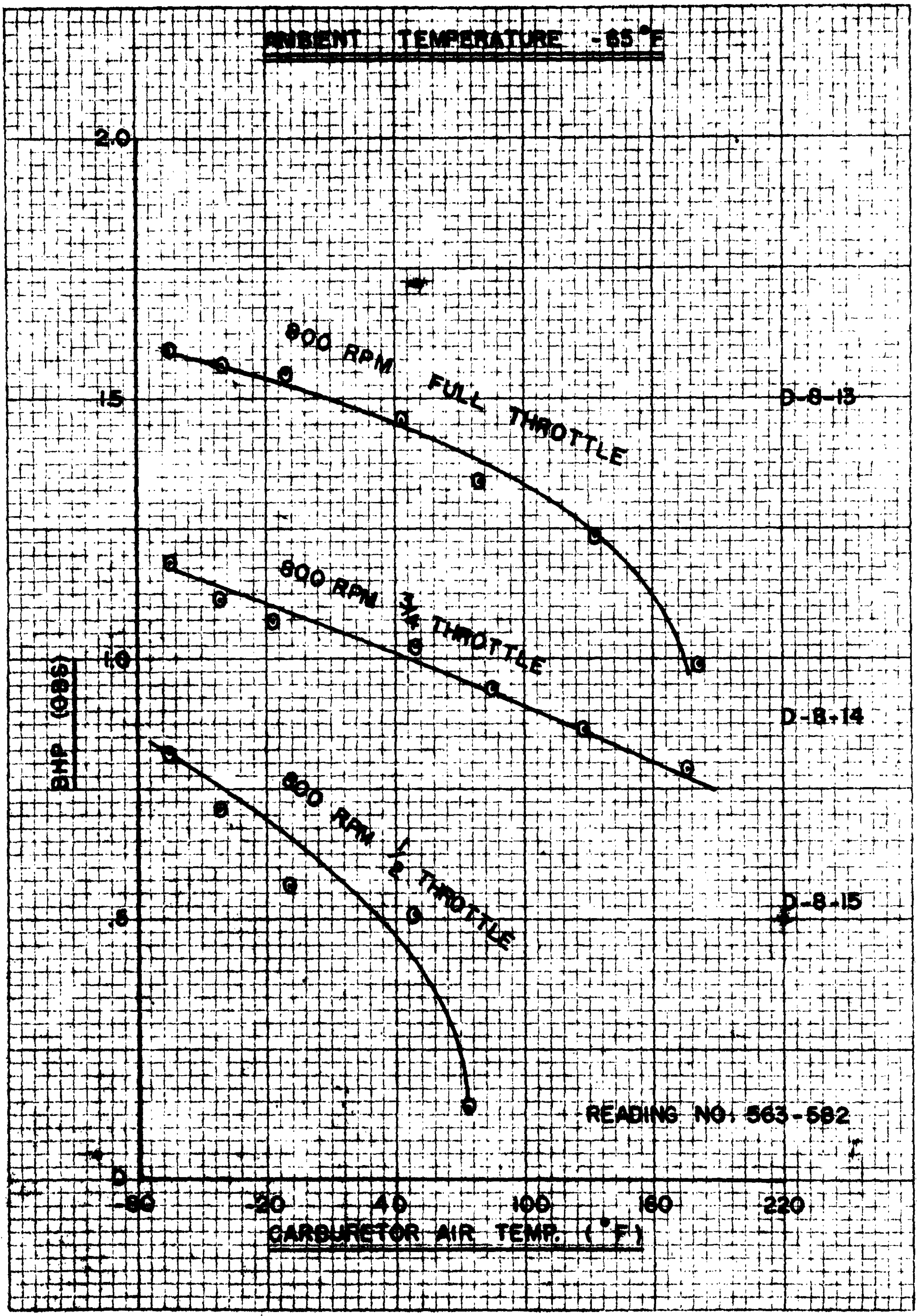
Curve No. 22


AMBIENT TEMPERATURE -65°F
2000 RPM FULL THROTTLE
2000 RPM 3/4 THROTTLE
2000 RPM 1/2 THROTTLE
2000 RPM 1/4 THROTTLE
D-8-1
D-8-2
D-8-3
D-8-4
BHP (OBS)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
.5
0
-80
-20
40
100
160
220
CARBURETOR AIR TEMP. (°F)
READING NO: 479-497
500-506

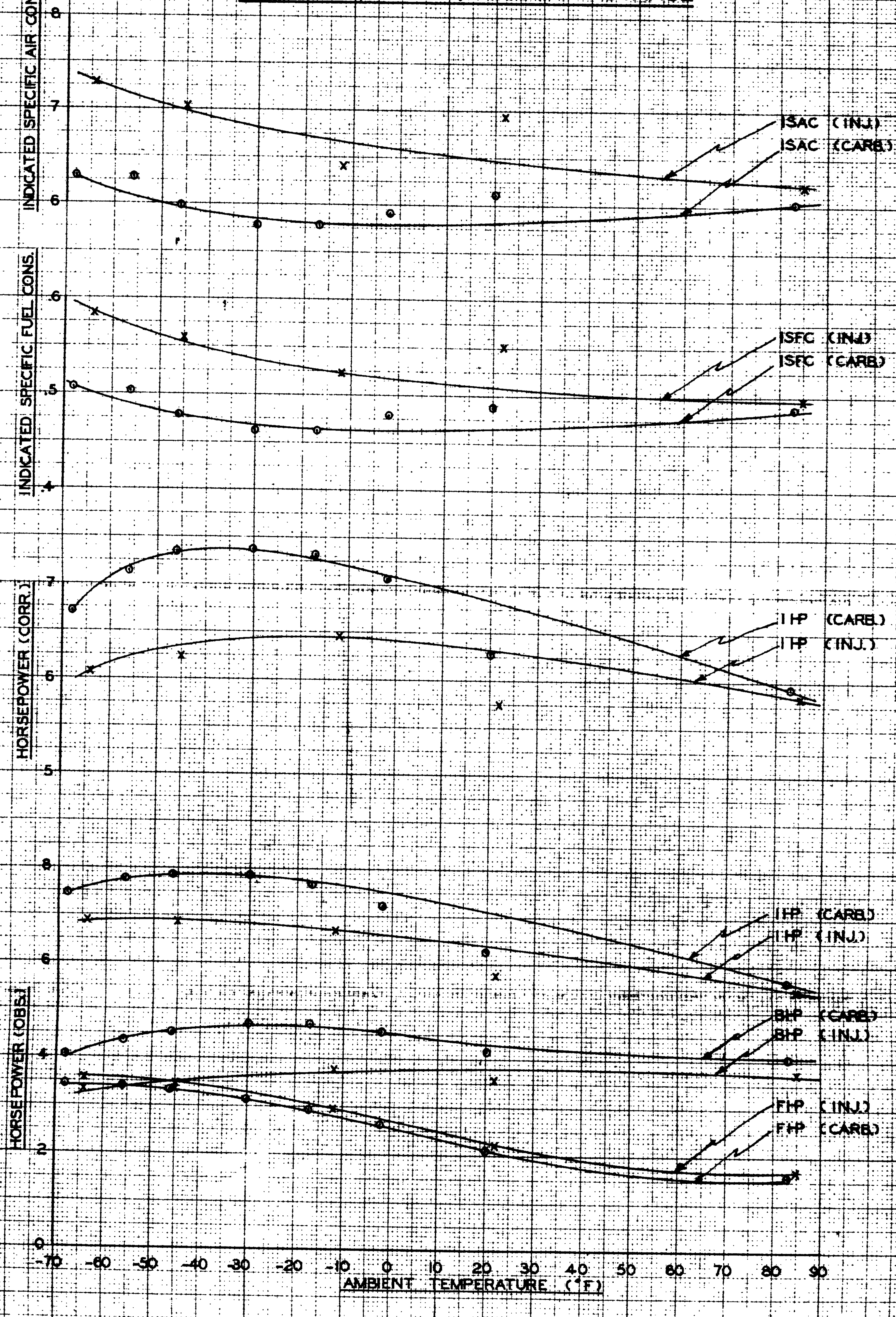
Curve No. 23


AMBIENT TEMPERATURE -65°F
1600 RPM FULL THROTTLE
1600 RPM 3/4 THROTTLE
1600 RPM 1/2 THROTTLE
1600 RPM 1/4 THROTTLE
D-8-5
D-8-6
D-8-7
D-8-8
READING NO. 506-513
514-535
BHP (OBS)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
.5
0
-80
-20
40
100
160
220
CARBURETOR AIR TEMP. (°F)


AMBIENT TEMPERATURE -65°F
1200 RPM FULL THROTTLE
D-8-9
1200 RPM 3/4 THROTTLE
D-8-10
1200 RPM 1/2 THROTTLE
D-8-11
1200 RPM 1/4 THROTTLE
D-8-12
READING NO. 535-563
BHP (OBS)
2.4
2.1
1.8
1.5
1.2
.9
.6
.3
0
-80
-20
40
100
160
220
CARBURETOR AIR TEMP. (°F)

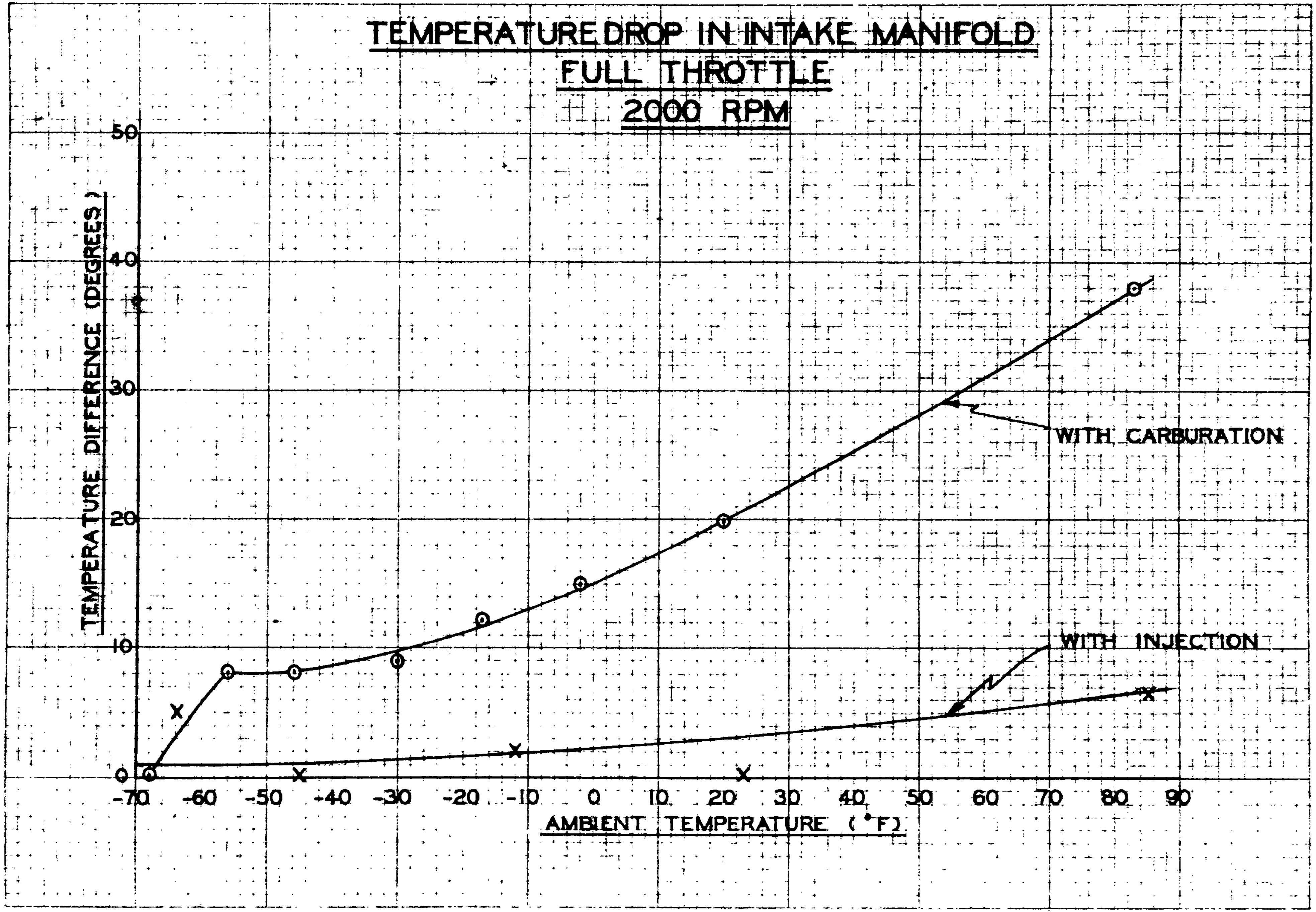

AMBIENT TEMPERATURE -65°F
2.0
1.5
1.0
.5
0
BHP (OBS)
800 RPM FULL THROTTLE
800 RPM 3/4 THROTTLE
800 RPM 1/2 THROTTLE
D-8-13
D-8-14
D-8-15
READING NO. 563-582
-80
-20
40
100
160
220
CARBURETOR AIR TEMP. (°F)

FULL THROTTLE
ENGINE PERFORMANCE
2000 RPM, .08 F/A, 30° SPARK ADVANCE



Curve No. 26

Curve No. 27


TEMPERATURE DROP IN INTAKE MANIFOLD
FULL THROTTLE
2000 RPM
TEMPERATURE DIFFERENCE (DEGREES)
0
10
20
30
40
50
AMBIENT TEMPERATURE (°F)
-70
-60
-50
-40
-30
-20
-10
0
10
20
30
40
50
60
70
80
90
WITH CARBURATION
WITH INJECTION

SPARK PLUG TEST RECORD

AKE & NUMBER A. C. 83 Gap .025"

LOG SHEET NO. 1

Read No	Bomb Press	Pri. D.C. Volts	Pri. D.C. Amps	Obs. Temp. Room	Obs. Temp. Gask	Obs. Temp. Med	Temp. Gask	Temp. Med	Oscilloscope Data Pri	Oscilloscope Data Pri Calib A	Oscilloscope Data Pri Calib V	Oscilloscope Data Secnd	Oscilloscope Data Secnd Calib A	Oscilloscope Data Secnd Calib V	Peak Volts Pri	Peak Volts Secnd	Remarks
CONSTANT VOLTAGE, VARIABLE COIL & SPARK PLUG TEMP.																	COIL TEMP.
22	143	4	3.4	67	177	170	-43	-36	11.5	16.5	118	21	12	6185	206	30700	-43 [illegible]
23	123	4	3.0	67	155	150	-21	-16	10.5	16.5	116	17.5	12	6185	187	25600	-23
24	134	4	3.1	68	141	139	-5	-3	11	16.5	117	16.5	12	6185	197	27100	-5
25	130	4	3.1	68	+1	+3	+1	+3	10.5	16.5	117	17.5	12	6185	186	25600	0
26	128	4	3.05	68	10	12	10	12	10	16.5	117	18	12	6185	179	26300	13
27	117	4	2.95	68	22	25	22	25	9.5	16.5	117	16.5	12	6185	170	24100	[illegible]
28	111	4	2.90	68	30	32	30	32	9.5	16.5	117	16	12	6100	170	23100	[illegible]
29	105	4	2.85	68	44	44	44	44	9	16.5	117	14.5	12	6185	161	21200	[illegible]
CONSTANT VOLTAGE, VARIABLE TEMP. & PRESS.																	
1	132	6	3.5	67	79	79	79	79	11.5	20	115	18	12.5	6575	187	27200	5/23
2	136	6	3.45	67	129	129	129	129	11.5	20	115	18	12.5	6575	187	26500	
3	148	6	3.45	72	183	183	183	183	11.5	20	115	17.5	12.5	6575	187	26000	
4	168	6	3.40	72	234	234	234	234	11.5	20	115	17.5	12.5	6575	187	26000	
5	192	6	3.40	74	280	279	280	279	11.5	20	116	18.5	12.5	6575	189	27400	
6	210	6	3.45	76	330	328	330	328	11.5	20	115	17.5	12.5	6575	187	26000	
7	245	6	3.40	75	380	378	380	378	11.5	20	116	17.5	12.5	6575	189	26000	
8	248	6	3.40	75	430	426	430	426	11.5	20	116	17.5	12.5	6575	189	26000	
9	255	6	3.40	75	475	467	475	467	11.5	20	115	17.5	12.5	6575	187	26000	
CONSTANT PRESSURE TEST																	
1	100	4.5	3.05	74	223	218	-75	-70	11.5	21	115	18	13.5	6500	178	24500	5/[illegible]
2	100	4.65	3.10	74	216	210	-68	-62	11.5	21	115	18	13.5	6500	178	24500	
3	100	4.70	3.10	74	206	201	-58	-53	11.5	21	115	17.5	13.5	6420	178	23600	
4	100	4.80	3.10	75	196	192	-46	-42	11.5	21	115	17.5	13.5	6420	178	23600	
5	100	4.70	3.10	73	183	177	-37	-31	11.5	21	115	17	13.5	6420	178	22900	
6	100	4.65	3.05	72	173	168	-29	-24	11	21	115	17	13.5	6420	171	22900	
7	100	4.65	3.00	72	162	156	-18	-12	11	21	115	16.5	13.5	6420	171	22200	
8	100	4.60	3.00	70	148	144	-8	-4	11	21	115	16	13.5	6420	171	21600	
9	100	4.55	2.95	68	+2	+5	+2	+5	10.5	21	115	15.5	13.5	6420	163	20900	
10	100	4.55	3.05	66	10	13	10	13	11	21	114	15	13.5	6420	169	20200	
11	100	4.55	2.95	68	20	22	20	22	11	21	114	15	13.5	6420	169	20200	
12	100	4.40	2.95	67	32	33	32	33	11	21	114	14.5	13.5	6420	169	19550	

SPARK PLUG TEST RECORD

[illegible] A. C. 86 Gap .025"

LOG SHEET NO. [illegible]

[illegible] No.	[illegible] Press.	Pri. Volts	D.C. Amps.	Obs. Temp. Room	Obs. Temp. Gask	Obs. Temp. Med	Temp. Gask	Temp. Med	Oscilloscope Data Pri	Oscilloscope Data Pri Calib ▲	Oscilloscope Data Pri Calib ▼	Oscilloscope Data Secnd	Oscilloscope Data Secnd Calib ▲	Oscilloscope Data Secnd Calib ▼	Peak Volts Pri	Peak Volts Secnd	Remarks.
	CONSTANT VOLTAGE VARIABLE TEMP. & PRESS.																COIL TEMP.
[illegible]	[illegible]	6	3.9	70	70	69	70	69	11.5	19.5	116	20.5	12	6020	194	29100	[illegible]
[illegible]	[illegible]	6	4.0	73	220	215	-62	-57	13	19.5	117	21.5	11.5	6100	221	32400	[illegible]
[illegible]	[illegible]	6	4.2	74	74	74	74	74	14	19.5	117	22.5	12	6185	238	30000	[illegible]
[illegible]	[illegible]	6	3.6	76	74	74	74	74	11.5	19.5	117	20	12	6260	196	29600	[illegible]
[illegible]	[illegible]	6	4.35	81	220	230	-58	-68	15	18.5	117	22	12	6185	269	32100	[illegible]
	CONSTANT VOLTAGE VARIABLE COIL & SPARK PLUG TEMP.																COIL TEMP.
[illegible]	[illegible]	[illegible]	3.55	75	203	206	-53	-56	12	18.5	117	22	12	6185	215	32100	[illegible] 4/27
66	[illegible]	[illegible]	3.40	77	185	178	-31	-24	11.5	18.5	117	21.5	12	6185	206	31400	[illegible]
67	[illegible]	[illegible]	3.20	77	169	165	-15	-11	10.5	18.5	117	21	12	6185	188	30700	[illegible]
68	[illegible]	[illegible]	3.15	77	0	+4	0	+4	10	18.5	117	19	12	6185	179	27600	+2
[illegible]	[illegible]	[illegible]	3.0	77	19	22	19	22	10	18.5	117	19	12	6185	179	27000	21
[illegible]	[illegible]	[illegible]	3.	78	36	38	36	38	9.5	18.5	117	17	12	6185	171	24900	36
	CONSTANT VOLTAGE VARIABLE TEMP. & PRESS.																
1	125	6	3.35	66	80	80	80	80	12	20	115	18.5	12.5	6575	195	27500	[illegible]
2	125	6	3.30	66	130	129	130	129	12	20	115	18.5	12.5	6575	195	27300	
3	135	6	3.35	67	182	180	182	180	12	20	115	18	12.5	6575	195	26400	
4	150	6	3.45	67	230	228	230	228	12	20	115	18	12.5	6575	195	26800	
5	162	6	3.40	67	280	280	280	280	12	20	115	17	12.5	6575	195	25300	
6	185	6	3.45	67	329	328	329	328	12	20	115	17.5	12.5	6575	195	26000	
7	205	6	3.40	67	380	377	380	377	12	20	115	17.5	12.5	6575	195	26000	
8	220	6	3.45	67	430	426	430	426	11.5	20	115	17.5	12.5	6575	187	26000	
9	240	6	3.55	69	477	470	477	470	12	20	115	17.5	12.5	6575	195	26000	
	CONSTANT PRESSURE TEST																
1	100	4.75	3.35	68	215	212	-79	-76	12.5	21	113	19.5	13	6260	191	26600	[illegible]
2	100	4.65	3.20	68	205	198	-69	-62	12	21	114	19.5	13	6260	185	25600	
3	100	4.80	3.30	69	192	186	-54	-46	12	21	114	18.5	13	6335	185	25400	
4	100	4.70	3.20	70	180	177	-40	-37	11.5	21	114	18	13	6335	177	24800	
5	100	4.85	3.20	70	170	167	-30	-27	12	21	114	17.5	13	6335	185	24300	
6	100	4.80	3.20	71	162	159	-20	-17	11.5	21	115	17.5	13	6335	178	24100	
7	100	4.65	3.10	72	156	153	-12	-9	12	21	115	17	13.5	6420	186	23900	
8	100	4.60	3.10	71	0	+2	0	+2	11.5	21	115	16.5	13.5	6420	178	22200	
9	100	4.55	3.05	72	+11	14	+11	14	11.5	21	115	16	13.5	6420	178	21600	
10	100	4.75	3.10	72	20	23	20	23	11.5	21	115	15.5	13.5	6420	178	20900	
11	100	4.50	3.00	70	32	34	32	34	10.5	21	115	15.5	13.5	6420	166	20900	

SPARK PLUG TEST RECORD

MAKE & NUMBER Auto-Lite B 5 Gap .025" LOG SHEET NO. 3

		Pri D.C.		Obs. Temp.			Temp.		Oscilloscope Data						Peak Volts		
Read No	Bomb Press	Volts	Amps	Room	Gask	Med	Gask	Med	Pri	Pri Calib A	Pri Calib V	Secnd	Secnd Calib A	Secnd Calib V	Pri	Secnd	Remarks
				CONSTANT VOLTAGE, VARIABLE COIL & SPARK PLUG TEMP.													COIL TEMP.
11	150	4	3.5	77	202	197	-48	-43	12	17	112	19.5	10.5	5940	224	31200	-48 4/30
12	148	4	3.30	77	186	180	-32	-26	11.5	18	117	21	11.5	6100	193	31600	-32
13	132	4	3.20	77	179	175	-25	-21	10	18	117	20	11.5	6185	184	30500	-23
14	128	4	3.10	77	161	157	-7	-3	10	18	117	19.5	11.5	6185	184	29800	-6
15	125	4	3.05	77	+9	+14	+9	+14	10	18.5	117	17.5	12	6185	179	29600	+8
16	118	4	3.00	77	19	22	19	22	9.5	18.5	117	18	12	6185	170	26300	19
17	115	4	2.95	77	32	33	32	33	9	18.5	117	17	12	6185	161	24900	32
				CONSTANT VOLTAGE, VARIABLE TEMP. & PRESS.													
1	139	6	3.5	78	78	78	78	78	12	20	117	17	12.5	6675	199	25700	5/17
2	132	6	3.5	78	130	130	130	130	11.5	20	117	16.5	12.5	6575	192	24500	
3	150	6	3.45	78	182	184	182	184	11.5	20	117	16.5	12.5	6575	192	24500	
4	169	6	3.45	80	230	230	230	230	11.5	20	117	16	12.5	6575	192	23800	
5	190	6	3.45	80	280	280	280	280	11.5	20	117	17	12.5	6575	192	25800	
6	202	6	3.45	80	330	329	330	329	11.5	20	116	16.5	12.5	6575	189	24500	
7	221	6	3.40	80	380	377	380	377	11.5	20	116	16.5	12.5	6575	189	24500	
8	230	6	3.40	80	427	421	427	421	11.5	20	116	16.5	12.5	6575	189	24500	
9	233	6	3.40	80	473	469	473	469	11.5	20	116	17	12.5	6575	189	25300	
				CONSTANT PRESSURE TEST													
1	100	4.94	3.10	72	209	206	-65	-62	10	19	119	13.6	10.5	6420	177	23300	4/17
2	100	5.00	3.10	72	198	195	-54	-51	10	19	119	13	10.5	6420	177	22250	
3	100	5.00	3.10	72	186	183	-42	-39	10	18.5	119	12.8	10.5	6420	182	22100	
4	100	5.00	3.05	72	174	173	-30	-29	9.7	19	119	12.6	10.5	6420	172	21900	
5	100	4.94	3.00	72	165	164	-21	-20	9.7	19	119	12.8	10.3	6335	172	22200	
6	100	4.94	3.00	72	155	155	-11	-11	9.8	19	119	12.5	10.5	6335	174	21300	
7	100	5.00	3.00	72	1	3	1	3	9.8	19	118	12	10.5	6420	172	20800	
8	100	5.13	3.10	72	12	12	12	12	9.8	18.5	118	11.7	10.5	6420	177	20300	
9	100	5.07	3.05	71	22	20	22	20	9.7	19	118	11	10.5	6420	171	19050	
10	100	4.73	2.90	72	30	29	30	29	9.3	19	118	11.1	10.5	6420	163	19050	

SPARK PLUG TEST RECORD

MAKE & NUMBER Auto-Lite B 9 Gap .025" LOG SHEET NO. 4

		Pri D.C.		Obs. Temp.			Temp.		Oscilloscope Data						Peak Volts		
Read No	Bomb Press	Volts	Amps	Room	Gask	Med	Gask	Med	Pri	Pri Calib A	Pri Calib V	Secnd	Secnd Calib A	Secnd Calib V	Pri	Secnd	Remarks
	CONSTANT VOLTAGE, VARIABLE COIL & SPARK PLUG TEMP.																COIL TEMP.
12	210	4	3.4	79	200	192	-42	-34	12	18.5	117	22	12	6185	215	32100	-42 4/28
13	200	4	3.3	79	188	182	-30	-24	11.5	18.5	117	21.5	12	6185	206	31500	-28
14	178	4	3.2	79	168	164	-10	-6	11	18.5	117	20.5	12	6185	197	30000	-10
15	168	4	3	79	156	150	+2	+8	10.5	18.5	117	18.5	12	6185	188	27100	+2
16	155	4	2.95	79	13	16	13	16	10	18.5	117	18.5	12	6185	179	27100	14
17	143	4	2.95	79	25	27	25	27	10	18.5	117	17	12	6185	179	24000	26
18	120	4	2.9	79	32	32	32	32	9	18.5	117	15.5	12	6185	163	22700	32
	CONSTANT VOLTAGE, VARIABLE TEMP. & PRESS.																
27	142	6	3.4	83	100	99	100	99	11.5	20	117	15.5	12.5	6500	192	22800	5/16
28	135	6	3.35	83	152	152	152	152	11.5	20	117	15	12.5	6500	192	22100	
29	145	6	3.35	83	204	202	204	202	11.5	20	115	14.5	12.5	6500	187	21300	
30	162	6	3.35	84	252	249	252	249	11.5	20	115	15	12.5	6500	187	22100	
31	171	6	3.30	84	300	297	300	297	11.5	20	115	15	12.5	6500	187	22100	
32	195	6	3.35	84	349	344	349	344	11.5	20	116	14.5	12.5	6500	189	21300	
33	215	6	3.35	84	404	397	404	397	11.5	20	115	15	12.5	6500	187	22100	
34	232	6	3.35	85	443	433	443	433	11.5	20	116	15	12.5	6500	189	22100	
35	232	6	3.30	85	479	470	469	470	11.5	20	115	14.5	12.5	6500	187	21300	
	CONSTANT PRESSURE TEST																
1	100	4.3	2.9	71	219	215	-77	-73	11	21.5	115	15	13	6420	167	21000	5/8
2	100	4.25	2.85	71	208	203	-66	-61	11	21.5	115	15	13	6420	167	21000	
3	100	4.50	3.00	71	198	194	-56	-52	11	21.5	115	14.5	13	6420	167	20300	
4	100	4.5	2.95	71	188	184	-46	-42	11	21.5	115	14.5	13	6420	167	20300	
5	100	4.4	2.90	71	179	175	-37	-43	10.5	21.5	115	14.5	13	6420	159	20300	
6	100	4.45	2.95	72	168	164	-24	-20	10.5	21.5	115	14.5	13	6420	159	20300	
7	100	4.40	2.90	72	157	155	-13	-11	10.5	21.5	115	14	13	6420	159	19600	
8	100	4.3	2.8	72	148	145	-4	-1	10.5	21.5	115	14	13	6420	159	19600	
9	100	4.2	2.8	72	10	12	+10	+12	10.5	21.5	115	14	13	6420	159	19600	
10	100	4.1	2.7	72	18	19	18	19	10	21.5	115	13	13	6420	152	18200	
11	100	4.05	2.6	72	32	32	32	32	9.5	21.5	115	12.5	13	6420	144	17500	

SPARK PLUG TEST RECORD

MAKE & NUMBER Auto-Lite BR4 Gap .040" LOG SHEET NO. 5

Read No	Bomb Press	Pri D.C.		Obs. Temp.			Temp.		Oscilloscope Data						Peak Volts		Remarks
		Volts	Amps	Room	Gask	Med	Gask	Med	Pri	Pri Calib A	Pri Calib V	Secnd	Secnd Calib A	Secnd Calib V	Pri	Secnd	
	CONSTANT VOLTAGE, VARIABLE COIL & SPARK PLUG TEMP.																COIL TEMP.
12	138	4	3.4	83	210	205	-44	-39	11.5	18.5	115	21	12	6260	203	31100	-44 4/30
13	130	4	3.3	83	198	191	-32	-25	11	18.5	115	19	12	6185	194	27800	-32
14	123	4	3.2	83	180	172	-17	-9	10.5	18.5	115	18.5	12	6100	185	26700	-17
15	118	4	3.1	83	168	164	-2	+2	10	18.5	115	18	12	6185	176	26300	-2
16	112	4	3.0	83	+10	+14	+10	+14	10	18.5	115	17.5	12	6185	176	25700	+8
17	105	4	3.0	83	22	25	22	25	9.5	18.5	115	17	12	6185	168	24900	21
18	100	4	2.95	83	32	33	32	33	9.5	18.5	115	16	12	6020	168	22800	33
	CONSTANT VOLTAGE, VARIABLE PRESS. & TEMP.																
1	122	6	3.45	80	80	80	80	80	11.5	20	115	18.5	12.5	6575	187	27500	5/19
2	125	6	3.45	80	130	130	130	130	11.5	20	115	18.5	12.5	6575	187	27500	
3	132	6	3.45	80	180	180	180	180	11.5	20	115	18	12.5	6575	187	26800	
4	148	6	3.45	80	230	230	230	230	11.5	20	115	17.5	12.5	6575	187	26000	
5	158	6	3.40	80	280	279	280	279	11.5	20	115	17.5	12.5	6575	187	26000	
6	170	6	3.40	82	330	328	330	328	11.5	20	115	17	12.5	6575	187	25300	
7	180	6	3.40	82	380	376	380	376	11.5	20	115	16.5	12.5	6575	187	24600	
8	195	6	3.40	82	430	426	430	426	11.5	20	115	16	12.5	6575	187	23800	
9	198	6	3.35	84	477	468	477	468	11.5	20	115	16.5	12.5	6575	187	24600	
	CONSTANT PRESSURE TEST																
1	100	5.27	3.4	70	204	201	-64	-61	10	19	117	11.2	10.5	6335	175	19100	4/18
2	100	5.00	3.25	70	193	191	-53	-51	10.5	19	117	11.6	10.5	6335	183	19750	
3	100	5.20	3.25	70	183	183	-43	-43	10.2	19	117	11.2	10.3	6260	178	19300	
4	100	5.13	3.20	70	172	171	-32	-31	10	19	117	11.5	10	6185	175	20200	
5	100	5.20	3.20	71	161	160	-19	-18	10.2	19	117	11.0	10	6185	178	19300	
6	100	5.27	3.25	71	153	151	-11	-9	10	18.5	117	10.3	10	6185	179	18100	
7	100	5.13	3.20	72	4	6	4	6	10.2	19	117	10	10	6185	178	17550	
8	100	5.40	3.20	72	151	149	-7	-5	10	19	117	11	10	6185	175	19300	
9	100	5.80	3.55	72	13	13	13	13	11	19	117	10.2	11	6185	192	19900	
10	100	5.67	3.35	72	21	20	21	20	10.2	18.5	117	10.5	11.2	6185	183	16450	
11	100	5.55	3.30	72	32	33	32	33	10	19	117	10.2	10	6185	175	17900	

SPARK PLUG TEST RECORD

MAKE & NUMBER Auto-Lite BR8 Gap .040" LOG SHEET NO. 6

Read No	Bomb Press	Pri D.C. Volts	Pri D.C. Amps	Obs. Temp. Room	Obs. Temp. Gask	Obs. Temp. Med	Temp. Gask	Temp. Med	Oscilloscope Data Pri	Pri Calib A	Pri Calib V	Secnd	Secnd Calib A	Secnd Calib V	Peak Volts Pri	Peak Volts Secnd	Remarks
	CONSTANT VOLTAGE, VARIABLE COIL & SPARK PLUG TEMP.																COIL TEMP.
12	130	4	3.45	80	208	206	-48	-46	11.5	18	114	20	12	6020	207	28500	-48 4/30
13	118	4	3.30	80	202	196	-42	-36	11	18.5	115	19.5	12	6100	194	28100	-42
14	115	4	3.20	80	186	180	-26	-20	11	18.5	115	19	12	5940	194	26600	-26
15	112	4	3.20	80	173	167	-13	-7	10.5	18.5	115	19	12	6100	185	27400	-14
16	105	4	3.05	80	165	161	-5	-1	10	18.5	114	18.5	12	6100	176	26700	-6
17	95	4	3.05	80	+2	+6	+2	+6	10	18.5	115	18.5	12	6100	176	26700	0
18	88	4	3.0	80	12	16	12	16	9.5	18.5	115	17.5	12	6100	167	25200	12
19	88	4	3.0	80	23	25	23	25	9.5	18.5	114	16.5	12	6100	167	23800	23
20	80	4	2.90	80	32	33	32	33	9.5	18.5	113	15	12	6020	167	21400	32
	CONSTANT VOLTAGE, VARIABLE TEMP. & PRESS.																
1	142	6	3.55	75	79	79	79	79	12	20	117	19	12.5	6675	199	28800	5/18
2	137	6	3.45	75	133	133	133	133	11.5	20	117	18	12.5	6575	192	26800	
3	155	6	3.45	75	184	184	184	184	11.5	20	116	18.5	12.5	6575	189	27500	
4	160	6	3.40	75	233	231	233	231	11.5	20	116	17.5	12.5	6575	189	26000	
5	178	6	3.40	78	280	279	280	279	11.5	20	116	17.5	12.5	6575	189	26000	
6	198	6	3.40	78	330	326	330	326	11.5	20	116	17	12.5	6575	189	25300	
7	205	6	3.40	80	380	375	380	375	11.5	20	116	18	12.5	6675	189	27200	
8	212	6	3.40	80	430	424	430	424	11.5	20	116	17	12.5	6575	189	25300	
9	198	6	3.40	82	479	472	479	472	11.5	20	116	17	12.5	6575	189	25300	
	CONSTANT PRESSURE TEST																
1	100	5.55	3.9	67	209	207	-75	-73	15	21.5	114	22	12.5	6420	226	32000	5/8
2	100	5.75	3.95	66	197	192	-65	-60	14.5	21.5	115	21	13	6420	220	29400	
3	100	5.30	3.60	66	186	182	-54	-50	14	21.5	115	21	13	6420	212	29400	
4	100	5.20	3.50	66	177	174	-45	-42	13	21.5	115	20	13	6420	197	28000	
5	100	5.20	3.45	67	166	163	-32	-29	13	21.5	115	20	13	6420	197	28000	
6	100	5.25	3.50	67	158	156	-24	-22	13	21.5	115	19.5	13	6420	197	27300	
7	100	5.20	3.45	67	146	144	-12	-10	12.5	21.5	115	19.5	13	6420	189	27300	
8	100	5.10	3.40	68	0	+2	0	+2	12	21.5	115	19	13	6420	182	26600	
9	100	5.05	3.35	68	+11	13	+11	13	12	21.5	115	19	13	6420	182	25600	
10	100	5.15	3.30	69	18	17	18	17	12	21.5	115	18	13	6420	182	25200	
11	100	5.10	3.40	70	32	32	32	32	12	21.5	115	17.5	13	6420	182	24500	

LOG SHEET NO. 7

scilloscope Data					Peak Volts		Remarks	
Pr Calb V	Pri Calib V	Secnd	Secnd Calib A	Secnd Calib V	Pri	Secnd		
&K PARK PLUG TEMP.							COIL TEMP.	
11	117	22	12	6185	224	32100	-51	4/27
11	117	21	12	6185	215	30700	-41	
11	117	20	12	6185	197	29200	-27	
11	117	19.5	12	6185	188	28500	-12	
11	117	19	12	6185	188	27800	0	
11	117	18.5	12	6185	179	27000	8	
11	117	17	12	6185	171	24800	20	
11	117	16.5	12	6185	161	24100	30	
& PRESS.								
115	115	18	12.5	6575	187	25300		5/22
115	115	18.5	12.5	6575	157	27500		
115	115	18	12.5	6575	187	26700		
115	115	13	12.5	6575	187	26300		
115	115	17.5	12.5	6575	187	26000		
116	116	18	12.5	6575	189	26800		
115	115	17	12.5	6575	187	25300		
116	116	18	12.5	6575	189	26800		
116	116	17	12.5	6575	189	25300		
116	116	13.5	8.75	6260	187	27400		4/14
116	116	12	9	6260	167	23700		
115	115	11.5	8.75	6185	167	23100		
115	115	11	8.75	6260	166	22300		
115	115	10.5	8.75	6185	158	21100		
115	115	10.25	8.75	6335	158	21100		
116	116	10	8.75	6260	174	20300		
117	117	10	8.5	6260	180	20900		
117	117	9.75	8.75	6260	152	19800		
117	117	9	8.75	6335	130	18425		
117	117	9	8.75	6260	152	18300		

Read No	Bomb Press	Pri D.C.		Obs. Temp.			Temp.		Oscilloscope Data						Peak Volts		Remarks
		Volts	Amps	Room	Gask	Med	Gask	Med	Pri	Pri Calib A	Pri Calib V	Secnd	Secnd Calib A	Secnd Calib V	Pri	Secnd	
	CONSTANT VOLTAGE, VARIABLE COIL & SPARK PLUG TEMP.																COIL TEMP.
12	195	4	3.4	74	190	183	-42	-35	11.5	18.5	117	22	12	6185	206	32100	-43 4/28
13	182	4	3.25	74	170	164	-22	-16	11	18.5	117	20.5	12	6185	197	30000	-25
14	170	4	3.10	74	155	150	-7	-2	10.5	18.5	117	19.5	12	6185	188	28500	-7
15	165	4	3.05	74	+1	+6	+1	+6	10	18.5	117	19	12	6185	179	27800	0
16	163	4	3.05	74	11	16	11	16	10	18.5	117	18.5	12	6185	179	27100	11
17	155	4	3	74	21	25	21	25	9.5	18.5	117	18	12	6185	170	26300	23
18	152	4	3	74	28	31	28	31	9	18.5	117	18	12	6185	163	26300	32
	CONSTANT VOLTAGE, VARIABLE PRESS. & TEMP.																
1	147	6	3.35	80	80	80	80	80	11.5	20	116	16.5	12.5	6675	189	24900	5/21
2	150	6	3.35	80	132	132	132	132	11.5	20	115	15.5	12.5	6675	187	23500	
3	175	6	3.35	80	180	179	180	179	11.5	20	116	16.5	12.5	6675	189	24900	
4	190	6	3.35	80	230	230	230	230	11.5	20	116	16.5	12.5	6675	189	24900	
5	198	6	3.30	80	280	279	280	279	11.5	20	116	16	12.5	6675	189	24300	
6	218	6	3.35	83	330	330	330	330	11.5	20	116	16	12.5	6575	189	23800	
7	234	6	3.35	83	379	378	379	378	11	20	116	16	12.5	6575	181	23800	
8	248	6	3.35	83	429	427	429	427	11.5	20	116	15.5	12.5	6575	189	23000	
9	252	6	3.35	83	475	469	475	469	11.5	20	116	15.5	12.5	6575	189	23000	
	CONSTANT PRESSURE TEST																
1	100	4.32	2.95	71	214	211	-72	-69	9	19.5	115	11.5	10.5	6260	150	19450	4/16
2	100	4.27	2.75	72	201	197	-57	-53	8.8	19.5	116	10.8	10.5	6260	148	18250	
3	100	4.27	2.70	72	192	190	-48	-46	8.2	19	116	9.8	10.5	6260	142	16550	
4	100	4.32	2.70	72	182	181	-38	-37	8	19	116	9.5	10.5	6260	138	16050	
5	100	4.27	2.60	72	170	167	-26	-23	8	19	115	9.5	10.3	6260	137	16350	
6	100	4.32	2.65	72	161	159	-17	-15	8.5	19	115	9	10.5	6260	145	15200	
7	100	4.32	2.60	72	154	153	-10	-9	7.8	19	115	9	10.3	6260	133	15000	
8	100	4.60	2.70	72	3	5	+3	+5	7.8	19	115	8.5	10.3	6260	133	14650	
9	100	4.73	2.80	72	12	14	12	14	8	18.7	115	7.5	10.3	6260	139	12950	
10	100	4.73	2.80	72	20	20	20	20	8	19	115	8	10.3	6335	137	13950	
11	100	4.32	2.50	72	31	31	31	31	7.3	19	116	7.8	10.3	6335	126	13550	

..RONAUTICAL RESEARCH LABORATO**k**.
UNIVERSITY OF KENTUCKY

Data Sheet No. 20

ENGINE LOG SHEET

ENGINE NO 12

DATE 10-10-52

MAKE: MERZ

OBJECT GROUP A RUN No 2 (READINGS 99-104) RUN 3 (105-110)

Reading No.	99	100	101	102	103	104	STOP	START	105	106
Time of Day AM	11:25	1132	1140	1145	11:52	11:57	12:00	1:30	1:41	
Speed	2000	2000	2000	2000	2000	2000			2000	2000
Dyn. Scale	.055	.061	.063	.064	.059	.045			.029	.058
Fuel Flow—Lbs Hr	2.8	2.7	2.5	2.3	2.1	1.85			2.45	2.40
Spark Advance—Deg.	20	20	20	20	20	20			0	10
FUEL FLOW CORR	2.95	2.85	2.64	2.42	2.22	1.96			2.49	2.54
Temperatures °F										
Carb. Air before Heater	81	85	87	88	87	87			85	87
Carb. Air after Heat	84	90	90	92	92	92			88	90
Intake Manifold	85	90	90	92	92	92			87	90
Spark Plug Gasket	243	250	255	258	252	238			230	245
Cylinder Base	111	115	114	117	117	118			112	117
Crankcase	96	95	100	100	100	102			110	107
Water In	105	105	107	107	110	110			105	107
Water Out	157	155	158	160	160	162			157	157
Carburetor Fuel	91	90	93	93	93	93			90	93
Nozzle Fuel										
Injector Fuel										
Pressure Oil	126	130	130	132	132	134			138	138
Sump Oil	110	110	113	115	115	117			120	120
Engine Room Air	86	85	87	87	87	87			80	87
Pressures										
Carb. Air Vent Diff—In. H	1.53	1.51	1.5	1.47	1.47	1.49		1	1.43	1.50
Int. Man. Vac.—In Hg	-.1	-.1	-.1	-.1	-.1	-.1			-.1	-.1
Oil—Lbs sq.in.—High	105	105	105	102	102	102			102	105
Oil—Lbs. sq.in.—Low	25	25	25	25	25	25			25	25
Fuel—Lbs. sq.in	22	22	22	22	22	22			22	22
Barometer—In Hg. OBS	29.05	29.05	29.05	29.05	29.05	29.05		29.08	29.08	29.08
BAR CORR	28.43	28.43	28.43	28.43	28.43	28.43		28.70	28.70	28.70
Calculated Data.										
Vapor Pressure—In. Hg	.47	.47	[illegible]	.47	.47	.47		.38	.38	.38
ADMP	28.33	28.33	28.33	28.33	28.33	28.33			28.60	28.60
Corr. Factor	.895	.890	.89	.89	.89	.89		.9	.9	.9
BHP—Observed	2.17	2.40	2.48	2.52	2.34	1.78			1.145	2.29
BHP—Corrected										
RPM	2000	2000	2000	2000	2000	2000			2000	[illegible]
BMEP—Corrected										
BSFC—Lbs BHP Hr	1.36	1.185	1.065	.960	.950	1.10			2.17	1.11
Torque—Ft. Lbs.—Observed										
Combustion Air—Lbs hr	32.8	32.2	32.2	31.8	31.8	32.2			31.6	32.4
Fuel Air	.090	.0885	.082	.0761	.070	.061			.079	.0785
Stop Report No.										
Total Time—Hrs.										
AIR FLOW OBS	36.7	36.2	36.1	35.8	35.8	36.1			35.1	36

REMARKS—Lbs. Oil added if any COMP. RATIO = 6.78:1

CF(AIR) .895 CF(FUEL) = 1.055

OPERATOR VC Culkens

...RONAUTICAL RESEARCH LABORATORY.
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Data Sheet No. 21

ENGINE LOG SHEET

ENGINE NO. 12

DATE: 10-10-52

MAKE: MERZ

OBJECT: CONTINUE RUN NO 3 IN GROUP A (105-110) START RUN B-1

Reading No.	107	108	109	110		111	112	113	114	115
Time of Day	1:58	205	2:09	2:21		2:32	2:37	2:44	2:50	2:56
Speed	2000	2000	2000	2000		2000	2000	2000	2000	2000
Dyn. Scale	.071	.075	.073	.062		.072	.073	.074	.075	.070
Fuel Flow—Lbs Hr	2.4	2.4	2.35	2.4		2.7	2.55	2.4	2.25	2.10
Spark Advance—Deg.	20	30	40	50		30	30	30	30	30
FF (CORR)	2.54	2.54	2.48	2.54		2.85	2.69	2.54	2.38	2.22
Temperatures—°F										
Carb. Air before Heater	87	85	87	88		88	88	87	87	87
Carb. Air after Heater	92	92	92	92	START	92	92	92	92	92
Intake Manifold	90	90	92	92		92	92	92	92	92
Spark Plug Gasket	260	275	288	313	RUN	270	275	277	277	267
Cylinder Base	118	117	117	118		117	117	117	118	118
Crankcase	107	105	103	103	No	105	103	103	103	103
Water In	108	108	108	113		107	108	108	110	110
Water Out	160	160	160	160	B-1	160	160	160	160	160
Carburetor Fuel	93	93	92	93		93	93	93	93	93
Nozzle Fuel										
Injector Fuel										
Pressure Oil	137	135	137	138		135	135	135	135	135
Sump Oil	118	117	117	117		117	117	117	117	117
Engine Room Air	87	85	87	88		87	87	87	87	88
Pressures.										
Carb. Air Vent Diff.—In H_2O	1.47	1.50	1.39	1.42		1.48	1.45	1.45	1.45	1.44
Int. Man. Vac.—In. Hg.	-.1	-.1	-.1	-.1		-.1	-.1	-.1	-.1	-.1
Oil—Lbs sq in—High	105	102	105	105		105	105	100	101	101
Oil—Lbs. sq.in.—Low	25	25	25	25		25	25	25	25	25
Fuel—Lbs. sq.in.	22	22	22	22		22	22	22	22	22
Barometer—In. Hg. OBS	29.08	29.08	29.08	29.08		29.08	29.08	29.08	29.08	29.08
CORR BAR	28.70	28.70	28.70	28.70		28.70	28.70	28.70	28.70	28.70
Calculated Data										
Vapor Pressure—In. Hg.	.38	.38	.38	.38		.38	.38	.38	.38	.38
ADMP	28.60	28.60	28.60	28.60		28.60	28.60	28.60	28.60	28.60
Corr Factor	.895	.895	.896	.895		.895	.895	.895	.895	.895
BHP—Observed	2.80	2.95	2.88	2.45		2.83	2.88	2.91	2.95	2.75
BHP—Corrected										
RPM	2000	2000	2000	2000		2000	2000	2000	2000	2000
BMEP—Corrected										
BSFC—Lbs/BHP Hr.	.907	.860	.861	1.035		1.01	.935	.873	.805	.805
Torque—Ft. Lbs.—Observed										
Combustion Air—Lbs hr	31.8	32.2	31.4	31.5		32.0	31.8	31.8	31.8	31.8
Fuel/Air	.080	.079	.079	.0805		.089	.0845	.080	.0748	.0696
Stop Report No.										
Total Time—Hrs.										
OBS AIR FLOW	35.5	36	35	35.2		35.8	35.6	35.6	35.6	35.6
REMARKS—Lbs. Oil added if any.										

OPERATOR

AERONAUTICAL RESEARCH LABORATORY
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Data Sheet No. 22

ENGINE LOG SHEET

ENGINE NO. 12

DATE: 10-10-52

MAKE: MERZ

OBJECT: CONTINUE RUN B1 (READINGS 111 TO 117)

Reading No.	116	117	STOP
Time of Day	3:05	309	3:17
Speed	2000	2000	
Dyn. Scale	.053	.043	
Fuel Flow—Lbs Hr	1.9	1.8	
Spark Advance—Deg.	30	30	
FF (CORR)	2.00	1.90	
Temperatures—F			
Carb. Air before Heater	88	88	
Carb. Air after Heater	93	92	
Intake Manifold	93	92	
Spark Plug Gasket	245	232	
Cylinder Base	118	118	
Crankcase	103	105	
Water In	108	107	
Water Out	160	160	
Carburetor Fuel	95	95	
Nozzle Fuel			
Injector Fuel			
Pressure Oil	135	135	
Sump Oil	117	117	
Engine Room Air	88	88	
Pressures.			
Carb. Air Vent. Diff.—In H O	1.46	1.49	
Int. Man. Vac.– In. Hg.	-.1	-.1	
Oil—Lbs sq.in.—High	101	101	
Oil—Lbs., sq.in.—Low	25	25	
Fuel—Lbs, sq in.	22	22	
Barometer—In. Hg OBS	29.08	29.08	
CORR BAR	28.70	28.70	
Calculated Data:			
Vapor Pressure—In. Hg.	.38	.38	
ADMP	28.6	28.6	
Corr. Factor	.895	.895	
BHP—Observed	209	1.70	
BHP—Corrected			
RPM	2000	2000	
BMEP—Corrected			
BSFC—Lbs BHP Hr	.956	1.12	
Torque—Ft. Lbs.—Observed			
Combustion Air—Lbs hr	318	320	
Fuel/Air	.063	.0595	
Stop Report No			
Total Time—Hrs.			
AIRFLOW OBS	35.6	35.8	

REMARKS—Lbs Oil added if any. Comp. Ratio 6.78:1

OPERATOR Currens

RONAUTICAL RESEARCH LABORATOR

UNIVERSITY OF KENTUCKY

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Data Sheet No. 23

ENGINE LOG SHEET

ENGINE NO. 11

DATE 10-14-52

MAKE. MCRZ

OBJECT: GROUP B RUN

Reading No.	118	119	120	121	122	123	124	125	126	Stop
Time of Day	9:22	9:26	9:42	9:55	10:02	10:08	10:14	10:25	10:34	10:45
Speed	2000	2000	2000	2000	2000	2000	2000	2000	2000	
Dyn. Scale	070	071	.073	.074	.075	.076	.075	.066	.048	
Fuel Flow—Lbs Hr	3.3	3.1	2.95	2.75	2.6	2.4	2.25	2.1	1.9	
Spark Advance Deg.	30°	30°	30°	30°	30°	30°	30°	30°	30°	
Fuel Flow CORR.	3.48	3.27	3.11	2.9	2.74	2.53	2.38	2.22	2.01	
Temperatures—°F										
Carb. Air before Heater	87	90	90	90	90	90	90	95	95	
Carb. Air after Heater	87	90	90	90	90	90	90	95	95	
Intake Manifold	85	85	89	89	89	89	89	90	92	
Spark Plug Gasket	257	260	265	275	280	280	285	265	256	
Cylinder Base	117	115	115	120	120	120	122	122	122	
Crankcase	100	100	100	100	100	100	100	100	101	
Water In	102	103	105	110	110	114	115	115	115	
Water Out	157	160	160	160	156	160	160	160	155	
Carburetor Fuel	—	—	—							
Nozzle Fuel	—	—	—							
Injector Fuel	87	89	82	90	90	90	89	95	95	
Pressure Oil	130	130	130	130	130	130	131	134	134	
Sump Oil	117	115	115	115	115	117	119	120	120	
Engine Room Air	82	85	80	85	85	85	85	87	89	
Pressures.										
Carb. Air Vent. Diff.—In H_2O	1.73	1.73	1.72	1.7	1.68	1.65	1.64	1.65	1.65	
Int. Man. Vac.—in. Hg.	-.2	-.2	-.2	-.1	-.1	-.1	-.1	-.1	-.1	
Oil—Lbs./sq.in.—High	100	100	100	100	100	100	100	100	100	
Oil—Lbs./sq.in.—Low	26	26	26	26	26	26	26	26	26	
Fuel—Lbs/sq.in.	26	26	26	25	25	25	25	24	24	
Barometer—in. Hg. obs.	29.10	29.10	29.10	29.10	29.10	29.10	29.10	29.10	29.10	
BAR. CORR.	28.64	28.64	28.64	28.64	28.64	28.64	28.64	28.64	28.64	
Calculated Data										
Vapor Pressure—In Hg	.46	.46	.46	.46	.46	.46	.46	.46	.46	
ADMP	28.41	28.44	28.44	28.54	28.54	28.54	28.54	28.54	28.54	
Corr. Factor	.90	.895	.895	.895	.895	.895	.895	.891	.89	
BHP—Observed	2.76	2.81	2.89	2.93	2.96	3.0	2.96	2.61	1.9	
BHP—Corrected										
RPM	2000	2000	2000	2000	2000	2000	2000	2000	2000	
BMEP—Corrected										
BSFC—Lbs BHP Hr	1.26	1.16	1.075	.99	.925	.845	.805	.85	1.06	
Torque—Ft. Lbs.—Observed										
Combustion Air—Lbs hr	34.6	34.4	34.4	34.2	34.0	33.9	33.8	33.7	33.7	
Fuel/Air	.1055	.095	.0905	.085	.0807	.0747	.0765	.066	.0597	
Stop Report No.										
Total Time—Hrs.										

REMARKS—Lbs. Oil added if any. ENGINE SURGING READING NOS. 125, 126

OPERATOR Currens

RONAUTICAL RESEARCH LABORATO
UNIVERSITY OF KENTUCKY

ENGINE LOG SHEET

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Data Sheet No.

ENGINE NO. 11

DATE: 10-14-52

MAKE: Merz

OBJECT: Run in New 7.23 Piston

Reading No.	Start	END of Run in
Time of Day	8:34 A.M.	9:10
Speed		
Dyn. Scale		
Fuel Flow—Lbs Hr		
Spark Advance—Deg.		
Temperatures—°F		
Carb. Air before Heater		
Carb. Air after Heater		
Intake Manifold		
Spark Plug Gasket		
Cylinder Base		
Crankcase		
Water In		
Water Out		
Carburetor Fuel		
Nozzle Fuel		
Injector Fuel		
Pressure Oil		
Sump Oil		
Engine Room Air		
Pressures:		
Carb. Air Vent. Diff.—In H₂O		
Int. Man. Vac.—In. Hg.		
Oil—Lbs sq.in.—High		
Oil—Lbs. sq.in.—Low		
Fuel—Lbs sq.in.		
Barometer—In. Hg.		
Calculated Data:		
Vapor Pressure—In. Hg		
ADMP		
Corr. Factor		
BHP—Observed		
BHP—Corrected		
RPM		
BMEP—Corrected		
BSFC—Lbs BHP Hr		
Torque—Ft. Lbs.—Observed		
Combustion Air —Lbs hr		
Fuel Air		
Stop Report No		
Total Time—Hrs.		

REMARKS—Lbs Oil added if any

OPERATOR

RONAUTICAL RESEARCH LABORATOR
UNIVERSITY OF KENTUCKY

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Data Sheet No. 25

ENGINE LOG SHEET

ENGINE NO. 11

DATE: 10-14-52

MAKE: MERZ

OBJECT: FIND OPTIMUM SPARK ADVANCE

Reading No.	START	127	128	129	STOP
Time of Day	11:15	11:27	11:37	11:53	11:55
Speed		2000	2000	2000	
Dyn. Scale		.073	.071	.064	
Fuel Flow—Lbs Hr		2.6	2.6	2.7	
Spark Advance—Deg.		30°	40°	20°	
FUEL CORR		2.74	2.74	2.85	
Temperatures—°F					
Carb. Air before Heater		95	95	95	
Carb. Air after Heater		95	95	95	
Intake Manifold		92	92	95	
Spark Plug Gasket		285	300	262	
Cylinder Base		125	125	125	
Crankcase		100	102	105	
Water In		118	118	119	
Water Out		157	158	150	
Carburetor Fuel		—	—	—	
Nozzle Fuel		—	—	—	
Injector Fuel		93	93	95	
Pressure Oil		80	135	135	
Sump Oil		118	120	121	
Engine Room Air		88	88	90	
Pressures					
Carb. Air Vent. Diff.—In H O		1.64	1.59	1.73	
Int. Man. Vac.—In. Hg.		-.1	-.1	-.1	
Oil—Lbs/sq.in.—High		105	105	105	
Oil—Lbs./sq.in.—Low		26	26	26	
Fuel—Lbs sq in.		24	24	25	
Barometer—In. Hg.	29.10	29.10	29.10	29.10	
BAR CORR	28.64	28.64	28.64	28.64	
Calculated Data:					
Vapor Pressure—In. Hg.	.46	.46	.46	.46	
ADMP		28.54	28.54	28.54	
Corr. Factor					
BHP—Observed		2.89	2.81	2.53	
BHP—Corrected					
RPM		2000	2000	2000	
BMEP—Corrected					
BSFC—Lbs BHP Hr.		.95	.975	112	
Torque—Ft. Lbs.—Observed					
Combustion Air—Lbs/hr		33.4	33.62	34.0	
Fuel/Air		.082	.0815	.084	
Stop Report No.					
Total Time—Hrs.					

REMARKS—Lbs. Oil added if any.

OPERATOR Currens

RONAUTICAL RESEARCH LABORATOR
UNIVERSITY OF KENTUCKY

ENGINE LOG SHEET

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Data Sheet No. 26

ENGINE NO. 11

DATE: 10-14-52

MAKE: Merz

OBJECT: PART C1 - RUN I N.G

Reading No.	START	130	131	132	133	134	135*	STOP	START	136
Time of Day	8:30	9:10	9:40	9:54	9:59	10:04	10:07	10:20	11:15	11:27
Speed	—	2000	2000	2000	2000	2000	2000			2000
Dyn. Scale		.075	.096	.092	.094	.093	.089			.094
Fuel Flow- Lbs/Hr 1.055		2.70	2.8	3.0	3.15	3.3	3.5			2.55
Spark Advance—Deg.		30	30	30	30	30	30			30
Fuel Flow Corr.		2.85	2.95	3.17	3.32	3.48	3.69			2.68
Temperatures— F										
Carb. Air before Heater		85	87	90	92	92	92			85
Carb. Air after Heater		85	85	90	92	92	92			85
Intake Manifold		78	85	90	88	89	88			82
Spark Plug Gasket		242	277	271	248	267	260			275
Cylinder Base		107	110	112	112	112	112			105
Crankcase		93	93	95	92	97	97			90
Water In		97	102	102	105	103	104			99
Water Out		157	155	160	157	157	158			155
Carburetor Fuel		—	—	—	—	—	—			
Nozzle Fuel		—	—	—	—	—	—			
Injector Fuel		85	87	90	90	90	90			82
Pressure Oil		120	122	125	125	125	125			115
Sump Oil		108	108	112	112	112	112			104
Engine Room Air		78	83	85	85	87	85			80
Pressures.										
Carb. Air Vent. Diff.—In H O		1.72	1.68	1.7	1.7	1.7	1.73			1.64
Int. Man. Vac.—In. Hg.		-.1	-.1	-.1	-.1	-.1	-.1			-.1
Oil—Lbs sq.in —High		96	95	95	95	95	95			97
Oil—Lbs./sq.in.—Low		26	26	26	26	26	26			26
Fuel—Lbs sq in.		21	18.0	24	24	25	25			19
Barometer—In. Hg.	28.93	28.93	2893	28.93	28.93	28.93	28.93		28.93	2893
Corr Bar	28.59	28.59	28.59	28.59	28.59	28.59	28.59		28.59	28.59
Calculated Data:										
Vapor Pressure—In. H	.34	.34	.34	.34	.34	.34	.34		.34	.34
ADMP		28.49	28.49	28.49	28.49	28.49	28.49			2849
Corr. Factor (air)		.9	.899	.89	.891	.891	.891			.90
BHP—Observed		2.96	3.80	3.64	3.71	3.68	3.51			3.71
BHP—Corrected										
RPM		2000	2000	2000	2000	2000	2000			2000
BMEP— Corrected										
BSFC—Lbs BHP Hr		.96	.775	.870	.90	.945	1.501			.722
Torque—Ft. Lbs.—Observed										
Combustion Air—Lbs hr		34.8	34.1	33.9	33.9	33.9	34.4			33.6
Fuel/Air		.0818	.0865	.0935	.0980	.1025	.1072			.0798
Stop Report No.										
Total Time—Hrs										
Comb. Air obs.		38.6	38.0	38.1	38.1	38.1	38.6			37.5

REMARKS—Lbs. Oil added if any.

BLED FUEL SYSTEM - ROTAMETER

OPERATOR Currens

AERONAUTICAL RESEARCH LABORATORY

UNIVERSITY OF KENTUCKY

ENGINE LOG SHEET

Data Sheet No. 27

ENGINE NO.

DATE: 10-14-52

MAKE: MERZ

OBJECT: RUN C1-1.

Reading No.	137	138	139	140	141	STOP
Time of Day	11:35	11:50	12:00	12:06	1214	12[illegible]
Speed	2000	2000	2000	2000	2000	
Dyn. Scale	.093	.091	.088	.082	.084	
Fuel Flow—Lbs Hr	2.55	2.50	2.50	2.50	2.50	
Spark Advance—Deg	30	30	30	30	30	
FF (CORR)	2.68	2.64	2.64	2.64	2.64	
Temperatures—°F						
Carb. Air before Heater	85	90	93	95	95	
Carb. Air after Heater	102	130	150	172	200	
Intake Manifold	91	110	120	132	148	
Spark Plug Gasket	275	275	275	277	275	
Cylinder Base	105	110	114	114	116	
Crankcase	90	95	96	97	99	
Water In	95	102	107	107	110	
Water Out	155	157	160	158	158	
Carburetor Fuel						
Nozzle Fuel						
Injector Fuel	82	90	92	93	95	
Pressure Oil	115	124	125	127	127	
Sump Oil	105	110	114	112	116	
Engine Room Air	80	89	90	90	92	
Pressures:						
Carb. Air Vent Diff.—in H.O	1.64	1.58	1.58	1.57	1.54	
Int. Man. Vac.—In. Hg.	-.1	-.1	-.1	-.1	-.1	
Oil—Lbs sq.in.—High	97	95	95	95	95	
Oil—Lbs. sq.in.—Low	26	26	26	26	26	
Fuel—Lbs sq.in.	19	23	22	23	23	
Barometer—In. Hg.	28.93	28.93	28.93	28.93	28.93	
BAR CORR	28.59	28.59	28.59	28.59	28.59	
Calculated Data:						
Vapor Pressure—In. Hg	.34	.34	.34	.34	.34	
ADMP	28.49	28.49	28.49	28.49	28.49	
Corr. Factor	.9	.9	.895	.895	.895	
BHP—Observed	3.66	3.59	3.48	3.43	3.31	
BHP—Corrected						
RPM	2000	2000	2000	2000	2000	
BMEP—Corrected						
BSFC—Lbs BHP Hr.	.732	.735	.760	.768	.798	
Torque—Ft. Lbs.—Observed						
Combustion Air—Lbs hr	33.6	33.3	33.1	33.0	32.7	
Fuel/Air	.0798	.0793	.0798	.080	.0808	
Stop Report No.						
Total Time—Hrs.	37.5	37	37	36.8	36.5	

REMARKS—Lbs Oil added if any.
NO HEAT REQD AT 2000 - FULL THROTTLE

OPERATOR Curvens

ERONAUTICAL RESEARCH LABORATO
UNIVERSITY OF KENTUCKY

ENGINE LOG SHEET

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Data Sheet No. 28

ENGINE NO.

DATE: 10-15-52

MAKE: MERC

OBJECT: RUN C-1-5 (C-1, 2, 3 + 4 DELETED)*

Reading No.	START	142	143	144	145	146	147	S	148	149
Time of Day	1:55	2:16	2:23	2:27	2:35	2:40	2:48	T	3:10	3.19
Speed		1600	1600	1600	1600	1600	1600	A	1200	1200
Dyn. Scale		.10	.097	.094	.091	.090	.087	R	.096	.095
Fuel Flow—Lbs Hr		2.1	2.1	2.1	2.1	2.1	2.1	T	1.7	.17
Spark Advance—Deg		30°	30	30	30	30	30		30	30
FUEL FLOW CORR		222	2.22	2.22	2.22	2.22	2.22	R	1.79	1.99
Temperatures—°F										
Carb. Air before Heater		92	93	92	92	92	92	N	92	94
Carb. Air after Heater		92	110	132	159	177	204		96	115
Intake Manifold		90	98	110	126	135	149	No	92	100
Spark Plug Gasket		268	263	263	263	262	260		255	255
Cylinder Base		112	112	111	111	111	111	C	111	110
Crankcase		100	99	99	98	97	97	-	99	98
Water In		102	102	102	102	102	102	1	101	100
Water Out		157	156	156	159	157	157	-	155	154
Carburetor Fuel								9		
Nozzle Fuel										
Injector Fuel		92	92	92	92	92	92	No	91	91
Pressure Oil		124	120	120	119	119	119		120	116
Sump Oil		115	111	111	109	109	108	HEAT	116	107
Engine Room Air		90	86	86	87	87	86		89	87
								REQD		
Pressures:										
Carb. Air Vent. Diff.—In H₂O		1.14	1.13	1.12	1.10	1.08	1.06	AT	.73	.73
Int. Man. Vac.—In. Hg.		-.1	-.1	-.1	-.1	-.1	-.1			
Oil—Lbs/sq.in.—High		90	90	88	88	88	88	FULL	95	95
Oil—Lbs./sq.in.—Low		27	27	27	27	27	27		27	27
Fuel—Lbs/sq.in.		26	26	24	25	25	25	THROTTLE	25	24
Barometer—In. Hg.		29.00	29.00	29.00	29.00	29.00	29.00		29.00	29.00
BAR CORR		28.61	28.61	28.61	28.61	28.61	28.61	SO	28.61	28.61
Calculated Data:										
Vapor Pressure—In. Hg.		.29	.29	.29	.29	.29	.29	PART	.29	.29
ADMP		28.51	28.51	28.51	28.51	28.51	28.51		28.51	28.51
Corr. Factor		.89	.89	.89	.89	.89	.89	THROTTLE	.89	.89
BHP—Observed		3.15	3.06	2.96	2.88	2.84	2.75		2.27	2.25
BHP—Corrected								UNNEC		
RPM		1600	1600	1600	1600	1600	1600	ESSARY	1200	1200
BMEP—Corrected										
BSFC—Lbs BHP Hr										
Torque—Ft. Lbs.—Observed		.705	.726	.750	.770	.782	.818		.789	.795
Combustion Air—Lbs hr		28.0	28.0	27.8	27.7	27.7	27.7		22.3	22.3
Fuel/Air		.0793	.0794	.0798	.0800	.0800	.0800		.0802	.0802
Stop Report No.										
Total Time—Hrs.										
AIR FLOW OBS		31.5	31.4	31.2	31.1	31.1	31.1		25.1	25.1

REMARKS—Lbs. Oil added if any

* NOT NECESSARY - NO HEAT REQD AT FULL THROTTLE

OPERATOR CURRENS

ERONAUTICAL RESEARCH LABORATC .
UNIVERSITY OF KENTUCKY

ENGINE LOG SHEET

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Data Sheet No. 29

ENGINE NO.

DATE: 10-15-52

MAKE: MERZ

OBJECT: RUN C1-9 AND C·1-13

Reading No.	150	151	152	153	154	155	156	157	158	STOP
Time of Day	3:24	3:30	3:37	3:42	3:52	401	406	412	4:26	4:31
Speed	1200	1200	1200	1200	800	800	800	800	800	
Dyn. Scale	.093	.092	.089	.086	.083	.084	.086	.087	.088	
Fuel Flow—Lbs Hr	1.7	1.7	1.6	1.6	1.3	1.3	1.3	1.35	1.35	
Spark Advance—Deg.	30	30	30	30	30	30	30	30	30	
FUEL FLOW CORR	1.79	1.79	1.69	1.69	1.37	1.37	1.37	1.42	1.42	
Temperatures—°F										
Carb. Air before Heater	92	92	92	92	92	92	90	90	90	
Carb. Air after Heater	132	147	177	201	202	170	152	127	92	
Intake Manifold	110	115	131	142	136	122	115	105	90	
Spark Plug Gasket	248	255	255	255	246	245	245	245	245	
Cylinder Base	109	109	109	108	106	105	104	103	102	
Crankcase	96	96	95	95	94	93	92	92	91	
Water In	98	98	98	99	96	95	94	94	94	
Water Out	155	155	158	155	152	155	160	160	154	
Carburetor Fuel										
Nozzle Fuel										
Injector Fuel	92	92	92	92	91	91	90	90	89	
Pressure Oil	114	113	112	111	108	105	104	104	102	
Sump Oil	105	105	105	104	102	101	99	99	98	
Engine Room Air	87	87	87	87	86	86	86	86	85	
Pressures										
Carb. Air Vent. Diff.—In H O	.73	.71	.69	.67	.42	.42	.43	.43	.43	
Int. Man. Vac.—In. Hg.	-.1	-.1	-.1	-.1	-.1	-.1	-.1	-.1	-.1	
Oil—Lbs sq.in.—High	95	95	95	95	89	89	89	90	90	
Oil—Lbs./sq.in.—Low	27	27	27	27	27	27	27	27	27	
Fuel—Lbs sq.in.	24	24	24	25	25	25	25	25	25	
Barometer—In. Hg.	29.00	29.00	29.00	29.00	29.00	29.00	29.00	29.00	29.00	
BAR CORR	28.61	28.61	28.61	28.61	28.61	28.61	28.61	28.61	28.61	
Calculated Data:										
Vapor Pressure—In. Hg	.29	.29	.29	.29	.29	.29	.29	.29	.29	
ADMP	28.51	28.51	28.51	28.51	28.51	28.51	28.51	28.51	28.51	
Corr. Factor	.89	.89	.89	.89	.89	.89	.89	.89	.89	
BHP—Observed	2.2	2.18	2.10	2.03	1.31	1.325	1.36	1.375	1.39	
BHP—Corrected										
RPM	1200	1200	1200	1200	800	800	800	800	800	
BMEP—Corrected										
BSFC—Lbs BHP Hr.	.815	.821	812	.832	1.045	1.032	1.005	1.03	1.02	
Torque—Ft. Lbs.—Observed										
Combustion Air—Lbs hr	22.3	22.1	21.8	21.4	17.3	17.3	17.4	17.4	17.4	
Fuel Air	.0803	.081	.0775	.079	.0793	.0793	.0790	.0815	.0815	
Stop Report No.										
Total Time—Hrs.										
AIR FLOW OBS	25.1	24.8	24.5	24.0	19.4	19.4	19.6	19.6	19.6	

REMARKS- Lbs. Oil added if any.
START RUN NO C1-18 SLIGHT DETONATION AT 800 RPM

OPERATOR CURRENS

ERONAUTICAL RESEARCH LABORATC

UNIVERSITY OF KENTUCKY

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Data Sheet No. 30

ENGINE LOG SHEET

NGINE NO.

DATE: 10-16-52

MAKE: MERZ

OBJECT: RUN No C-2-1 AND C 2-5

		*					**	***		
Reading No.	START	159	160	161	162	163	164	165	166	167
Time of Day	1:35	2:04	2:21	2:27	2:35	2:45	2:52	2:59	3:08	3:17
Speed		2000	2000	2000	2000	2000	1600	1600	1600	1600
Dyn. Scal		.090	.088	.086	.081	.078	.081	.084	.086	.088
Fuel Flow—Lb. Hr		3.0	3.05	3.00	3.00	290	245	250	2.45	2.45
Spark Advance—Deg.		30	30	80	80	30	30	30	30	30
FUEL FLOW CORR		3.17	3.21	3.17	3.17	3.06	2.58	2.64	2.58	2.58
Temperatures—°F										
Carb. Air before Heater		21	20	20	20	20	21	21	21	21
Carb. Air after Heater		22	39	74	110	146	154	100	72	50
Intake Manifold		22	32	50	75	96	101	75	56	42
Spark Plug Gasket		269	260	260	266	267	249	237	249	254
Cylinder Base		54	55	55	55	56	59	55	55	55
Crankcase		43	45	46	49	49	49	49	48	48
Water In		27	26	26	26	26	27	27	27	26
Water Out		150	160	145	149	155	145	150	157	157
Carburetor Fuel										
Nozzle Fuel										
Injector Fuel		24	23	24	22	23	24	24	24	23
Pressure Oil		80	85	85	85	86	84	80	77	76
ump Oil		62	70	66	69	74	70	64	67	67
ngine Room Air		20	21	21	21	21	21	22	22	21
Pressures:										
Carb. Air Vent. Diff.—In H.C		1.73	1.72	1.69	1.65	1.54	1.14	1.07	1.1	1.11
Int. Man. Vac.—In. Hg.		-.1	-.1	-.1	-.1	-.1	-.1	-.1	-.1	-.1
Oil—Lbs. sq.in.—High		100	100	100	100	100	92	92	95	95
Oil—Lbs./sq.in.—Low		27	27	27	27	27	27	27	27	27
Fuel—Lbs. sq.in.		24	24	24	24	25	25	25	24	24
Barometer—In. Hg. OBS		29.08	29.08	29.08	29.08	29.08	29.08	29.08	29.08	29.08
BAR CORR		28.9	28.90	28.90	28.90	28.90	28.90	28.90	28.90	28.90
Calculated Data:										
Vapor Pressure—In. Hg		.18	.18	.18	.18	.18	.18	.18	.18	.18
ADMP		28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8
Corr. Factor		1.035	1.035	1.035	1.035	1035	1.035	1.035	1.035	1.035
BHP—Observed		3.56	3.48	3.4	3.2	308	2.56	2.66	2.72	2.78
BHP—Corrected										
RPM		2000	2000	2000	2100	2000	1600	1600	1600	1600
BMEP—Corrected										
BSFC—Lbs BHP Hr										
Torque—Ft. Lbs.—Observ		.890	.921	.933	.990	.995	1.010	.993	.950	.929
Combustion Air—Lbs. hr		40.0	40.0	39.6	39.2	37.8	32.6	31.6	32.2	32.3
Fuel/Air		.0792	.0802	.0800	.809	.0810	.0744	.084	.0802	.0800
Stop Report No.										
Total Time—Hrs										
AIR FLOW OBS		38.7	38.6	38.2	37.8	36.5	31.5	30.55	31.0	31.1

EMARKS—Lbs. Oil added at an

* HIGHEST TEMP OBTAINABLE 20°F
** START, RUN C-2-5
*** NB

OPERATOR CURRENS

AERONAUTICAL RESEARCH LABORATORY
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Data Sheet No. 31

ENGINE LOG SHEET

ENGINE NO.

DATE: 10-16-52

MAKE: MERZ

OBJECT RUN C2-5 AND C2-9 AND C2-13

		*				**			N.G ↓		
Reading No.	168	169	170	171	172	173	174	175	176	177	Stop
Time of Day	3:30	3:41	3:46	3:58	4:02	4:19	4:25	4:35	4:58	5:14	5:20
Speed	1600	1200	1200	1200	1200	800	800	800	800	800	
Dyn. Scale	.090	.098	.095	.088	.084	.082	.089	.090	.086	.091	
Fuel Flow—Lbs Hr	2.45	2.0	2.0	2.0	1.95	1.5	1.5	1.55	1.6	1.6	
Spark Advance—Deg	30	30	30	30	30	30	30	30	30	30	
FUEL FLOW CORR	2.58	2.11	2.11	2.11	2.02	1.585	1.59	1.63	1.69	1.69	
Temperatures—°F											
Carb. Air before Heater	21	20	20	20	20	20	18	19	19	18	
Carb Air after Heater	24	23	50	101	159	157	97	53	22	23	
Intake Manifold	25	24	36	64	94	92	66	45	24	23	
Spark Plug Gasket	251	243	244	235	236	204	209	210	205	218	
Cylinder Base	54	52	54	51	51	51	50	50	52	48	
Crankcase	46	46	45	45	44	42	43	42	40	40	
Water In	26	26	25	25	25	25	24	24	24	23	
Water Out	150	151	150	145	154	155	162	154	153	150	
Carburetor Fuel											
Nozzle Fuel											
Injector Fuel	22	23	23	22	21	21	21	21	20	21	
Pressure Oil	75	70	67	65	65	56	55	54	52	52	
Sump Oil	67	65	62	61	60	58	55	55	54	53	
Engine Room Air	21	21	21	21	21	20	20	20	20	19	
Pressures.											
Carb. Air Vent Diff.—In H₂O	1.11	.77	.76	.73	.71	.43	.44	.45	.47	.46	
Int. Man. Vac.—In Hg.	-.1	-.1	-.1	-.1	-.1	0	0	0	0	0	
Oil—Lbs/sq.in.—High	97	100	101	101	101	99	99	99	98	98	
Oil—Lbs. sq in.—Low	27	28	28	28	28	28	28	28	28	28	
Fuel—Lbs/sq in.	24	24	24	24	24	24	24	24	24	23	
Barometer—In. Hg.	29.08	29.08	29.08	29.08	29.08	29.08	29.08	29.08	29.08	29.08	
BAR CORR	28.90	28.90	28.90	28.90	28.90	28.90	28.90	28.90	28.90	28.90	
Calculated Data:											
Vapor Pressure—In. Hg	.18	.18	.18	.18	.18	.18	.18	.18	.18	.18	
ADMP	28.80	28.80	28.80	28.80	28.90	28.90	28.90	28.90	28.90	28.90	
Corr. Factor	1.035	1.035	1.035	1.035	1.035	1.035	1.035	1.035	1.035	1.035	
BHP—Observed	2.84	2.32	2.25	2.09	1.99	1.215	1.375	1.420	1.36	1.44	
BHP—Corrected											
RPM											
BMEP—Corrected											
BSFC—Lbs BHP Hr	.910	.910	.936	1.010	1.015	1.220	1.155	1.150	1.240	1.172	
Torque—Ft Lbs.—Observed											
Combustion Air—Lbs hr	32.3	26.7	26.5	26.0	25.7	20.3	20.5	20.7	21.2	20.9	
Fuel/Air	.0800	.0790	.0798	.081	.0788	.078	.0775	.0790	.0825	.0805	
Stop Report No.											
Total Time—Hrs.											
AIR FLOW OBS	31.1	25.8	25.6	25.0	24.8	19.6	19.8	20.0	20.4	20.2	

REMARKS—Lbs. Oil added if any.
*START C2-9
**START C2-13

OPERATOR Curtis

AERONAUTICAL RESEARCH LABORATORY
UNIVERSITY OF KENTUCKY

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Data Sheet No. 32

ENGINE LOG SHEET

ENGINE NO.

DATE: 10-17-52

MAKE: MERZ

OBJECT: RUN C 4-1 and C 4-5

							C-4-5 *			
Reading No.	START	178	179	180	181	182	183	184	185	186
Time of Day	12:50	1:25	1:32	1:42	1:50	1:56	2:05	2:11	2:20	2:28
Speed		2000	2000	2000	2000	2000	1600	1600	1600	1600
Dyn. Scale		.095	.094	.091	.085	.083	.083	.084	.089	.091
Fuel Flow—Lbs Hr		3.3	3.25	3.25	3.2	3.15	2.5	2.5	2.55	2.59
Spark Advance—Deg		30	30	30	30	30	30	30	30	30
FUEL FLOW CORR		3.49	3.42	3.42	3.38	3.33	2.64	2.64	2.64	2.73
Temperatures—°F										
Carb. Air before Heater		-15	-14	-15	-15	-15	-15	-15	-15	-15
Carb. Air after Heater		-12	0	25	60	101	106	64	25	0
Intake Manifold		-10	-2	10	17	56	60	38	15	0
Spark Plug Gasket		267	270	268	265	262	242	248	255	250
Cylinder Base		30	30	30	30	30	29	27	27	28
Crankcase		18	17	16	15	15	15	14	13	13
Water In		-6	-6	-6	-6	-7	-7	-8	-8	-8
Water Out		154	153	153	152	152	153	152	155	155
Carburetor Fuel										
Nozzle Fuel										
Injector Fuel		-10	-10	-10	-10	-10	-12	-12	-12	-12
Pressure Oil		50	51	51	50	-50	43	42	40	40
Sump Oil		43	43	43	43	43	39	37	37	37
Engine Room Air		-13	-13	-13	-14	-14	-14	-14	-14	-14
Pressures.										
Carb. Air Vent. Diff.—In H₂O		1.65	1.66	1.64	1.58	1.54	.97	.97	1.0	1.04
Int. Man. Vac.—In. Hg.		-.1	-.1	-.1	-.1	-.1	-.1	-.1	-.1	-.1
Oil—Lbs/sq.in.—High		102	102	103	103	103	101	101	101	101
Oil—Lbs./sq.in.—Low		27	27	26	26	26	27	27	27	27
Fuel—Lbs/sq.in		24	24	24	24	24	24	24	24	24
Barometer—In. Hg.	29.12	29.12	29.12	29.12	29.12	29.12	29.12	29.12	29.12	29.12
BAR CORR	28.95	28.95	28.95	28.95	28.95	28.95	28.95	28.95	28.95	28.95
Calculated Data:										
Vapor Pressure—In. Hg	-.17	.17	.17	.17	.17	.17	.17	.17	.17	.17
ADMP		28.85	28.85	28.85	28.85	28.85	28.85	28.85	28.85	28.85
Corr. Factor		1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135
BHP—Observed		3.75	3.71	360	335	3.27	2.62	2.66	2.81	2.88
BHP—Corrected										
RPM		2000	2000	2000	2000	2000	1600	1600	1600	1600
BMEP—Corrected										
BSFC—Lbs BHP Hr		930	.92	.950	1.010	1.02	1.005	.994	.955	.950
Torque—Ft Lbs.—Observed										
Combustion Air Lbs/hr		42.9	43.2	42.8	42.0	41.5	33.0	33.0	33.5	34.2
Fuel/Air		.0812	.0792	.0798	.0806	.0801	.0800	.0800	.0804	.0799
Stop Report No.										
Total Time—Hrs										
AIR FLOW OBS		37.8	38.0	37.7	37.0	36.5	29.05	29.05	29.5	30.1

REMARKS—Lbs. Oil added if any

*START C 4-5

OPERATOR Cerrens

RONAUTICAL RESEARCH LABORATO
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Data Sheet No. 33

ENGINE LOG SHEET

ENGINE NO. 11

DATE. 10-17-52

MAKE: MeRZ

OBJECT C 4-5 And C4-9 And C4-13

		*					* *			
Reading No.	187	188	189	190	191	192	193	194	195	196
Time of Day	2:37	2:50	2:57	3:04	3:13	3:22	3:38	3:48	3:54	4:00
Speed	1600	1200	1200	1200	1200	1200	800	800	800	800
Dyn. Scale	.095	.095	.091	.087	.082	.071	.069	.073	.075	.078
Fuel Flow—Lbs Hr	2.62	2.18	2.18	2.18	2.15	2.06	1.58	1.6	1.6	1.61
Spark Advance—Deg.	30	30	30	30	30	30	30	30	30	30
Fuel Flow CoRR	2.765	2.30	2.30	2.30	2.27	2.17	1.67	1.69	1.69	1.70
Temperatures—°F										
Carb. Air before Heater	-15	-15	-15	-15	-15	-15	-16	-16	-16	-16
Carb. Air after Heater	-13	-13	-1	25	62	97	108	62	27	3
Intake Manifold	-10	-12	-4	8	28	47	52	32	16	3
Spark Plug Gasket	255	239	240	232	235	235	197	200	205	208
Cylinder Base	27	27	27	25	27	25	27	27	27	27
Crankcase	12	12	12	12	12	10	8	7	8	7
Water In	-8	-8	-10	-8	-8	-8	-8	-8	-8	-8
Water Out	155	150	152	152	155	152	147	148	148	150
Carburetor Fuel										
Nozzle Fuel										
Injector Fuel	-12	-12	-12	-13	-12	-12	-13	-8	-12	-12
Pressure Oil	40	33	32	32	32	30	18	18	18	18
Sump Oil	37	33	32	32	32	30	27	25	25	23
Engine Room Air	-14	-14	-14	-14	-14	-14	-14	-14	-14	-14
Pressures.										
Carb. Air Vent Diff – in H_2O	1.05	.75	.75	.74	.72	.67	.37	.38	.38	.39
Int. Man. Vac.—In. Hg	-1	-1	0	0	0	0	0	0	0	0
Oil—Lbs sq.in —High	101	103	103	103	103	105	100	100	100	100
Oil—Lbs. sq.in.—Low	27	27	27	27	27	27	27	27	27	27
Fuel—Lbs sq in	24	24	24	24	24	24	24	24	24	24
Barometer—In. Hg	24.12	29 12	29.12	29.12	29.12	2912	29.12	29.12	29.12	2912
BAR CORR	28.95	28.95	28.95	28.95	28.95	28.95	28.95	28.95	28.95	28.95
Calculated Data										
Vapor Pressure—In. Hg	.17	.17	.17	.17	.17	.17	.17	.17	.17	.17
ADMP	28.95	28.95	28.95	28.95	28.95	28.95	28.95	28.95	28.95	28.95
Corr. Factor	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135	1.135
BHP—Observed	3.00	2.25	2.16	2.06	1.94	1.68	1.64	1.73	1.78	1.85
BHP—Corrected										
RPM	1600	1200	1200	1200	1200	1200	800	800	800	800
BMEP—Corrected										
BSFC—Lbs BHP Hr	.923	1.02	1.063	1.115	1.17	1.29	1.02	0.975	0.950	0.920
Torque—Ft. Lbs.—Observed										
Combustion Air—Lbs hr	34.6	28.8	28.8	28.65	28.25	27.35	20.8	21.05	21.05	21.30
Fuel Air	.080	.0798	.0798	.0803	.0804	.0795	.0801	.0801	.0801	.0798
Stop Report No										
Total Time —Hrs										
AiR Flow obs	30.25	25.4	25.4	25.24	24.92	24.06	18.31	18.54	18.54	18.77

REMARKS—Lbs. Oil added if any

* StART C4-9
* * START C4-13

OPERATOR CURRENS

RONAUTICAL RESEARCH LABORATOR
UNIVERSITY OF KENTUCKY

ENGINE LOG SHEET

Data Sheet No. 34

ENGINE NO. 11

DATE: 10-17-52
10-20-52

MAKE: Merz

OBJECT: Run C4-13 * C-6-1 ** C-6-5

Reading No.	197	Stop	START	198	199	200	201	202	203	204
Time of Day	4:19	4:45	11:15	1150	12:02	12:07	12:14	12:19	12:25	12:32
Speed	800			2000	2000	2010	2000	2000	1600	1600
Dyn. Scale	.076			.085	.083	.079	.070	.066	.066	.068
Fuel Flow—Lbs Hr	1.61			3.6	3.6	3.6	3.5	3.45	2.7	275
Spark Advance—Deg.	30°			30	30	30	30	30	30	30
Fuel Flow Corr	1.70			3.81	3.81	3.81	3.69	3.65	2.85	291
Temperatures—°F										
Carb. Air before Heater	-16			-49	-48	-47	-46	-46	-46	-47
Carb. Air after Heater	-14			-45	-27	1	49	98	101	46
Intake Manifold	-8			-45	-32	-15	17	47	46	16
Spark Plug Gasket	215			264	259	254	241	237	227	228
Cylinder Base	27			+10	9	9	9	9	9	8
Crankcase	7			-10	-10	-10	-11	-11	-11	-11
Water In	-8			-40	-39	-40	-40	-40	-40	-40
Water Out	152			145	145	144	142	141	148	147
Carburetor Fuel										
Nozzle Fuel										
Injector Fuel	-13			-45	-45	-45	-45	-45	-45	-45
Pressure Oil	18			24	22	21	20	20	12	11
Sump Oil	24			25	23	21	21	21	19	17
Engine Room Air	-14			-45	-46	-46	-45	-45	-45	-45
Pressures:										
Carb. Air Vent Diff.—In H O	.39			1.75	1.75	1.72	1.65	1.57	1.0	1.04
Int. Man. Vac.—In. Hg.	0			-.1	-.1	-.1	-.1	-.1	-.1	-.1
Oil—Lbs/sq in.—High	100			91	90	90	90	90	93	93
Oil—Lbs. sq.in—Low	27			30	30	29	29	29	29	29
Fuel—Lbs sq in.	24			24	24	24	24	24	24	24
Barometer—In. Hg	29.12		29.34	29.34	29.34	29.34	29.34	29.34	29.34	29.34
Bar Corr	28.95		29.21	29.27	29.27	29.27	29.27	29.27	29.27	29.27
Calculated Data										
Vapor Pressure—In. Hg	.17		.07	.07	.07	.07	.07	.07	.07	.07
ADMP	28.95			29.17	29.17	29.17	29.17	29.17	29.17	29.17
Corr. Factor	1.135			1.23	1.23	1.23	1.23	1.23	1.23	1.23
BHP—Observed	1.87			3.36	3.28	3.12	2.76	2.60	2.08	2.15
BHP—Corrected										
RPM	800			2000	2000	2000	2000	2000	1600	1600
BMEP—Corrected										
BSFC—Lbs BHP Hr.	.907			1.135	1.160	1.220	1.34	1.405	1.370	1.350
Torque—Ft. Lbs.—Observed										
Combustion Air—Lbs hr	21.30			47.8	47.8	47.5	46.5	45.4	36.3	36.8
Fuel/Air	.0795			.0796	.0796	.0803	.0795	.0805	.0785	.0793
Stop Report No.										
Total Time Hrs										
Air Flow obs	18.77			38.9	38.9	38.6	37.8	36.9	29.5	27.9

REMARKS—Lbs. Oil added if any
* Start C-6-1 10-20 52
** Start C-6-5

OPERATOR Curkens

ONAUTICAL RESEARCH LABORATO

UNIVERSITY OF KENTUCKY

ENGINE LOG SHEET

PAGE NO. 195

Data Sheet No. 35

ENGINE NO.

DATE: 10·20·52

MAKE: MERZ

OBJECT: RUN C-6-5 * C-6 9 ** C-6-13

Reading No	205	206	207	208	209	210	211	212	213	214
Time of Day	12:40	1246	12:49	1.03	1:11	1:17	1:24	1:30	1:37	1:47
Speed	1600	1600	1600	1200	1200	1200	1200	1200	800	800
Dyn. Scale	.072	.076	.080	.074	.073	.068	.061	.054	.056	.057
Fuel Flow—Lbs Hr	2.8	2.85	2.90	2.35	2.35	2.35	2.3	2.25	1.75	1.8
Spark Advance—Deg.	30	30	30	30	30	30	30	30	30	30
FUEL FLOW CORR	2.96	301	3.06	2.48	2.48	2.48	2.43	2.38	1.85	1.90
Temperatures—°F										
Carb. Air before Heater	-48	-47	-47	-47	-47	-48	-48	-48	-48	-48
Carb. Air after Heater	-5	-25	-46	-46	-22	-1	55	111	110	4
Intake Manifold	-15	-25	-42	-43	-20	20	10	36	39	10
Spark Plug Gasket	226	227	230	217	215	214	211	213	188	179
Cylinder Base	7	6	6	7	7	6	6	6	8	7
Crankcase	-12	-14	-13	-15	-15	-16	-16	-16	-16	-16
Water In	-41	-41	-40	-40	-41	-41	-42	-42	-41	-40
Water Out	144	142	142	148	147	148	146	146	145	135
Carburetor Fuel										
Nozzle Fuel										
Injector Fuel	-45	-45	-46	-46	-45	-46	-46	-45	-45	-45
Pressure Oil	8	8	8	0	-2	-6	-6	-6	-19	-22
Sump Oil	15	15	15	11	10	8	8	8	7	5
Engine Room Air	-45	-46	-45	-45	-46	-46	-46	-45	-45	-45
Pressures.										
Carb. Air Vent Diff.—In H_2O	1.08	1.1	1.14	.76	.75	.74	.70	.64	.4	.41
Int. Man. Vac.—In. Hg.	-.1	-.1	-.1	-.1	-.1	-.1	-.1	-.1	0	0
Oil—Lbs. sq.in.—High	95	95	95	98	95	95	98	98	101	101
Oil—Lbs. sq.in.—Low	29	30	30	30	30	30	30	30	30	30
Fuel—Lbs sq.in.	24	24	24	23	23	23	23	23	23	23
Barometer—In. Hg.	29.34	29.34	29.34	29.34	29.34	29.34	29.34	29.34	29.34	29.34
BAR - CORR	29.27	29.27	29.27	29.27	29.27	29.27	29.24	29.24	29.24	29.27
Calculated Data:										
Vapor Pressure—In Hg	.07	.07	.07	.07	.07	.07	.07	.07	.07	.07
ADMP	29.17	29.17	29.17	29.17	29.17	29.17	29.17	29.17	29.27	29.27
Corr. Factor	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23	1.23
BHP—Observed	2.28	2.40	2.53	1.76	1.73	1.61	1.45	1.28	.87	.90
BHP—Corrected										
RPM	1600	1600	1600	1200	1200	1200	1200	1200	800	800
BMEP Corrected										
BSFC—Lbs. BHP Hr	1.300	1252	1.210	1.410	1.435	1.54	1675	1.855	2.13	2.11
Torque—Ft. Lbs.—Observed										
Combustion Air—Lbs hr	37.8	38.1	38.7	31.1	31.0	30.9	30.2	28.9	23.4	23.6
Fuel Air	.0785	.079	.0792	.0796	.0801	.0803	.0805	.0820	.079	.0805
Stop Report No.										
Total Time—Hrs.										
AIR FLOW OBS	30.7	31.0	31.5	25.3	25.2	25.1	24.6	23.5	19	19.2

REMARKS—Lbs. Oil added if any

*START C6-9

**START C6-13

OPERATOR CURRENS

AERONAUTICAL RESEARCH LABORATORY
UNIVERSITY OF KENTUCKY

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Data Sheet No. 36

ENGINE LOG SHEET

ENGINE NO.

DATE. 10-20-52

MAKE. MERK

OBJECT Run C-6-13 and C-8-1

Reading No	215	216	217	STOP	START	* 218	219	220	221	222
Time of Day	1:53	1:59	2:10	2:34	9:00	9:41	9:57	10:03	10:08	10:18
Speed	800	800	800			2000	2000	2000	2000	2600
Dyn. Scale	.058	.059	.062			.084	.078	.076	.073	.065
Fuel Flow—Lbs Hr	1.8	1.80	1.80			3.77	3.74	3.72	3.66	3.59
Spark Advance—Deg.	30	30	30			30	30	30	30	30
FUEL FLOW CORR	1.90	1.90	1.90			3.98	3.95	3.93	3.86	3.78
Temperatures—°F										
Carb. Air before Heater	-48	-48	-48			-65	-66	-66	-66	-69
Carb. Air after Heater	4	-22	-45			-64	-45	-19	2	51
Intake Manifold	-7	-22	-40			-59	-49	-34	-16	15
Spark Plug Gasket	180	182	188			265	260	255	250	235
Cylinder Base	6	5	5			5	0	-1	-1	-1
Crankcase	-18	-19	-19			-20	-30	-30	-31	-31
Water In	-41	-41	-41			-55	-55	-56	-56	-59
Water Out	132	180	132			155	150	150	150	145
Carburetor Fuel										
Nozzle Fuel										
Injector Fuel	-45	-45	-45		10-21-52	-62	-64	-64	-65	-65
Pressure Oil	-22	-22	-21			10	6	7	8	0
Sump Oil	4	4	3			7	5	0	0	0
Engine Room Air	-45	-45	-45			-64	-65	-65	-65	-66
Pressures										
Carb. Air Vent. Diff.—In H₂O	.41	.41	.41			1.74	1.72	1.70	1.65	1.58
Int. Man. Vac.—In. Hg.	0	0	0			-.1	-.1	-.1	-.1	-.1
Oil—Lbs sq.in.—High	102	102	102			108	109	109	109	112
Oil—Lbs. sq.in.—Low	30	30	30			30	30	30	30	30
Fuel—Lbs/sq.in.	23	23	23			23	23	23	23	22
Barometer—In. Hg.	29.34	29.34	29.34			29.50	29.50	29.50	29.50	29.50
BAR CORR.	29.27	29.27	29.27			29.40	29.40	29.40	29.40	29.40
Calculated Data:										
Vapor Pressure—In. Hg	.07	.07	.07			0.10	0.10	0.10	0.10	0.10
ADMP	29.27	29.27	29.27			29.30	29.30	29.30	29.30	29.30
Corr. Factor	1.23	1.23	1.23			1.28	1.28	1.28	1.28	1.28
BHP—Observed	.916	.934	.980			3.32	3.08	3.00	2.88	2.56
BHP—Corrected										
RPM	800	800	800			2000	2000	2000	2000	2000
BMEP—Corrected										
BSFC—Lbs BHP Hr.	2.07	2.04	1.94			1.20	1.282	1.31	1.34	1.48
Torque—Ft. Lbs.—Observed										
Combustion Air—Lbs hr	23.6	23.6	23.6			49.7	49.4	49.1	48.5	47.3
Fuel Air	.0805	.0805	.0805			.0800	.0800	.0800	.0795	.0800
Stop Report No.										
Total Time—Hrs.										
AIR FLOW OBS	19.2	29.2	19.2			38.84	38.62	38.40	37.80	36.46

REMARKS—Lbs. Oil added if any.

* Start C8-1

OPERATOR V. L. CURRENS

AERONAUTICAL RESEARCH LABORATORY
UNIVERSITY OF KENTUCKY

ENGINE LOG SHEET

Data Sheet No. 37

ENGINE NO. 11

DATE: 10-21-52

MAKE: MERZ

OBJECT: Run C 8-1 N.G. C-8-2 * C 8-5

Reading No.	223	224	225	226	227	228	229	230	231	232
Time of Day	10:27	10:39	10:56	11:07	11:14	11:22	11:27	11:36	11:52	11:59
Speed	2000	2000	2000	2000	2000	2000	2000	2000	1600	1600
Dyn. Scale	.058	.049	.0435	.048	.054	.056	.057	.060	.082	.077
Fuel Flow - Lbs Hr	3.49	3.34	3.16	3.2	3.25	3.3	3.3	3.4	3.0	3.0
Spark Advance- Deg	30	30	30	30	30	30	30	30	30	30
Fuel Flow Corr	3.68	3.53	3.32	3.38	3.43	3.48	3.48	3.58	3.18	3.18
Temperatures- F										
Carb. Air before Heater	-67	-69	-69	-69	-69	-69	-69	-69	-68	-68
Carb. Air after Heater	100	100	100	50	0	-19	-41	-65	-66	-42
Intake Manifold	46	59	55	24	-7	-25	-39	-56	-64	-51
Spark Plug Gasket	234	235	235	240	245	244	249	251	232	228
Cylinder Base	-5	-4	-5	-5	-5	-2	-5	-4	-3	-3
Crankcase	-35	-34	-35	-35	-35	-35	-35	-36	-36	-37
Water In	-55	-57	-57	-57	-57	-57	-59	-58	-59	-60
Water Out	144	140	135	140	140	144	140	143	153	153
Carburetor Fuel										
Nozzle Fuel										
Injector Fuel	-64	-65	-65	-65	-65	-65	-66	-66	-66	-66
Pressure Oil	1	-2	-1	-1	-1	-1	-4	-2	-14	-13
Sump Oil	-1	0	-1	-1	-1	-1	-1	-2	-6	-6
Engine Room Air	-66	-65	-65	-65	-65	-65	-65	-65	-66	-65
Pressures										
Carb. Air Vent Diff. -In H_2O	1.5	1.37	1.25	1.29	1.33	1.35	1.37	1.44	1.14	1.11
Int. Man. Vac. -In Hg.	-1	-.45	-.55	-.55	-.55	-.55	-.55	-.55	-.1	-.1
Oil— Lbs sq.in.—High	112	112	112	112	112	112	112	112	112	112
Oil—Lbs. sq.in.—Low	30	30	31	31	31	31	30	30	30	30
Fuel— Lbs sq in.	22	22	22	22	22	22	22	22	21	21
Barometer—In. Hg	29.50	29.50	29.50	29.50	29.50	29.50	29.50	29.50	29.50	29.50
Bar Corr	29.40	29.40	29.40	29.40	29.40	29.40	29.40	29.40	29.40	29.40
Calculated Data.										
Vapor Pressure—In. H	0.10	0.10	0.10	.10	.10	.10	.10	.10	.10	.10
ADMP	29.30	28.45	28.85	28.85	28.85	28.85	28.85	28.85	29.30	29.30
Corr. Factor	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28
BHP—Observed	2.29	1.93	1.72	1.90	2.13	2.21	2.25	2.37	2.59	2.43
BHP- Corrected										
RPM	2000	2000	2000	2000	2000	2000	2000	2000	1600	1600
BMEP—Corrected										
BSFC—Lbs BHP Hr.	1.61	1.83	1.93	1.78	1.61	1.575	1.545	1.51	1.23	1.51
Torque— Ft Lbs Observed										
Combustion Air Lbs hr	46.1	44.0	42.0	42.6	43.4	43.8	44.0	46.0	40.3	34.8
Fuel Air	.0798	.0802	.079	.0793	.0792	.0795	.0792	.0796	.0788	.0798
Stop Report No.										
Total Time—Hrs										
Air Flow OBS	36.0	34.41	32.9	33.3	33.9	34.2	34.4	35.2	31.5	31.1

REMARKS Lbs Oil added if any. Start Run C8-2 3/4 Throttle

OPERATOR V. E. Currens

RONAUTICAL RESEARCH LABORATO
UNIVERSITY OF KENTUCKY
ENGINE LOG SHEET

PAGE NO. 98

Data Sheet No. 38

ENGINE NO. 11

DATE: 10-21-52

MAKE: Merz

OBJECT. C8-5 AND C-8-9 AND C8-13*

Reading No.	233	234	235	236	237	238	239	240	241	* * 242
Time of Day	12:07	12:10	12:19	12:26	12:36	12:43	12:50	12:57	1:11	1:21
Speed	1600	1600	1600	1600	1200	1200	1200	1200	1200	800
Dyn. Scale	.072	.068	.063	.057	.051	.053	.063	.066	.070	.068
Fuel Flow—Lbs Hr	3.0	2.94	2.90	2.85	2.25	2.28	2.42	2.42	2.45	1.85
Spark Advance—Deg.	30	30	30	30	30	30	30	30	30	30
Fuel Flow CoRR	3.16	3.10	3.06	3.01	2.38	2.41	2.55	2.55	2.585	1.95
Temperatures—°F										
Carb. Air before Heater	-68	-68	-68	-68	-68	-69	-70	-70	-70	-71
Carb. Air after Heater	-15	+5	55	102	95	50	-10	-44	-66	-66
Intake Manifold	-36	-21	6	34	32	6	-24	-45	-60	-60
Spark Plug Gasket	224	220	218	214	207	214	217	220	220	210
Cylinder Base	-4.	-4	-4	-5	-2	-2	-3	-3	-1	0
Crankcase	-36	-37	-37	-38	-37	-39	-40	-35	-40	-41
Water In	-59	-60	-58	-60	-58	-60	-60	-60	-60	-60
Water Out	150	150	150	149	152	152	155	155	155	157
Carburetor Fuel										
Nozzle Fuel										
Injector Fuel	-66	-66	-67	-65	-67	-67	-67	-67	-67	-61
Pressure Oil	-14	-16	-17	-17	-27	-32	-32	-32	-32	-40
Sump Oil	-7	-7	-8	-9	-12	-14	-15	-16	-20	-19
Engine Room Air	-67	-66	-66	-66	-66	-67	-67	-67	-66	-66
Pressures.										
Carb. Air Vent Diff.—In H.C	1.10	1.06	1.01	.99	.63	.64	.72	.72	.74	.4
Int. Man. Vac.—In. Hg.	-.1	-.1	-.1	-.1	-.1	-.1	-.1	-.1	-.1	-.1
Oil—Lbs/sq.in.—High	112	112	114	114	112	112	112	111	111	110
Oil—Lbs./sq.in.—Low	30	30	30	30	30	30	30	30	30	30
Fuel—Lbs/sq in.	21	21	21	21	21	21	21	21	22	22
Barometer—In. Hg.	29.50	29.50	29.50	29.50	29.50	29.50	29.50	29.50	29.50	29.50
BAR CORR	29.40	29.40	29.40	29.40	29.40	29.40	29.40	29.40	29.40	29.40
Calculated Data:										
Vapor Pressure—In. Hg.	.10	.10	.10	.10	.10	.10	.10	.10	.10	.10
ADMP	29.30	29.30	29.30	29.30	29.30	29.30	29.30	29.30	29.30	29.30
Corr. Factor	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28	1.28
BHP—Observed	2.28	2.15	1.99	1.80	1.21	1.255	1.49	1.56	1.66	1.075
BHP—Corrected										
RPM	1600	1600	1600	1600	1200	1200	1200	1200	1200	800
BMEP—Corrected										
BSFC—Lbs BHP Hr	1.39	1.44	1.54	1.67	1.97	1.92	1.71	1.63	1.56	1.815
Torque—Ft. Lbs.—Observed										
Combustion Air—Lbs hr	39.7	38.9	38.0	37.6	29.9	30.1	31.9	31.9	32.35	24.3
Fuel/Air	.0797	.0798	.0805	.0800	.0796	.0800	.0800	.0800	.0800	.0803
Stop Report No.										
Total Time—Hrs										
AiR Flow obs.	31.0	30.4	29.65	29.35	23.34	23.52	24.92	24.92	25.24	19.0

REMARKS—Lbs. Oil added if any.

* START C-8-9
** START C-8-13

OPERATOR CURRENS

RONAUTICAL RESEARCH LABORATO
UNIVERSITY OF KENTUCKY

ENGINE LOG SHEET

Data Sheet No. 39

ENGINE NO. 11

DATE: 10-21-52

MAKE. Merz

OBJECT: C8-13

D1-1

Reading No.	243	244	245	246	247	Stop	START	248	249	250
Time of Day	1:28	1:32	1:39	1:42	1:46	1:51	9:30	10.04	10:12	10:20
Speed	800	800	800	800	800			2000	2000	2000
Dyn. Scale	.066	.062	.060	.058	.049			.102	.088	.094
Fuel Flow—Lbs Hr	1.88	1.80	1.80	1.80	1.78			2.6	2.6	2.57
Spark Advance—Deg.	30	30	30	30	30			30	30	30
Fuel Flow Corr	1.99	1.90	1.90	1.90	1.88			2.74	2.74	2.71
Temperatures—°F										
Carb. Air before Heater	-70	-71	-71	-71	-71			85	87	87
Carb. Air after Heater	-45	-15	10	45	109			83	100	125
Intake Manifold	-51	-40	-25	-5	20			45	52	62
Spark Plug Gasket	201	200	195	195	190			301	302	303
Cylinder Base	/	/	/	/	/			110	112	112
Crankcase	-42	-44	-45	-43	-45			95	96	95
Water In	-59	-60	-60	-60	-60			95	97	98
Water Out	149	143	140	139	140			155	155	155
Carburetor Fuel								—	—	—
Nozzle Fuel								85	85	87
Injector Fuel	-66	-66	-66	-67	-68			—	—	—
Pressure Oil	-40	-40	-42	-42	-42			127	127	126
Sump Oil	-20	-20	-24	-24	-24			115	115	116
Engine Room Air	-66	-66	-66	-66	-66			82	82	82
Pressures.										
Carb. Air Vent. Diff.—In H_2O	.42	.38	.38	.38	.37			1.58	1.58	1.54
Int. Man. Vac.—In Hg.	0	0	0	0	0			-.1	-.1	-.1
Oil—Lbs sq.in.—High	109	109	108	109	109			90	90	90
Oil—Lbs. sq.in.—Low	30	30	30	30	30			28	29	29
Fuel—Lbs sq.in.	22	22	22	22	22			18.5	18.6	18.5
Barometer—In. Hg.	29.50	29.50	29.50	29.50	29.50		29.22	29.22	29.22	29.22
BARR CORR.	29.40	29.40	29.40	29.40	29.40		29.12	29.12	29.12	29.12
Calculated Data:										
Vapor Pressure—In. Hg	.10	.10	.10	.10	.10		.10	.10	.10	.10
ADMP	29.40	29.40	29.40	29.40	29.40			29.02	29.02	29.02
Corr. Factor	1.28	1.28	1.28	1.28	1.28			.925	.925	.925
BHP—Observed	1.042	0.98	.948	.915	.774			40.4	38.8	37.2
BHP—Corrected										
RPM	800	800	800	800	800					
BMEP—Corrected										
BSFC—Lbs BHP Hr	1.91	1.94	2.005	2.08	2.43			.680	707	.738
Torque—Ft. Lbs.—Observed										
Combustion Air—Lbs hr	24.8	23.8	23.8	23.8	23.4			34.0	34.0	34.7
Fuel Air	.0800	.0798	.0798	.0798	.0801			.0805	.0805	.0780
Stop Report No.										
Total Time—Hrs.										
Air Flow Obs	19.4	18.54	18.54	18.54	18.31			36.8	36.8	36.5

10-22-52

REMARKS—Lbs. Oil added if any

OPERATOR CURRENS

RONAUTICAL RESEARCH LABORATOR
UNIVERSITY OF KENTUCKY
ENGINE LOG SHEET

PAGE NO. 100

Data Sheet No. 40

ENGINE NO. 11

DATE 10-23-52

MAKE: MERZ

OBJECT: D1-1 * D1-5 ** D1-9

Reading No.	251	252	253	254	255	256	257	Stop	Start	258
Time of Day	10:29	10:45	11:05	11:12	11:17	11:24	11:32	11:36	1:06	1:29
Speed	2000	2000	1600	1600	1600	1600	1600			1200
Dyn. Scale	.090	.088	.092	.096	.098	.10	.1025	—		.095
Fuel Flow—Lbs Hr	2.54	2.49	2.08	2.12	2.14	2.16	2.16		—	1.63
Spark Advance Deg.	30	30	30	30	30	30	30	—		20
FUEL FLOW CORR	2.68	2.63	2.195	2.24	2.26	2.28	2.28		START 20° SPARK ADV.	1.72
Temperatures—°F										
Carb. Air before Heater	87	87	87	87	87	87	87			85
Carb. Air after Heater	154	200	200	150	122	100	88			204
Intake Manifold	70	89	90	74	62	55	50			94
Spark Plug Gasket	307	302	284	285	290	290	291			257
Cylinder Base	112	112	110	107	107	110	107			100
Crankcase	94	95	89	89	98	87	94			90
Water In	98	99	89	95	90	89	95			89
Water Out	155	155	152	155	155	155	152			160
Carburetor Fuel	—	—	—	—						
Nozzle Fuel	87	87	85	85	85	85	85			85
Injector Fuel	—	—	—	—						
Pressure Oil	126	126	120	119	121	117	117			110
Sump Oil	115	115	110	110	116	109	109			101
Engine Room Air	82	82	80	82	81	80	82			80
Pressures.										
Carb. Air Vent. Diff.—In H O	151	1.45	102	1.05	1.07	1.09	1.09			.62
Int. Man. Vac.—In. Hg.	-.1	-.1	-.1	-.1	-.1	-.1	-.1			-.1
Oil—Lbs sq.in.—High	90	80	84	84	84	85	85			98
Oil—Lbs. sq.in.—Low	29	29	30	30	30	30	30			30
Fuel—Lbs sq.in.	18.5	18.5	15	14.5	14.0	14.0	13.5			25
Barometer—In. Hg.	29.22	29.22	29.22	29.22	29.22	29.22	29.22		29.17	29.17
BAR CORR	29.12	29.12	29.12	29.12	29.12	29.12	29.12		29.09	29.09
Calculated Data:										
Vapor Pressure—In. Hg	.10	.10	.10	.10	.10	.10	.10		.08	.08
ADMP	29.02	29.02	29.02	29.02	29.02	29.02	29.02			28.99
Corr. Factor	.925	.925	.925	.925	.925	.925	.925			.925
BHP—Observed	3.56	3.48	2.91	3.03	3.10	3.16	3.24			2.25
BHP—Corrected										
RPM	2000	2000	1600	1600	1600	1600	1600			1200
BMEP—Corrected										
BSFC—Lbs BHP Hr	.732	.755	.753	.739	.729	.721	.704			.765
Torque—Ft Lbs.—Observed										
Combustion Air—Lbs hr	33.4	32.8	27.55	28.0	28.20	28.55	28.55			21.4
Fuel Air	.0802	.0802	.0797	.0800	.0800	.0799	.0799			.0795
Stop Report No										
Total Time Hrs	36.1	35.4	29.8	30.25	30.55	30.85	30.85			23.16

REMARKS—Lbs. Oil added if any NECESSARY TO RETARD SPARK ADVANCE TO 20°, due TO DETONATION.

OPERATOR CURRENS

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Data Sheet No. 41

RONAUTICAL RESEARCH LABORATO

UNIVERSITY OF KENTUCKY

ENGINE LOG SHEET

ENGINE NO. 11

DATE: 10-23-52

MAKE: Merz

OBJECT: D1-9

* N6D1-13

Reading No.	259	260	261	262	STOP	START	263	264	265	266
Time of Day	1:37	1:44	1:53	2:00	2:55	3:10	3:15	3:28	3:43	3:47
Speed	1200	1200	1200	1200			800	800	800	800
Dyn. Scale	.098	.10	.107	.102			.084	.090	.091	.091
Fuel Flow—Lbs Hr	1.63	1.65	1.68	1.7			1.30	1.29	1.29	1.29
Spark Advance—Deg.	20	20	20	20			10	10	10	10
Fuel Flow CORR	1.72	1.74	1.77	1.795			1.37	1.362	1.362	1.362
Temperatures—°F										
Carb. Air before Heater	85	86	86	87			87	85	87	86
Carb. Air after Heater	146	125	100	88			84	103	124	149
Intake Manifold	76	69	60	56			56	61	65	75
Spark Plug Gasket	260	260	261	262			222	233	235	230
Cylinder Base	100	102	105	104			102	102	105	105
Crankcase	90	90	90	90			88	88	90	90
Water In	89	90	90	90			88	88	92	90
Water Out	150	155	155	155			150	150	160	150
Carburetor Fuel	—	—	—	—						
Nozzle Fuel	85	85	85	60			85	81	85	85
Injector Fuel	—	—	—	—						
Pressure Oil	109	109	107	107			100	104	100	100
Sump Oil	100	100	100	100			97	99	99	99
Engine Room Air	82	82	82	82			82	74	82	82
Pressures:										
Carb. Air Vent. Diff.—In H O	.62	.63	.67	.68			.39	.39	.38	.38
Int. Man. Vac.—In. Hg	-.1	-.1	-.1	-.1			-.1	-.1	-.1	-.1
Oil—Lbs sq.in.—High	99	99	99	99			91	90	91	91
Oil—Lbs. sq.in.—Low	30	30	30	30			30	31	31	31
Fuel—Lbs sq.in.	25	25	25	25			16	15	15	15
Barometer—In. Hg	29.17	29.17	29.17	29.17			29.17	29.17	29.17	29.17
BAR. CORR	29.09	29.09	29.09	29.09			29.09	29.09	29.09	29.09
Calculated Data.										
Vapor Pressure—In. Hg	.08	.08	.08	.08			.08	.08	.08	.08
ADMP	28.99	28.99	28.99	28.99			28.99	28.99	28.99	28.99
Corr. Factor	.925	.92	.92	.92			.92	.92	.92	.92
BHP—Observed	2.32	2.37	2.40	2.41			1.33	1.42	1.44	1.44
BHP—Corrected										
RPM	1200	1200	1200	1200			800	800	800	800
BMEP—Corrected										
BSFC—Lbs BHP Hr.	.740	.726	.738	.745			1.03	.96	.947	.947
Torque—Ft Lbs.—Observed										
Combustion Air—Lbs hr	21.4	21.45	22.15	22.6			17.25	17.25	17.05	17.05
Fuel Air	.0795	.0801	.0801	.0796			.0795	.0790	.0800	.0800
Stop Report No.										
Total Time—Hrs.										
Air Flow obs.	23.16	23.34	24.06	24.6			18.77	18.77	18.54	18.54

REMARKS—Lbs. Oil added if any. * START 10° SPARK ADVANCE Due to detonation

READINGS 263 – 268 DELETE CONDITIONS UNSTEADY

OPERATOR CURRENS

AERONAUTICAL RESEARCH LABORATORY.
UNIVERSITY OF KENTUCKY

ENGINE LOG SHEET

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Data Sheet No. 42

ENGINE NO. 11

DATE 10-23-52

MAKE: Merz

OBJECT. D1-13

D-1-15 (10-24-52)

*D-1-13

Reading No.	267	stop	START	268	269	270	271	272	*273	274
Time of Day	3:52	4:00	8:20	9:07	9:16	9:21	9:28	9:35	10:35	10:41
Speed	800		10-24-52	800	800	800	800	800	800	800
Dyn. Scale	.082			.041	.0375	.033	.032	.0255	.070	.078
Fuel Flow—Lbs/Hr	1.29			1.1	1.1	1.1	1.1	1.1	1.23	1.23
Spark Advance—Deg	10			10	10	10	10	10	10	10
Fuel Flow Corr	1.362			1.16	1.16	1.16	1.16	1.16	1.31	1.31
Temperatures—°F										
Carb. Air before Heater	86			83	82	83	82	84	87	88
Carb. Air after Heater	200			80	100	127	155	220	210	154
Intake Manifold	90			61	67	79	90	114	108	87
Spark Plug Gasket	220			217	216	211	214	209	212	215
Cylinder Base	100			99	99	99	99	99	102	102
Crankcase	90			86	86	87	87	87	90	92
Water in	90			85	85	85	85	85	90	92
Water Out	150			149	157	152	150	156	150	154
Carburetor Fuel										
Nozzle Fuel	85			81	82	82	82	82	87	87
Injector Fuel										
Pressure Oil	100			103	103	103	103	103	101	102
Sump Oil	99			98	97	97	97	97	96	98
Engine Room Air	82			80	80	80	80	80	84	87
Pressures.										
Carb. Air Vent. Diff.—in H_2O	.38			.27	.27	.25	.25	.24	.36	.36
Int. Man. Vac.—In. Hg.	-.1			-2.4	-2.4	-2.6	-2.4	-2.4	-.05	-.05
Oil—Lbs sq.in.—High	90			99	99	99	99	99	91	91
Oil—Lbs. sq.in.—Low	31			30	31	31	31	31	31	31
Fuel—Lbs sq.in.	15			28	28	28	28	26	19	19
Barometer—In. Hg	29.17		29.15	29.15	29.15	29.15	29.15	29.15	29.15	29.15
Bar. Corr	29.09		29.00	29.00	29.00	29.00	29.00	29.00	29.00	29.00
Calculated Data:										
Vapor Pressure—In. Hg	.08		.15	.15	.15	.15	.15	.15	.15	.15
ADMP	28.99			26.6	26.6	26.4	26.6	26.6	28.95	28.95
Corr Factor	.92		.93	.92	.92	.92	.92	.92	.91	.91
BHP—Observed	1.295			.65	.592	.521	.505	.403	1.105	1.23
BHP—Corrected										
RPM	800			800	800	800	800	800	800	800
BMEP—Corrected										
BSFC—Lbs/BHP Hr	1.052			1.79	1.96	2.22	2.30	2.88	1.185	1.065
Torque—Ft. Lbs.—Observed										
Combustion Air—Lbs/hr	17.05			14.7	14.7	14.3	14.3	14.1	16.49	16.49
Fuel/Air	.0800			.079	.079	.081	.081	.0822	.0746	.0746
Stop Report No.										
Total Time—Hrs.										
Air Flow obs	18.54			16	16	15.5	15.5	15.3	18.1	18.1

REMARKS—Lbs. Oil added if any.

* Repeat D-1-13

OPERATOR Currens

RONAUTICAL RESEARCH LABORATO

UNIVERSITY OF KENTUCKY

ENGINE LOG SHEET

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Data Sheet No. 43

ENGINE NO. 11

DATE 10-24-52

MAKE: MER Z

OBJECT D-1-13 (CONTINUED)

Reading No.	275	276	277	STOP	START	* 278	279	STOP
Time of Day	10.48	10:54	11:00	11:05	1:35	1:48	2:01	2:13
Speed	800	800	800			2000	2000	
Dyn. Scale	.084	.089	.090			.096	.097	
Fuel Flow—Lbs Hr	1.23	1.27	1.27			2.53	2.53	
Spark Advance—Deg	10	10	10			30°	30°	
CORR FUEL FLOW	1.31	1.34	1.34			2.67	2.67	
Temperatures—°F								
Carb. Air before Heater	88	88	90			87	91	
Carb. Air after Heater	125	102	92			85	88	
Intake Manifold	77	68	62			49	50	
Spark Plug Gasket	218	223	225			305	308	
Cylinder Base	102	102	102			106	113	
Crankcase	92	92	92			88	93	
Water In	92	92	92			96	102	
Water Out	157	150	154			156	156	
Carburetor Fuel	—	—	—					
Nozzle Fuel	88	88	88			87	91	
Injector Fuel	—	—	—					
Pressure Oil	102	102	102			114	122	
Sump Oil	98	98	98			105	112	
Engine Room Air	87	87	87			87	89	
Pressures.								
Carb. Air Vent. Diff.—In H.O	.36	.38	.38			1.53	1.55	
Int. Man. Vac.—In. Hg.	-.05	-.05	-.05			0	0	
Oil—Lbs. sq.in.—High	91	91	91			98	96	
Oil—Lbs. sq.in.—Low	31	31	31			29	29	
Fuel—Lbs. sq in.	19	19	19			20	23	
Barometer—In. Hg	29.15	29.15	29.15			29.15	29.15	
BAR CORR	29.00	29.00	29.00			29.00	29.00	
Calculated Data:								
Vapor Pressure—In. Hg.	.15	.15	.15			.15	.15	
ADMP	28.95	28.95	28.95			29.00	29.00	
Corr. Factor	.91	.91	.91			.91	.908	
BHP—Observed	1.325	1.405	1.42			3.79	3.83	
BHP—Corrected								
RPM	800	800	800			2000	2000	
BMEP—Corrected								
BSFC—Lbs/BHP Hr	.989	.954	.944			.705	.697	
Torque—Ft. Lbs—Observed								
Combustion Air—Lbs hr	16.49	16.8	16.8			33.05	33.2	
Fuel Air	.0796	.0798	.0798			.0808	.0805	
Stop Report No.								
Total Time—Hrs.								
AIR FLOW OBS	18.1	18.5	18.5			36.36	36.6	

REMARKS—Lbs Oil added if any * Make Dynamometer Check

CURTIS

RONAUTICAL RESEARCH LABORATORY.
UNIVERSITY OF KENTUCKY

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Data Sheet No. 44

ENGINE LOG SHEET

ENGINE NO.

DATE: 10-27-52

MAKE. MERZ

OBJECT: RUN D-2-1

Start D-2-5

Reading No.	START	280	281	282	283	284	285	286	287	288
Time of Day	12:36	1:05	1:15	1:24	1:29	1:39	1:53	1:58	2:04	2:21
Speed		2000	2000	2000	2000	1600	1600	1600	1600	1600
Dyn. Scale		.106	.104	.100	.097	.098	.101	.104	.107	.109
Fuel Flow—Lbs Hr		2.9	2.9	2.8	2.8	2.28	2.28	2.28	2.3	2.3
Spark Advance—Deg.		30	30	30	30	30	30	30	30	30
FF (CORR)		3.06	3.06	2.96	2.96	2.40	2.40	2.40	2.43	2.43
Temperatures—°F										
Carb. Air before Heater		20	20	20	20	20	20	20	20	20
Carb. Air after Heater		20	48	84	120	145	107	73	43	22
Intake Manifold		0	12	29	42	52	37	27	12	3
Spark Plug Gasket		280	280	280	273	262	272	274	273	273
Cylinder Base		55	63	55	56	55	52	54	53	52
Crankcase		45	45	45	47	46	47	47	44	43
Water In		0	26	27	27	26	25	25	25	25
Water Out		145	155	145	145	140	154	148	155	145
Carburetor Fuel										
Nozzle Fuel		22.5	22	23	23	22	21	21	21	21
Injector Fuel										
Pressure Oil		60	62	83	84	78	75	74	74	73
Sump Oil		70	72	72	73	70	67	67	67	67
Engine Room Air		20	20	20	20	20	20	20	20	20
Pressures										
Carb. Air Vent Diff.—In H O		1.6	1.59	1.51	1.47	.96	.96	.97	1.00	1.00
Int. Man. Vac.—In. Hg.		-.1	-.1	-.1	-.1	-.1	-.1		-.1	-.1
Oil—Lbs sq.in.—High		100	100	100	100	97	95	100	98	98
Oil—Lbs., sq.in.—Low		30	30	30	30	30	30	30	30	30
Fuel—Lbs/sq in.		19	19	19	19	17.5	25	22	21	21
Barometer—In. Hg		28.95	28.95	28.95	28.95	28.95	28.95	28.95	28.95	28.95
BAR CORR		28.76	28.76	28.76	28.76	28.76	28.76	28.76	28.76	28.76
Calculated Data:										
Vapor Pressure—In. Hg		.19	.19	.19	.19	.19	.19	.19	.19	.19
ADMP		28.66	28.66	28.66	28.66	28.66	28.66	28.66	28.66	28.66
Corr. Factor		1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03
BHP—Observed		4.18	4.11	3.95	3.83	3.1	3.19	3.28	3.38	3.44
BHP—Corrected										
RPM		2000	2000	2000	2000	1600	1600	1600	1600	1600
BMEP—Corrected										
BSFC—Lbs BHP Hr		.78	.744	.748	.773	.775	.753	.733	.718	.707
Torque—Ft. Lbs. -Observed										
Combustion Air—Lbs hr		38.3	38.2	37.2	36.6	29.8	29.8	30.0	30.4	30.4
Fuel/Air		.0798	.0802	.0796	.0808	.0806	.0806	.0800	.0800	.0800
Stop Report No.										
Total Time—Hrs										
AIR FLOW OBS		37.2	37.1	36.1	35.6	28.9	28.9	29.05	29.5	29.5

REMARKS—Lbs. Oil added if any.

OPERATOR CURRENS

..RONAUTICAL RESEARCH LABORATO.

UNIVERSITY OF KENTUCKY

ENGINE LOG SHEET

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Data Sheet No. 45

ENGINE NO.

DATE: 10 - 27 - 52

MAKE: MERA

OBJECT: D - 2 - 9 * ... *D - 2 - 13

Reading No.	289	290	291	292	293	294	295	296	STOP
Time of Day	2:34	2:40	2:46	3:54	3:17	3:24	3:34	3:46	4:02
Speed	1200	1200	1200	1200	800	800	800	800	
Dyn. Scale	.102	.099	.095	.092	.083	.088	.090	.097	
Fuel Flow—Lbs Hr	2.00	1.98	1.94	1.85	1.41	1.43	1.46	1.46	
Spark Advance—Deg.	20	20	20	20	10	10	10	10	
F.F. (COR)	2.11	2.09	2.05	1.955	1.49	1.51	1.54	1.546	
Temperatures—°F									
Carb. Air before Heater	20	20	20	20	18	18	18	18	
Carb. Air after Heater	20	43	85	114	108	75	46	21	
Intake Manifold	6	12	28	42	37	27	18	7	
Spark Plug Gasket	238	232	232	228	196	200	202	218	
Cylinder Base	50	50	50	50	48	48	46	47	
Crankcase	45	43	43	42	40	40	38	38	
Water In	24	23	23	23	22	21	22	21	
Water Out	147	152	150	152	152	150	154	152	
Carburetor Fuel	—	—	—	—	—	—	—	—	
Nozzle Fuel	20	20	20	20	18	18	18	18	
Injector Fuel	—	—	—	—	—	—	—	—	
Pressure Oil	66	65	63	63	52	52	50	50	
Sump Oil	63	62	62	61	54	54	52	52	
Engine Room Air	20	20	20	20	18	18	18	18	
Pressures.									
Carb. Air Vent. Diff.—In H O	.76	.76	.72	.69	.37	.38	.39	.39	
Int. Man. Vac.—In. Hg	−.1	−.1	−.1	−.1	−.1	−.1	−.1	−.1	
Oil—Lbs/sq.in.—High	100	100	100	100	100	100	100	100	
Oil—Lbs./sq.in.—Low	30	30	30	30	30	30	30	30	
Fuel—Lbs/sq.in.	20	19	19	19	18	19	22	22	
Barometer—In. Hg.	28.95	28.95	28.95	28.95	28.95	28.95	28.95	28.95	
BAR (COR)	28.76	28.76	28.76	28.76	28.76	28.76	28.76	28.76	
Calculated Data:									
Vapor Pressure—In. Hg	.19	.19	.19	.19	.19	.19	.19	.19	
ADMP	28.66	28.66	28.66	28.66	28.66	28.66	28.66	28.66	
Corr. Factor	1.03	1.03	1.03	1.03	1.03	1.03	1.03	1.03	
BHP—Observed	2.42	2.35	2.25	2.18	1.311	1.390	1.422	1.532	
BHP—Corrected									
RPM	1200	1200	1200	1200	800	800	800	800	
BMEP—Corrected									
BSFC—Lbs BHP Hr	.873	.890	.912	.897	1.135	1.087	1.082	1.005	
Torque—Ft. Lbs.—Observed									
Combustion Air—Lbs hr	26.4	26.4	25.6	24.5	18.85	19.1	19.46	19.46	
Fuel/Air	.0800	.0792	.0801	.0798	.079	.0791	.0792	.0792	
Stop Report No.									
Total Time—Hrs.									
AIR FLOW (OBS.)	25.6	25.6	24.9	23.8	18.3	18.5	18.9	18.9	

REMARKS—Lbs. Oil added if any. *20° SPARK ADV. *10° SPARK ADV.

OPERATOR CURRENS

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AERONAUTICAL RESEARCH LABORATO
UNIVERSITY OF KENTUCKY

ENGINE LOG SHEET

ENGINE NO. 11

DATE: Oct 28, 1952

MAKE: MERZ

OBJECT: D-3-1

Reading No.	START	297	298	STOP	START	STOP	START	STOP
Time of Day	8:35Am	9:45	10:00	10:06	9:55	10:05	10:30	11:05
Speed		2000	2000	*				
Dyn. Scale		.110	.106					
Fuel Flow—Lbs Hr		3.07	3.07					
Spark Advance Deg.		30	30					
		3.24	3.24					
Temperatures—F								
Carb. Air before Heater		0	0					
Carb. Air after Heater		0	25					
Intake Manifold		-14	-2					
Spark Plug Gasket		+287	278					
Cylinder Base		+42	42					
Crankcase		+32	30					
Water In		7	7					
Water Out		142	150					
Carburetor Fuel		—	—					
Nozzle Fuel		3	4					
Injector Fuel		—	—					
Pressure Oil		68	42					
Sump Oil		57	57					
Engine Room Air		0	0					
Pressures								
Carb Air Vent Diff.—In. H₂O		1.65	1.6					
Int. Man. Vac In. Hg		.2	.2					
Oil—Lbs sq in.—High		100	100					
Oil—Lbs. sq in.—Low		30	30					
Fuel—Lbs sq in		18.0	18.0					
Barometer—In. Hg		28.99	28.99					
BAR CORR		28.88	28.88					
Calculated Data:								
Vapor Pressure—In. Hg		.10	.10					
ADMP								
Corr. Factor		.1089	.1089					
BHP—Observed		4.35	4.18					
BHP—Corrected		2000	2000					
RPM								
BMEP—Corrected								
BSFC—Lbs BHP Hr		.745	.774					
Torque—Ft Lbs.—Observed								
Combustion Air—Lbs hr		40.5	40.4					
Fuel Air		.080	.0802					
Stop Report No.								
Total Time—Hrs.								
AIR FLOW OBS		37.8	37.2					

OCT 29, 52

TO CHECK FUEL FLOW

TO CHECK FUEL FLOW

FUEL FLOW SEEMS BETTER

REMARKS—Lbs Oil added if any. * FUEL CONTROL ACTUATOR MALFUNCTION

OPERATOR CURRENS

ERONAUTICAL RESEARCH LABORATO
UNIVERSITY OF KENTUCKY
ENGINE LOG SHEET

PAGE NO. 107
Data Sheet No. 47

ENGINE NO. 11
DATE. Oct 30, 1952
MAKE: MERZ
OBJECT D3-1

Reading No.	START	299	300	301	302	303	* 304	Stop	Start	STOP
Time of Day	9:15	10:00	10:09	10:15	10:20	10:30	10:40	11:25	3:00	3:07
Speed		2000	2000	2000	2000	2000	2000		⊙	
Dyn. Scale		.0845	.086	.088	.092	.095	.097			
Fuel Flow—Lbs Hr		2.8	2.8	2.82	2.86	2.9	2.97			
Spark Advance - Deg		30	30	30	30	30	30			
FUEL FLOW CORR		2.96	2.96	2.98	3.01	3.06	3.13			
Temperatures—°F										
Carb. Air before Heater		0	0	0	0	0	0			
Carb. Air after Heater		248	218	202	172	146	123			
Intake Manifold	START	83	71	68	52	42	38			
Spark Plug Gasket		258	257	255	261	263	262			
Cylinder Base		41	40	40	41	40	41			
Crankcase		28	28	27	27	27	27			
Water In		6	7	7	7	7	7			
Water Out		155	155	105	154	154	154		CHECK FUEL FLOW	
Carburetor Fuel		—	—	—	—	—	—			
Nozzle Fuel		3	3	3	3	3	3			
Injector Fuel		—	—	—	—	—	—			
Pressure Oil		62	62	62	62	64	64			
Sump Oil		54	54	54	54	54	54			
Engine Room Air		0	0	0	0	0	0			
Pressures.										
Carb. Air Vent Diff.—In H₂O		1.3	1.31	1.34	1.38	1.41	1.47			
Int. Man. Vac.—In. Hg		-.1	-.1	-.1	-.1	-.1				
Oil—Lbs sq.in.—High		100	100	100	100	100	100			
Oil—Lbs. sq.in.— Low		30	30	30	30	30	30			
Fuel—Lbs sq.in.		30.0	30	29	29	29	27			
Barometer—In. Hg		29.28	29.28	29.28	29.28	29.28	29.28			
BAR CORR		29.18	29.18	29.18	29.18	29.18	29.18			
Calculated Data:										
Vapor Pressure—In. Hg		.10	.10	.10	.10	.10	10			
ADMP										
Corr Factor		1.1	1.1	1.1	1.1	1.1	1.1			
BHP—Observed		3.34	3.39	3.48	3.63	3.75	3.84			
BHP—Corrected		2000	2000	2000	2000	2000	2000			
RPM										
BMEP—Corrected										
BSFC—Lbs BHP Hr		.882	.873	.855	.828	.816	.815			
Torque—Ft. Lbs.—Observed										
Combustion Air—Lbs hr		36.9	37.0	37.4	37.8	38.4	39.2			
Fuel/Air		.0801	.080	.0797	.0796	.0796	.080			
Stop Report No.										
Total Time—Hrs.										
AIR FLOW OBS		33.5	33.6	34.0	34.4	34.9	35.6			

REMARKS — Lbs. Oil added if any * FUEL FLOW UNSTEADY ⊙ ADD HEAT TO CARB AIR AND FUEL FLOW BECOMES STEADY. TAKE OFF HEAT+FUEL FLOW BECOMES UNSTEADY WHEN MANIFOLD TEMP GOES BELOW 38°

OPERATOR CURRENS

RONAUTICAL RESEARCH LABORATO
UNIVERSITY OF KENTUCKY

PAGE NO. 108

Data Sheet No. 48

ENGINE LOG SHEET

ENGINE NO. 11

MAKE: MERZ

OBJECT: D-3-1

DATE: OCT 30, 1952
OCT 31, 1952

OCT 31,1952

*

Reading No.	START	STOP	START	305	306	307	308	309	STOP	START
Time of Day	3:30	4:02	8:55AM	9:47	10:04	10:10	10:14	10:22	10:34	10:37
Speed				2000	2000	2000	2008	2000		
Dyn. Scale				.116	.114	.11	.107	.102		
Fuel Flow—Lbs Hr				3.26	2.82	3.06	3.06	3.00		
Spark Advance—Deg.				30°	30°	30°	30	30		
FUEL FLOW CORR				3.44	3	3.23	3 23	3.16		
Temperatures—°F										
Carb. Air before Heater				0	0	0	0	0		
Carb. Air after Heater				-2	25	54	80	105		
Intake Manifold				-17	-2	8	18	27		
Spark Plug Gasket				275	278	268	275	271		
Cylinder Base				40	40	40	41	41		
Crankcase				26	27	27	27	27		
Water In				7	7	7	7	7		
Water Out				148	155	153	154	148		
Carburetor Fuel										
Nozzle Fuel				3	4	4	3	3		
Injector Fuel										
Pressure Oil				62	64	65	65	64		
Sump Oil				53	52	52	54	54		
Engine Room Air				0	0	0	0	0		
Pressures										
Carb. Air Vent. Diff.—In H O				1.75	1.67	1.6	1.6	1.55		
Int. Man. Vac.— In. Hg				.1	-.1	.1	.1	.1		
Oil—Lbs sq.in — High				100	100	100	100	100		
Oil—Lbs./sq.in Low				30	30	30	30	30		
Fuel—Lbs sq in.				81	81	81	81	81		
Barometer— In. Hg				29.12	29.12	29.12	2912	29.12		
Calculated Data:				28.84	28.84	28.84	2884	2884		
Vapor Pressure— In. Hg				.28	.28	.28	.28	.28		
ADMP				28.74	28.74	28.74	28.74	28.74		
Corr. Factor				1.09	1.09	1.09	1.09	1.09		
BHP—Observed				4.58	4.50	4.34	42.2	4.04		
BHP—Corrected										
RPM				2000	2000	2000	2000	2000		
BMEP—Corrected										
BSFC—Lbs BHP Hr										
Torque—Ft. Lbs.—Observed										
Combustion Air—Lbs hr				42.5	41.6	40.5	40.5	39.2		
Fuel Air				.081	.0720	.0798	.0798	.0807		
Stop Report No.										
Total Time— Hrs										
AIR FLOW OBS								36.6		

CHECK FUEL FLOW

REMARKS— Lbs. Oil added if any *FUEL FLOW FLUCTUATING
STOP - OUT OF FUEL

OPERATOR CURRENS

AERONAUTICAL RESEARCH LABORATORY
UNIVERSITY OF KENTUCKY

PAGE NO. 109

Data Sheet No. 49

ENGINE LOG SHEET

ENGINE NO. 11

DATE 10-31-52

MAKE: Merz

OBJECT D-3-1

* D-3-5

Reading No.	310	311	312	313	314	315	316	317	318	319
Time of Day	10:53	11:00	11:05	11:23	11:25	11:28	11:32	11:37	11:47	11:54
Speed	2000	2000	2000	1600	1600	1600	1600	1600	1600	1600
Dyn. Scale	.098	.094	.088	.100	.104	.106	.11	.112	.115	.119
Fuel Flow—Lbs. Hr	2.96	2.85	2.85	2.40	2.40	2.45	2.44	2.46	2.46	2.49
Spark Advance Deg.	30	30	30	30	30	30	30	30	30	30
Fuel Flow CORR	3.125	3.005	3.005	2.53	2.53	2.58	2.575	2.60	2.60	2.63
Temperatures—F										
Carb. Air before Heater	0	0	0	0	0	0	0	0	0	0
Carb. Air after Heater	125	154	205	145	127	100	74	47	25	4
Intake Manifold	36	45	64	45	40	28	17	7	-3	-13
Spark Plug Gasket	271	265	250	248	248	252	262	263	268	269
Cylinder Base	38	40	40	38	38	38	38	37	38	38
Crankcase	26	27	27	27	27	26	25	26	25	25
Water In	7	7	7	7	7	7	7	7	7	7
Water Out	154	152	150	154	150	147	150	152	152	154
Carburetor Fuel										
Nozzle Fuel	2	4	4	2	2	2	2	2	2	2
Injector Fuel										
Pressure Oil	62	63	62	54	54	54	53	52	52	52
Sump Oil	51	52	51	50	49	49	48	49	48	49
Engine Room Air	0	0	0	0	0	0	0	0	0	0
Pressures										
Carb. Air Vent. Diff.—In. H	1.47	1.4	1.38	.96	.97	.99	1.00	1.02	1.02	1.05
Int. Man. Vac.—In. Hg	-.1	-.1	-.1	-.1	-.1	0	0	0	0	0
Oil—Lbs. sq.in.—High	100	100	100	98	98	98	98	98	98	98
Oil—Lbs. sq.in.—Low	30	30	30	31	31	31	31	31	31	31
Fuel—Lbs. sq.in.	46	46	46	46	46	46	46	46	64	68
Barometer—In. Hg	29.12	29.12	29.12	29.12	29.12	29.12	29.12	29.12	29.12	29.12
BAR CORR	28.84	28.84	28.84	28.84	28.84	28.54	28.84	28.84	28.84	28.84
Calculated Data:										
Vapor Pressure—In. H	.28	.28	.28	.28	.28	.28	.28	.28	.28	.28
ADMP	28.74	28.74	28.74	28.74	28.74	28.84	28.84	28.84	28.84	28.84
Corr. Factor	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09
BHP—Observed	3.87	3.72	3.48	3.16	3.29	3.35	3.48	3.54	3.64	3.76
BHP—Corrected										
RPM	2000	2000	2000	1600	1600	1600	1600	1600	1600	1600
BMEP—Corrected										
BSFC—Lbs. BHP Hr	.808	.810	.865	.800	.77	.77	.74	.734	.714	.699
Torque—Ft. Lbs.—Observed										
Combustion Air Lbs. hr	38.8	37.9	37.65	31.5	31.7	32.0	32.15	32.5	32.5	33.0
Fuel Air	.0805	.0794	.0798	.0804	.0798	.0809	.0801	.0800	.0800	.0796
Stop Report No.										
Total Time Hrs.										
Air Flow abs.	35.64	34.8	34.54	28.90	29.05	29.35	29.5	29.8	29.8	30.25

REMARKS—Lbs. Oil added if any.

OPERATOR Currens

RONAUTICAL RESEARCH LABORATOR

UNIVERSITY OF KENTUCKY

ENGINE LOG SHEET

PAGE NO. 110

Data Sheet No. 50

ENGINE NO. 11

DATE: Oct 31, 52

MAKE: Merz

OBJECT D3-9 ← N.G. see page 69 → *

Reading No.	STOP	START	320	321	322	323	324	325	326	327
Time of Day	11:56	1.25	1:48	1:52	1:57	2:03	2:11	2:16	2:21	2:25
Speed			1200	1200	1200	1200	1200	1200	1200	1200
Dyn. Scale			11	.108	.106	.097	.102	.10	.097	.10
Fuel Flow—Lbs Hr			2.06	2.04	2.03	1.98	1.98	1.96	1.94	1.98
Spark Advance—Deg.			30	30	30	30	30	30	30	30
Fuel Flow Corr			2.17	2.15	2.145	2.09	2.09	2.07	2.05	2.09
Temperatures—F										
Carb. Air before Heater			0	0	0	0	0	0	0	0
Carb. Air after Heater			2	23	58	75	100	125	154	80
Intake Manifold			-12	-6	8	17	25	38	43	24
Spark Plug Gasket			245	246	248	238	242	237	232	230
Cylinder Base			35	35	36	37	37	37	37	37
Crankcase			21	22	23	22	21	23	23	23
Water In			4	4	4	4	4	4	4	4
Water Out			150	154	155	155	150	154	155	152
Carburetor Fuel										
Nozzle Fuel			0	0	0	0	0	0	0	0
Injector Fuel										
Pressure Oil			41	41	41	41	42	41	41	41
Sump Oil			41	41	42	41	42	41	41	41
Engine Room Air			0	0	0	0	0	0	0	0
Pressures										
Carb. Air Vent Diff.—In Hg			.72	.71	.70	.66	.66	.65	.64	.66
Int. Man. Vac.—In. Hg			0	0	0	0	0	0	0	0
Oil—Lbs sq.in.—High			107	107	105	105	105	105	105	105
Oil—Lbs./sq.in.—Low			31	31	31	31	31	31	31	31
Fuel—Lbs/sq in			86	85	85	85	85	85	85	85
Barometer—In. Hg			29.06	29.05	29.05	29.05	29.05	29.05	29.05	29.05
BAR CORR			28.91	28.91	28.41	28.91	28.91	28.91	28.91	28.91
Calculated Data:										
Vapor Pressure—In. Hg			.14	.14	.14	.14	.14	.14	.14	.14
ADMP			28.91	28.41	28.41	28.91	28.91	28.91	28.91	28.91
Corr. Factor			1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09
BHP—Observed			2.6	2.56	2.515	2.3	2.42	2.37	2.3	2.37
BHP—Corrected										
RPM			1200	1200	1200	1200	1200	1200	1200	1200
BMEP—Corrected										
BSFC—Lbs BHP Hr.			.836	.840	.854	.91	.863	.875	.892	.982
Torque—Ft. Lbs.—Observed										
Combustion Air—Lbs/hr			27.15	26.95	26.8	26.05	26.05	25.8	25.6	26.05
Fuel/Air			.0800	.0800	.0801	.801	.0801	.0803	.0801	.0801
Stop Report No.										
Total Time—Hrs.										
Air Flow obs			24.92	24.76	24.6	23.88	23.88	23.7	23.52	23.88

REMARKS—Lbs. Oil added if any * Check on Reading No. 323

OPERATOR CURREN'S

AERONAUTICAL RESEARCH LABORATOR
UNIVERSITY OF KENTUCKY

PAGE NO. 111

Data Sheet No. 51

ENGINE LOG SHEET

ENGINE NO. 11

DATE: 10-31-52

MAKE: Merz

OBJECT: D-3-13 ← N.G. → see page 70

Reading No.	328	329	330	331	332	333	334	Stop
Time of Day	2:53	2:57	3:02	3:05	3:10	3:14	3:22	3:26
Speed	800	800	800	800	800	800	800	
Dyn. Scale	.092	.096	.098	.10	.102	.104	.106	
Fuel Flow—Lbs Hr	1.46	1.488	1.48	1.48	1.49	1.49	1.49	
Spark Advance—Deg.	30	30	30	30	30	30	30	
Fuel Flow Corr	1.54	1.56	1.56	1.56	1.57	1.57	1.57	
Temperatures—°F								
Carb. Air before Heater	0	0	0	0	0	0	0	
Carb. Air after Heater	143	127	96	75	50	27	0	
Intake Manifold	41	32	27	18	8	0	-5	
Spark Plug Gasket	206	207	208	212	213	217	217	
Cylinder Base	37	37	37	37	37	37	37	
Crankcase	21	22	21	21	21	21	21	
Water In	4	4	4	4	4	4	4	
Water Out	152	152	152	153	152	152	154	
Carburetor Fuel								
Nozzle Fuel	0	0	0	0	0	0	0	
Injector Fuel								
Pressure Oil	32	32	32	32	32	32	32	
Sump Oil	37	37	37	37	36	37	40	
Engine Room Air	0	0	0	0	0	0	0	
Pressures:								
Carb. Air Vent. Diff.—In H O	.34	.35	.35	.35	.36	.36	.36	
Int. Man. Vac.—In. Hg	0	0	0	0	0	0	0	
Oil—Lbs sq.in.—High	100	100	100	100	100	100	100	
Oil—Lbs. sq.in.—Low	31	31	31	31	31	31	31	
Fuel—Lbs sq.in.	86	86	86	86	86	86	86	
Barometer—In. Hg	29.05	29.05	29.05	29.05	29.05	29.05	29.05	
BAR. CORR.	28.91	28.91	28.91	28.91	28.91	28.91	28.91	
Calculated Data:								
Vapor Pressure—In Hg	.14	.14	.14	.14	.14	.14	.14	
ADMP	28.91	28.91	28.91	28.91	28.91	28.91	28.91	
Corr. Factor	1.09	1.09	1.09	1.09	1.09	1.09	1.09	
BHP—Observed	1.45	1.52	1.55	1.58	1.61	1.645	1.68	
BHP—Corrected								
RPM	800	800	800	800	800	800	800	
BMEP—Corrected								
BSFC—Lbs BHP Hr.	1.06	1.025	1.005	.988	.975	.955	.938	
Torque—Ft. Lbs.—Observed								
Combustion Air—Lbs hr	19.2	19.45	19.45	19.45	19.7	19.7	19.7	
Fuel Air	.0802	.0806	.0806	.0806	.0797	.0797	.0797	
Stop Report No.								
Total Time—Hrs.								
Air Flow obs.	17.62	17.85	17.86	17.86	18.08	18.08	18.08	
REMARKS—Lbs. Oil added if any								

OPERATOR CURRENS

Data Sheet No. 52

RONAUTICAL RESEARCH LABORATO

UNIVERSITY OF KENTUCKY

ENGINE LOG SHEET

ENGINE NO. 11

DATE: 11-3-52

MAKE: Mer Z

OBJECT: D-4-1

Reading No.	StarT	STOP	START	335	336	337	338	339	340	341
Time of Day	9:40AM	10:45	10:55	11:05	11:09	11:19	11:22	11:28	11:31	11:35
Speed				2000	2000	2000	2000	2000	2000	2000
Dyn. Scale				.119	.115	.112	.109	.106	.094	.088
Fuel Flow—Lbs/Hr				3.35	3.33	3.26	3.2	3.21	3.1	3.08
Spark Advance—Deg.				30	30	30	30	30	30	30
FUEL FLOW CORR				3.53	3.02	3.45	3.40	3.39	32.7	3.24
Temperatures—°F										
Carb. Air before Heater				-15	-14	-15	-15	-15	-15	-15
Carb. Air after Heater				-17	+14	38	67.	92	127	171
Intake Manifold				-29	37	-4	7	17	30	46
Spark Plug Gasket				319	276	276	272	268	271	265
Cylinder Base				26	29	28	29	30	30	31
Crankcase				14	13	13	13	12	13	13
Water In				-8	-8	-7	-7	-7	-7	-7
Water Out				150	154	154	153	152	154	152
Carburetor Fuel										
Nozzle Fuel				-10	-8	-9	-7	-8	-9	-9
Injector Fuel										
Pressure Oil				42	48	49	49	50	49	50
Sump Oil		OUT OF GAS		37	38	41	42	42	43	43
Engine Room Air				-15	-15	-15	-15	-15	-15	-15
Pressures.										
Carb. Air Vent Diff.—In H₂O				1.77	1.75	1.68	1 65	1.62	152	1.5
Int. Man. Vac.—In Hg.				-.1	-.1	-.1	-.1	-.1	-.1	-.1
Oil—Lbs sq in.—High				114	114	114	100	100	100	100
Oil—Lbs. sq.in.—Low				28	28	28	28	28	28	28
Fuel—Lbs sq.in.				96	96	96	96	96	96	96
Barometer—In. Hg.	29.24			29.24	29.21	29.24	29.24	29.24	29.21	29.24
BAR CORR	28.99			28.99	28.99	28.99	2899	28.99	28.99	28.99
Calculated Data:										
Vapor Pressure—In. Hg	.25			.25	.25	.25	25	.25	.25	.25
ADMP										
Corr. Factor				1.13	1.13	1.13	1.13	1.13	1.13	1.13
BHP—Observed				4.7	4.54	4.42	4.3	4.18	3.71	3.46
BHP—Corrected										
RPM				2000	2000	2000	2000	2000	2000	2000
BMEP—Corrected										
BSFC—Lbs BHP Hr				.752	.775	.780	.790	.810	884	.937
Torque—Ft. Lbs.—Observed										
Combustion Air—Lbs/hr				44.2	44.0	43.1	42.7	42.4	41.0	40.7
Fuel Air				.0798	.080	.080	.0796	.080	.0796	.0798
Stop Report No.										
Total Time—Hrs.										
AIR FLOW OBS				39.17	38.95	38.16	37.8	37.42	36.24	36.0
REMARKS—Lbs. Oil added if any										

OPERATOR CURRENS

RONAUTICAL RESEARCH LABORATO
UNIVERSITY OF KENTUCKY

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Data Sheet No. 53

ENGINE LOG SHEET

ENGINE NO. 11
DATE: 11-3-52
MAKE: MERZ
OBJECT: D-4-5

D-4-9
~~4~~237

Reading No.	STOP	Start	342	343	344	345	346	347	348	349
Time of Day	11:38	1.15	1:36	1:45	1:50	1:55	2:00	2:04	2:09	2:17
Speed			1600	1600	1600	1600	1600	1600	1600	1200
Dyn. Scale			.120	.118	.115	.112	.109	.107	.099	.094
Fuel Flow—Lbs Hr			2.68	2.54	2.54	2.53	2.53	2.51	2.50	1.98
Spark Advance—Deg			30	30	30	30	30	30	30	20
FUEL FLOW COR.			2.83	2.68	2.68	2.67	2.67	2.65	2.64	2.09
Temperatures—°F										
Carb. Air before Heater			-16	-15	-15	-15	-15	-15	-15	-15
Carb. Air after Heater			-15	12	40	70	92	122	175	175
Intake Manifold			-30	-17	-7	7	18	28	50	46
Spark Plug Gasket			254	252	256	250	252	249	242	217
Cylinder Base			26	27	27	27	26	27	27	27
Crankcase			14	12	12	12	12	12	12	12
Water In			-8	-8	-9	-8	-8	-8	-8	-8
Water Out			154	155	154	155	155	154	155	156
Carburetor Fuel			—	—	—	—	—	—	—	—
Nozzle Fuel			-12	-13	-12	-12	-12	-12	-12	-13
Injected Fuel			—	—	—	—	—	—	—	—
Pressure Oil			36	37	37	37	37	37	37	32
Sump Oil			36	34	35	35	35	35	35	32
Engine Room Air			-15	-15	-15	-15	-15	-15	-15	-15
Pressures:										
Carb. Air Vent Diff.—In H_2O			1.1	1.07	1.05	1.04	1.04	1.00	.98	.62
Int. Man. Vac.—In. Hg.			-.1	-.1	-.1	-.1	-.1	-.1	-.1	-.1
Oil—Lbs. sq.in.—High			100	100	100	100	100	100	100	100
Oil—Lbs. sq.in.—Low			30	30	30	30	30	30	30	30
Fuel—Lbs. sq in.			96	96	96	96	96	96	96	96
Barometer—In. Hg			29.22	29.22	29.22	2922	29.22	29.22	29.22	29.22
BAR COR.			2898	28.98	28.98	28.98	28.98	28 98	28.98	28.98
Calculated Data.										
Vapor Pressure—In. Hg.			.24	.24	.24	.24	.24	.24	.24	.24
ADMP										
Corr. Factor			1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13
BHP—Observed			3.79	3.73	3.64	3.54	3.44	3.38	3.13	2.23
BHP—Corrected										
RPM			1600	1600	1600	1600	1600	1600	1600	1200
BMEP—Corrected										
BSFC—Lbs BHP Hr			.746	.718	.737	.755	.776	.785	.843	.937
Torque—Ft. Lbs.—Observed										
Combustion Air—Lbs hr			35.0	33.4	33.4	33.4	33.4	33.4	33.0	26.2
Fuel/Air			.0801	.0802	.0802	.0800	.0800	.0794	.0800	.0797
Stop Report No.										
Total Time—Hrs.										
AIR FLOW OBS.			31.0	29.6	296	29.6	29.6	29.5	29.2	23.2

REMARKS— Lbs. Oil added if any

OPERATOR CURRENS

RONAUTICAL RESEARCH LABORATO
UNIVERSITY OF KENTUCKY

ENGINE LOG SHEET

ENGINE NO. 11

DATE: 11-3-52

MAKE: MERZ

OBJECT: D-4-9

* D-4-13

Reading No.	350	351	352	353	354	355	356	357	358	359
Time of Day	2:23	2:27	2:30	2:32	2:36	2:45	3:05	3:10	3:15	3:20
Speed	1200	1200	1200	1200	1200	1200	800	800	800	800
Dyn. Scale	.099	.100	.105	.107	.110	.112	.109	.104	.095	.099
Fuel Flow—Lbs Hr	2.01	2.01	2.06	2.07	2.07	2.12	1.63	1.61	1.57	1.56
Spark Advance Deg.	20	20	20	20	20	20	10	10	10	10
FUEL FLOW COR.	2.22	2.22	2.18	2.18	2.18	2.24	1.72	1.70	1.66	1.64
Temperatures °F										
Carb. Air before Heater	-15	-15	-15	-15	-16	-15	-15	-16	-16	-16
Carb. Air after Heater	123	92	63	38	13	-13	-15	10	34	62
Intake Manifold	30	21	8	0	-8	-25	-27	-16	-8	0
Spark Plug Gasket	218	221	222	223	225	222	168	182	155	155
Cylinder Base	26	27	26	26	25	26	21	22	24	25
Crankcase	10	10	10	10	8	8	7	7	7	7
Water In	-8	-10	-10	-10	-8	-8	-11	-10	-11	-11
Water Out	155	155	155	155	155	153	116	137	142	146
Carburetor Fuel	—	—	—	—	—	—	—	—	—	—
Nozzle Fuel	-14	-14	-14	-14	-13	-13	-14	-14	-15	-14
Injector Fuel	—	—	—	—	—	—	—	—	—	—
Pressure Oil	30	29	28	28	28	27	17	17	16	16
Sump Oil	32	31	31	30	29	28	23	23	23	23
Engine Room Air	-15	-15	-15	-15	-15	-15	-15	-15	-15	-15
Pressures										
Carb. Air Vent. Diff.—In H₂O	.64	.65	.67	.68	.69	.71	.4	.39	.38	.37
Int. Man. Vac.—In. Hg.	-.1	-.1	-.1	-.1	-.1	-.1	-.1	-.1	-.1	-.1
Oil—Lbs sq.in.—High	100	100	100	100	100	100	100	100	100	100
Oil—Lbs. sq.in.—Low	30	30	30	30	30	30	30	30	30	30
Fuel—Lbs. sq.in.	96	96	96	96	96	96	96	30	30	30
Barometer—In. Hg.	29.22	29.22	29.22	29.22	29.22	29.22	29.22	29.22	29.22	29.22
BAR. COR	28.98	28.98	28.98	28.98	28.98	28.98	28.98	28.98	28.98	28.98
Calculated Data:										
Vapor Pressure—In. Hg	.24	.24	.24	.24	.24	.24	.24	.24	.24	.24
ADMP										
Corr. Factor	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13	1.13
BHP—Observed	2.35	2.37	2.49	2.54	2.61	2.66	1.72	1.64	1.50	1.41
BHP—Corrected										
RPM	1200	1200	1200	1200	1200	1200	800	800	800	800
BMEP—Corrected										
BSFC—Lbs BHP Hr.	.945	.937	.875	.857	.835	.843	1.00	1.04	1.11	1.16
Torque—Ft. Lbs.—Observed										
Combustion Air—Lbs/hr	26.6	26.8	27.2	27.4	27.6	28.0	21.5	21.2	20.9	20.7
Fuel/Air	.0800	.0792	.0802	.0796	.0790	.0800	.0800	.0802	.0795	.0792
Stop Report No.										
Total Time—Hrs.										
AIR FLOW OBS.	23.5	23.7	24.1	24.2	24.4	24.8	19.0	18.8	18.5	18.3

REMARKS— Lbs. Oil added if any.

OPERATOR CURRENS

RONAUTICAL RESEARCH LABORATO
UNIVERSITY OF KENTUCKY

PAGE NO. 115

Data Sheet No. 55

ENGINE LOG SHEET

ENGINE NO. 11

DATE: 11-3-52

MAKE: MER.

D-5-1

OBJECT: D-4-13

11-4-52

Reading No.	360	361	362	Stop	Start	363	364	365	366	367
Time of Day	3:23	3:26	3:30	336	9:55	10:08	10:13	10:18	10:23	10:27
Speed	800	800	800		AM	2000	2000	2000	2000	2000
Dyn. Scale	.087	.085	.082			.119	.117	.113	.110	.105
Fuel Flow—Lbs Hr	1.56	1.56	1.55			3.44	3.42	3.39	3.36	3.33
Spark Advance Deg.	10	10	10			30°	30°	30°	30°	30°
FUEL FLOW COR.	1.64	1.64	1.63			3.63	3.61	3.58	3.54	3.51
Temperatures—°F										
Carb. Air before Heater	-16	-16	-16			-31	-30	-30	-30	-30
Carb. Air after Heater	94	125	185			-30	0	28	53	80
Intake Manifold	12	25	41			-39	-27	-12	-4	7
Spark Plug Gasket	158	160	180			266	262	257	257	255
Cylinder Base	25	25	25			18	21	20	20	20
Crankcase	6	6	6			2	2	2	1	1
Water In	-11	-11	-12			-23	-23	-21	-22	-22
Water Out	147	147	148			150	149	149	149	147
Carburetor Fuel	—	—	—			—	—	—	—	—
Nozzle Fuel	-15	-14	-14			-26	-26	-25	-27	-26
Injector Fuel	—	—	—			—	—	—	—	—
Pressure Oil	16	16	16			36	37	38	38	37
Sump Oil	23	23	23			28	29	28	29	28
Engine Room Air	-15	-15	-15			-30	-30	-30	-30	-30
Pressures:										
Carb. Air Vent. Diff.—In. H₂O	.37	.37	.36			1.7	1.69	1.66	1.63	1.6
Int. Man. Vac.—In. Hg	-.1	-.1	-.1			-.1	-.1	-.1	-.1	-.1
Oil—Lbs sq.in.—High	100	100	100			105	105	105	105	105
Oil—Lbs./sq.in.—Low	30	30	30			25	25	25	25	25
Fuel—Lbs/sq.in.	30	30	30			30	30	30	30	30
Barometer—In. Hg.	29.22	29.22	29.22			29.19	29.19	29.19	29.19	29.19
BAR. COR.	28.98	28.96	28.98			29.04	29.04	29.04	29.04	29.04
Calculated Data:										
Vapor Pressure—In. Hg.	.24	.24	.24			.15	.15	.15	.15	.15
ADMP						28.94	28.94	28.94	28.94	28.94
Corr. Factor	1.13	1.13	1.13			1.18	1.18	1.18	1.18	1.18
BHP—Observed	1.38	1.34	1.30			4.7	4.62	4.47	4.34	4.15
BHP—Corrected										
RPM	800	800	800			2000	2000	2000	2000	2000
BMEP—Corrected										
BSFC—Lbs BHP Hr.	119	1.22	1.25			.772	.782	.800	.816	.846
Torque—Ft. Lbs.—Observed										
Combustion Air—Lbs. hr	20.7	20.7	20.4			45.3	45.1	44.7	44.3	43.9
Fuel/Air	.0792	.0792	.0798			.0801	.0800	.0801	.0800	.0799
Stop Report No.										
Total Time—Hrs.										
AIR FLOW obs	18.3	18.3	18.1			38.4	38.28	37.92	37.56	37.20

REMARKS—Lbs. Oil added if any.

OPERATOR CURRENS

ERONAUTICAL RESEARCH LABORATC

UNIVERSITY OF KENTUCKY

PAGE NO 116

Data Sheet No. 56

ENGINE LOG SHEET

ENGINE NO. 11

DATE: 11-4-52

MAKE: Merz

OBJECT: D-5-1

* D-5-5.

Reading No.	368	369	370	371	372	373	374	375	376	Stop
Time of Day	10:30	10:39	10:48	10:56	11:05	11:10	11:18	11:23	11:31	11:40
Speed	2000	2000	1600	1600	1600	1600	1600	1600	1600	
Dyn. Scale	.099	.098	.092	.098	.103	.106	.109	.112	.114	
Fuel Flow—Lbs Hr	3.26	3.17	2.52	2.54	2.57	2.64	2.67	268	2.70	
Spark Advance—Deg.	30°	30°	30°	30°	30°	30°	30°	30°	30°	
Fuel Flow Corr	3.44	3.37	2.66	268	2.71	2.79	2.82	2.83	2.85	
Temperatures—°F										
Carb. Air before Heater	-30	-30	-30	-30	-28	-30	-31	-31	-31	
Carb. Air after Heater	128	175	185	120	73	49	22	-2	-28	
Intake Manifold	26	47	49	22	7	-5	-16	-27	-40	
Spark Plug Gasket	250	238	235	240	250	244	250	251	250	
Cylinder Base	20	20	20	18	18	18	18	18	18	
Crankcase	0	0	0	0	0	-1	-1	-2	-2	
Water In	-21	-22	-24	-24	-23	-23	-23	-23	-24	
Water Out	147	145	150	153	154	152	152	152	151	
Carburetor Fuel										
Nozzle Fuel	-26	-26	-27	-27	-26	-28	-28	-27	-27	
Injector Fuel										
Pressure Oil	37	37	39	27	30	27	27	27	25	
Sump Oil	28	28	26	23	24	23	23	22	22	
Engine Room Air	-30	-30	-30	-30	-29	-30	-30	-30	-30	
Pressures:										
Carb. Air Vent. Diff.—In H₂O	1.53	1.45	.91	.93	.95	1.0	1.02	1.03	1.06	
Int. Man. Vac.—In. Hg.	-.1	-.1	-.1	-.1	-.1	-.1	-.1	-.1	-.1	
Oil—Lbs sq.in.—High	105	105	105	105	105	105	105	105	105	
Oil—Lbs./sq.in.—Low	25	25	28	28	28	28	28	28	28	
Fuel—Lbs sq.in.	30	30	30	30	30	30	30	30	30	
Barometer—In. Hg.	29.19	29.19	29.19	29.19	29.19	29.19	29.19	29.19	29.19	
BAR. CORR	29.04	29.04	29.04	29.04	29.04	29.04	29.04	29.04	29.04	
Calculated Data:										
Vapor Pressure—In Hg	.15	.15	.15	.15	.15	.15	.15	.15	.15	
ADMP	28.94	28.94	28.94							
Corr. Factor	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.18	
BHP—Observed	3.91	3.52	2.90	3.09	3.25	3.35	3.34	3.54	3.6	
BHP—Corrected										
RPM	2000	2000	1600	1600	1600	1600	1600	1600	1600	
BMEP—Corrected										
BSFC—Lbs BHP Hr	.890	.957	.916	.866	.834	.832	.844	.800	.793	
Torque—Ft. Lbs.—Observed										
Combustion Air—Lbs hr	42.9	41.7	33.2	33.6	33.9	34.8	35.2	35.3	35.8	
Fuel/Air	.0803	.0803	.0801	.0797	.080	.0803	.0801	.0801	.0797	
Stop Report No.										
Total Time—Hrs.										
Air Flow obs	36.36	35.4	28.15	28.45	28.75	29.5	29.8	29.95	30.4	

REMARKS—Lbs. Oil added if any.

OPERATOR Currens

RONAUTICAL RESEARCH LABORATO.

UNIVERSITY OF KENTUCKY

ENGINE LOG SHEET

Data Sheet No. 57

ENGINE NO. 11

MAKE: MERZ

OBJECT: D-5-9

DATE: 11-4-52

D5-13

Reading No.	START	377	378	379	380	381	382	383	* 384	* 385
Time of Day	12:59	1:17	1:24	128	1:32	1:34	1:45	1:54	2:05	2:14
Speed		1200	1200	1200	1200	1200	1200	1200	800	800
Dyn. Scale		.111	.109	.106	.1	.098	.093	.087	.070	.078
Fuel Flow—Lbs Hr		2.27	2.27	2.25	2.25	2.21	2.14	2.08	1.62	1.62
Spark Advance—Deg.		20	20	20	20	20	20	20	10	10
FUEL FLOW CORR		2.39	2.39	2.37	2.37	2.33	2.25	2.19	1.71	1.71
Temperatures—°F										
Carb. Air before Heater		-32	-32	-32	-32	-32	-32	-31	-31	-31
Carb. Air after Heater		-30	-2	+28	55	77	130	173	176	118
Intake Manifold		-41	-28	-17	-7	+4	23	44	37	22
Spark Plug Gasket		226	222	218	215	213	212	212	173	175
Cylinder Base		18	17	17	17	16	16	16	16	15
Crankcase		2	-2	-2	-3	-4	-5	-5	-6	-6
Water In		-25	-25	-25	-25	-26	-25	-25	-25	-24
Water Out		155	152	150	148	146	146	147	138	140
Carburetor Fuel										
Nozzle Fuel		-29	-28	-30	-30	-31	-31	-29	-30	-30
Injector Fuel										
Pressure Oil		16	14	14	14	13	12	12	+3	0
Sump Oil		18	16	17	17	16	16	16	13	10
Engine Room Air		-31	-31	-31	-31	-31	-31	-30	-30	-30
Pressures										
Carb. Air Vent. Diff.—In H₂O		.76	.76	.75	.75	.72	.67	.64	.37	.37
Int. Man. Vac.—In. Hg.		-.1	-.1	-.1	-.1	-.1	-.1	-.1	-.1	-.1
Oil—Lbs/sq.in.—High		105	105	105	100	100	100	100	100	100
Oil—Lbs./sq.in.—Low		30	30	30	30	30	30	30	30	30
Fuel—Lbs sq.in.		30	30	30	30	30	30	30	30	30
Barometer—in. Hg.	29.07	29.07	29.07	29.07	29.07	29.07	29.07	29.07	29.07	29.07
CORR BAR	28.94	28.94	28.94	28.94	28.94	28.44	28.94	28.94	2894	28 44
Calculated Data.										
Vapor Pressure—In. Hg	.13	.13	.13	.13	.13	.13	.13	.13	.13	.13
ADMP										
Corr. Factor		1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17
BHP—Observed		2.63	2.59	2.51	2.37	2.32	2.2	2.06	1.105	1.23
BHP—Corrected										
RPM		1200	1200	1200	1200	1200	1200	1200	800	800
BMEP—Corrected										
BSFC—Lbs/BHP Hr		.905	.924	.945	1.00	1.01	1.021	1.061	1.545	1.38
Torque—Ft. Lbs—Observed										
Combustion Air—Lbs hr		29.9	29.9	29.7	29.7	29.2	28.2	27.5	21.4	21.4
Fuel/Air		.0801	.0801	.0799	.0799	.0799	.080	.0796	.0799	.0799
Stop Report No										
Total Time—Hrs										
AIR FLOW OBS		25.56	25.56	25.40	25.4	24.92	24.06	23.5	18.3	18.3

REMARKS—Lbs. Oil added if any. * ENGINE SURGING

OPERATOR CURRENS

RONAUTICAL RESEARCH LABORATO

UNIVERSITY OF KENTUCKY

PAGE NO 118

Data Sheet No. 58

ENGINE LOG SHEET

ENGINE NO. 11

DATE: 11-4-52

MAKE: MERZ

OBJECT: D-5-13

Reading No.	386	387	388	389	390	STOP
Time of Day	2:25	2:30	2:39	2:45	3:03	3:07
Speed	800	800	800	800	800	
Dyn. Scale	.092	.096	.1	.104	.107	
Fuel Flow—Lbs Hr	1.60	1.60	1.63	1.63	1.63	
Spark Advance—Deg.	10°	10°	10	10	10	
FUEL FLOW CORR	1.69	1.69	1.72	1.72	1.72	
Temperatures—°F						
Carb. Air before Heater	-32	-31	-32	-31	-31	
Carb. Air after Heater	72	48	25	0	-28	
Intake Manifold	4	-5	-12	-20	-30	
Spark Plug Gasket	193	194	199	200	205	
Cylinder Base	16	16	16	17	17	
Crankcase	-8	-7	-7	-7	-7	
Water In	-25	-25	-24	-24	-24	
Water Out	145	150	150	150	153	
Carburetor Fuel						
Nozzle Fuel	-30	-30	-30	-30	-30	
Injector Fuel						
Pressure Oil	0	0	2	0	0	
Sump Oil	11	11	11	11	11	
Engine Room Air	-30	-30	-30	-30	-30	
Pressures:						
Carb. Air Vent Diff.—in H₂O	.37	.37	.38	.38	.38	
Int. Man. Vac.—In Hg.	-1	-.1	-.1	-.1	-.1	
Oil—Lbs/sq.in.—High	102	102	102	102	102	
Oil—Lbs./sq.in.—Low	30	30	30	30	30	
Fuel—Lbs sq.in.	30	30	30	30	30	
Barometer—In. Hg.	29.07	29.07	29.07	29.07	29.07	
BAR CORR	28.94	28.94	28.94	28.94	28.94	
Calculated Data:						
Vapor Pressure—In. Hg.	.13	.13	.13	.13	.13	
ADMP						
Corr. Factor	1.17	1.17	1.17	1.17	1.17	
BHP—Observed	1.45	1.515	1.579	1.64	1.68	
BHP—Corrected						
RPM	800	800	800	800	800	
BMEP—Corrected						
BSFC—Lbs BHP Hr.	1.165	1.15	1.09	1.05	1.025	
Torque—Ft. Lbs.—Observed						
Combustion Air—Lbs hr	21.4	21.4	21.7	21.7	21.7	
Fuel/Air	.079	.079	.0792	.0792	.0792	
Stop Report No.						
Total Time—Hrs.						
AIR FLOW OBS	18.3	18.3	18.54	18.54	18.54	

REMARKS—Lbs. Oil added if any.

OPERATOR CURRENS

RONAUTICAL RESEARCH LABORATO

UNIVERSITY OF KENTUCKY

ENGINE LOG SHEET

PAGE NO. 119

Data Sheet No. 59

ENGINE NO. 11

DATE 11-5-52

MAKE: Merz

OBJECT: D-6-1

← NG →

										*
Reading No.	STarT	391	392	393	394	395	396	397	398	399
Time of Day	9:38AM	10:00	10:13	10:19	10:26	10:30	10:35	10:40	10:47	11:02
Speed		2000	2000	2000	2000	2000	2000	2000	2000	2000
Dyn. Scale		.095	.094	.090	.099	.095	.090	.086	.078	.084
Fuel Flow—Lbs Hr		3.48	3.52	3.48	3.43	3.34	3.35	3.3	3.22	3.47
Spark Advance—Deg.		30	30	30	30	30	30	30	30	30
Fuel Flow Corr.		3.68	3.72	3.68	3.62	3.58	3.54	3.48	3.40	3.66
Temperatures—°F										
Carb. Air before Heater		-46	-47	-46	-47	-47	-47	-47	-47	-47
Carb. Air after Heater		-46	-20	+5	+32	+57	+82	+125	177	+6
Intake Manifold		-54	-42	-30	-16	-5	+5	+22	46	-28
Spark Plug Gasket		263	252	247	245	248	244	235	226	244
Cylinder Base		10	10	9	9	8	8	8	8	8
Crankcase		-14	-14	-14	-14	-15	-15	-16	-16	-16
Water In		-38	-37	-37	-37	-38	-39	-39	-39	-39
Water Out		144	142	142	141	142	141	140	135	142
Carburetor Fuel										
Nozzle Fuel		-42	-40	-42	-40	-41	-42	-41	-42	-42
Injector Fuel										
Pressure Oil		21	21	21	21	21	19	18	18	18
Sump Oil		15	15	14	13	13	13	14	13	13
Engine Room Air		-45	-45	-45	-45	-46	-45	-45	-45	-45
Pressures:										
Carb. Air Vent. Diff.—In H₂O		1.7	1.72	1.67	1.63	1.59	1.55	1.50	1.43	1.65
Int. Man. Vac.—In. Hg.		-.1	-.1	-.1	-.1	-.1	-.1	-.1	-.1	-.1
Oil—Lbs sq.in.—High		105	105	105	105	105	105	105	105	105
Oil—Lbs. sq.in.—Low		30	30	30	30	30	30	30	30	30
Fuel—Lbs/sq.in.		31	31	31	31	31	31	31	31	31
Barometer—In. Hg.		28.86	28.86	28.86	28.86	28.86	28.86	28.86	28.86	28.86
Bar. Corr.		28.77	28.77	28.77	28.77	28.77	28.77	28.77	28.77	28.77
Calculated Data:										
Vapor Pressure—In. Hg.		.09	.09	.09	.09	.09	.09	.09	.09	.09
ADMP		28.76	28.76	28.76	28.76	28.76	28.76	28.76	28.76	28.76
Corr. Factor		1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21
BHP—Observed		3.75	3.71	3.56	3.91	3.75	3.56	3.39	3.08	3.32
BHP—Corrected										
RPM		2000	2000	2000	2000	2000	2000	2000	2000	2000
BMEP—Corrected										
BSFC—Lbs/BHP Hr		.980	1.01	1.032	.926	.955	.994	1.026	1.102	1.098
Torque—Ft. Lbs.—Observed										
Combustion Air—Lbs/hr		46.5	46.7	46.0	45.4	44.8	44.4	43.6	42.5	45.9
Fuel/Air		.0792	.0795	.080	.0799	.080	.0799	.0797	.080	.080
Stop Report No.										
Total Time—Hrs.										
Air Flow obs.		38.4	38.62	38.04	37.56	37.08	36.6	36.0	35.16	37.8

REMARKS—Lbs. Oil added if any. * CHECK POINT FOR READING #393

OPERATOR CURRENS

.ERONAUTICAL RESEARCH LABORATC.

UNIVERSITY OF KENTUCKY

ENGINE LOG SHEET

Data Sheet No. 60

ENGINE NO. 11

DATE: 11-5-52

MAKE: MERZ

OBJECT: DG-1

Reading No.	STOP	START	*400	401	402	403	404	405	406	407
Time of Day	11:32	105	1:42	1:50	1:55	2:01	2:04	2:10	2:15	2:21
Speed			2000	2000	2000	2000	2000	2000	2000	2000
Dyn. Scale			.114	.111	.105	.102	.099	.095	.088	.082
Fuel Flow—Lbs Hr			3.55	3.5	3.45	3.40	3.4	3.35	3.35	3.25
Spark Advance—Deg.			30	30	30	30	30	30	30	30
FUEL FLOW CORR			3.75	3.7	3.64	3.59	3.59	3.54	3.54	3.43
Temperatures—°F										
Carb. Air before Heater			-46	-46	-45	-45	-45	-45	-45	-45
Carb. Air after Heater			-46	-22	10	35	57	91	128	175
Intake Manifold			-54	-42	-27	-16	-5	8	22	46
Spark Plug Gasket			261	260	258	255	252	246	241	235
Cylinder Base			10	10	9	8	9	9	9	9
Crankcase			-14	-14	-14	-15	-15	-15	-15	-15
Water In			-38	-38	-37	-37	-37	-38	-38	-38
Water Out			145	145	144	143	142	140	139	136
Carburetor Fuel										
Nozzle Fuel			-40	-40	-40	-40	-40	-40	-41	-41
Injector Fuel										
Pressure Oil			-22	23	25	23	22	22	22	22
Sump Oil			15	15	15	15	15	14	14	13
Engine Room Air			-45	-45	-45	-45	-45	-45	-45	-45
Pressures:										
Carb. Air Vent. Diff.—In H.O			1.75	1.7	1.66	1.62	1.59	1.54	1.51	1.46
Int. Man. Vac.—In. Hg.			-.1	-.1	-.1	-.1	-.1	-.1	-.1	-.1
Oil—Lbs/sq.in.—High			101	101	101	101	101	101	101	101
Oil—Lbs./sq.in.—Low			30	30	30	30	30	30	30	30
Fuel—Lbs/sq.in.			33	33	33	33	33	34	34	34
Barometer—In. Hg.	29.73		28.73	28.73	28.73	28.73	28.73	28.73	28.78	28.73
BAR CORR.	28.63		28.63	28.63	28.63	28.63	28.63	28.63	28.63	28.63
Calculated Data:										
Vapor Pressure—In. Hg.	.1		.10	.10	.10	.10	.10	.10	.10	.10
ADMP			28.53	28.53	28.53	28.53	28.53	28.53	28.53	28.53
Corr. Factor	1.20		1.205	1.205	1.205	1.205	1.205	1.205	1.205	1.205
BHP—Observed			4.6	4.39	4.15	4.03	3.91	3.75	3.48	3.24
BHP—Corrected										
RPM			2000	2000	2000	2000	2000	2000	2000	2000
BMEP—Corrected										
BSFC—Lbs/BHP Hr.			.834	.844	.876	.890	.92	.944	1.01	1.059
Torque—Ft. Lbs.—Observed										
Combustion Air—Lbs hr			47	46.4	45.7	44.9	44.6	44.0	43.6	42.8
Fuel/Air			.0798	.0798	.0797	.0800	.0803	.0803	.081	.0803
Stop Report No.										
Total Time—Hrs.										
AIR FLOW OBS			38.95	38.4	37.9	3225	37	365	36.2	35.5

REMARKS—Lbs. Oil added if any.

* START OF RUN

OPERATOR CURRENS

ERONAUTICAL RESEARCH LABORATC
UNIVERSITY OF KENTUCKY

ENGINE LOG SHEET

PAGE NO. 121

Data Sheet No. 61

ENGINE NO. 11

DATE: 11-5-52

MAKE: MERZ

OBJECT: D-6-5

Reading No.	408	409	410	411	412	413	414	415	STOP
Time of Day	2:32	2:39	2:45	2:50	2:56	3:03	3:10	3:24	3:28
Speed	1600	1600	1600	1600	1600	1600	1600	1600	
Dyn. Scale	.085	.095	.099	.102	.105	.107	.111	.113	
Fuel Flow—Lbs Hr	2.54	2.60	2.65	2.70	2.75	2.75	2.80	2.83	
Spark Advance—Deg.	30	30	30	30	30	30	30	30	
FUEL FLOW CORR	2.68	2.74	2.80	2.85	2.91	291	2.95	2.99	
Temperatures—°F									
Carb. Air before Heater	-46	-46	-46	-46	-46	-46	-46	-47	
Carb. Air after Heater	175	120	74	53	27	1	-23	-44	
Intake Manifold	40	20	1	-10	-22	-34	-45	-54	
Spark Plug Gasket	224	233	234	233	234	236	240	244	
Cylinder Base	9	8	8	7	7	6	6	7	
Crankcase	-16	-16	-17	-17	-17	-17	-17	-17	
Water In	-40	-40	-40	-40	-40	-40	-40	-38	
Water Out	145	145	145	144	143	142	144	146	
Carburetor Fuel									
Nozzle Fuel	-44	-44	-44	-43	-44	-44	-44	-43	
Injector Fuel									
Pressure Oil	11	10	9	9	9	9	9	9	
Sump Oil	10	9	9	9	8	8	9	8	
Engine Room Air	-45	-45	-45	-45	-45	-45	-43	-44	
Pressures:									
Carb. Air Vent. Diff.—In. H_2O	.89	.94	.97	1.0	1.02	1.05	1.07	1.1	
Int. Man. Vac.—In. Hg.	-.1	-.1	-.1	-.1	-.1	-.1	-.1	-.1	
Oil—Lbs/sq.in.—High	100	100	100	101	101	101	101	101	
Oil—Lbs./sq.in.—Low	30	30	30	30	30	30	30	30	
Fuel—Lbs/sq.in.	34	34	34	33	33	33	33	33	
Barometer—In. Hg.	28.73	28.73	28.73	28.73	28.73	28.73	28.73	28.73	
CORR BAR	28.63	28.63	28.63	28.63	28.63	28.63	28.63	28.63	
Calculated Data:									
Vapor Pressure—In. Hg.	.10	.10	.10	.10	.10	.10	.10	.10	
ADMP	28.53	28.53	28.53	28.53	28.53	28.53	28.53	28.53	
Corr. Factor	1.205	1.205	1.205	1.205	1.205	1.205	1.205	1.205	
BHP—Observed	2.69	2.98	3.12	3.22	3.32	3.38	3.48	3.58	
BHP—Corrected									
RPM	1600	1600	1600	1600	1600	1600	1600	1600	
BMEP—Corrected									
BSFC—Lbs/BHP Hr.	.997	.920	.896	.885	.875	.860	.849	.835	
Torque—Ft. Lbs.—Observed									
Combustion Air—Lbs/hr	32.8	34.6	35.0	35.6	36.0	36.4	36.7	37.4	
Fuel Air	.0815	.0795	.080	.0801	.0809	.0799	.0805	.0799	
Stop Report No.									
Total Time—Hrs.									
OBS AIR FLOW	27.2	28.7	29	29.5	29.8	30.2	30.5	31.0	

REMARKS—Lbs. Oil added if any.

OPERATOR CURRENS

RONAUTICAL RESEARCH LABORATO
UNIVERSITY OF KENTUCKY

Data Sheet No. 62

ENGINE LOG SHEET

ENGINE NO. 11

DATE: 11-6-52

MAKE: Merz.

OBJECT: D-6-9

Reading No.	Start	416	417	418	419	420	421	422	423
Time of Day	9:20AM	9:35	9:45	9:52	10:04	10:06	10:12	10:15	10:21
Speed		1200	1200	1200	1200	1200	1200	1200	1200
Dyn. Scale		.108	.105	.101	.096	.093	.090	.084	.078
Fuel Flow—Lbs Hr		2.38	2.38	2.32	2.24	2.24	2.24	2.22	2.18
Spark Advance—Deg		20°	20°	20°	20°	20°	20°	20°	20°
Fuel flow corr.		252	2.52	2.46	2.37	2.37	2.37	2.35	2.30
Temperatures—°F									
Carb. Air before Heater		-47	-47	-47	-47	-47	-47	-47	-47
Carb. Air after Heater		-45	-23	+7	+32	+53	83	128	182
Intake Manifold		-52	-44	-32	-18	-11	-1	16	58
Spark Plug Gasket		196	192	193	194	192	192	172	170
Cylinder Base		4	4	4	4	4	4	4	+3
Crankcase		-18	-18	-20	-20	-21	-21	-22	-21
Water In		-40	-39	-40	-39	-40	-41	-41	-40
Water Out		138	138	138	138	139	138	137	136
Carburetor Fuel									
Nozzle Fuel		-44	-44	-44	-44	-44	-44	-44	-44
Injector Fuel									
Pressure Oil		-7	-6	-7	-6	-7	-7	-7	-7
Sump Oil		0	-2	-2	-2	-2	-2	-2	-2
Engine Room Air		-44	-44	-45	-44	-45	-45	-45	-45
Pressures:									
Carb. Air Vent Diff.—In H C		.77	.77	.75	.7	.7	.7	.68	.66
Int. Man. Vac.—In Hg.		-.1	-.1	-.1	-.1	-.1	-.1	-.1	-.1
Oil—Lbs/sq.in.—High		109	109	109	108	108	108	108	108
Oil—Lbs./sq.in.—Low		30	30	30	30	30	30	30	30
Fuel—Lbs/sq.in.		33	33	33	33	33	33	33	33
Barometer—In. Hg.		28.88	28.88	2888	28.88	28.88	28.88	28.88	28.88
Corr. Bar		28.70	28.70	28.70	28.70	28.70	28.70	28.70	28.70
Calculated Data:									
Vapor Pressure—In. Hg.		.18	.18	.18	.18	.18	.18	.18	.18
ADMP		28.60	28.60	28.60	28.60	28.60	28.60	28.60	28.60
Corr. Factor		1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21
BHP—Observed		2.56	2.49	2.39	2.27	2.2	2.13	1.99	1.845+
BHP—Corrected									
RPM		1200	1200	1200	1200	1200	1200	1200	1200
BMEP—Corrected									
BSFC—Lbs BHP H.								1.47	1.245+
Torque—Ft. Lbs.—Observed									
Combustion Air—Lbs hr		31.2	31.2	30.8	29.8	29.8	29.8	29.2	28.8
Fuel/Air		.0805	.0805	.0794	.0795	.0795	.0795	.0801	.080
Stop Report No.									
Total Time—Hrs.									
OBS Air Flow		25.7	25.7	25.4	24.6	24.6	24.6	24.2	23.8

REMARKS—Lbs. Oil added if any.

OPERATOR CURRENS

RONAUTICAL RESEARCH LABORATOR
UNIVERSITY OF KENTUCKY

PAGE NO 123

Data Sheet No. 63

ENGINE LOG SHEET

ENGINE NO. 11

DATE 11-6-52

MAKE: MERZ

OBJECT: D-6-13

	*							
Reading No.	424	425	426	427	428	429	430	431
Time of Day	10:35	10:39	10:47	10:50	10:54	11:00	11:03	11:12
Speed	800	800	800	800	800	800	800	800
Dyn. Scale	.080	.082	.085	.088	.090	.093	.096	.100
Fuel Flow —Lbs Hr	1.64	1.64	1.69	1.68	168	1.7	1.7	1.7
Spark Advance—Deg.	10°	10°	10°	10°	10°	10°	10°	10°
FUEL CORR	1.73	1.73	1.78	1.71	1.71	1.795	1.795	1795
Temperatures—°F								
Carb. Air before Heater	-48	-48	-49	-48	-48	-48	-48	-47
Carb Air after Heater	+170	+127	+80	50	27	+5	-18	-44
Intake Manifold	32	23	+2	-9	-17	-27	-38	-50
Spark Plug Gasket	147	156	155	156	158	158	157	158
Cylinder Base	-3	+2	+2	+4	3	3	2	3
Crankcase	-21	-23	-23	-23	-23	-23	-25	-25
Water In	-41	-41	-41	-41	-41	-41	-41	-41
Water Out	127	128	128	130	130	132	131	130
Carburetor Fuel								
Nozzle Fuel	-46	-41	-46	-41	-41	-46	-47	-41
Injector Fuel								
Pressure Oil	-18	-18	-20	-20	-20	-20	-21	-19
Sump Oil	-7	-7	-8	-8	-8	-8	-8	-7
Engine Room Air	-45	-45	-45	-45	-45	-45	-45	-45
Pressures.								
Carb. Air Vent. Diff.—In H₂O	.35	.35	.37	.37	.37	.38	38	.38
Int. Man. Vac.—In. Hg.	0	0	0	0	0	0	0	0
Oil—Lbs sq.in.—High	108	108	108	108	108	109	108	108
Oil—Lbs./sq.in.—Low	31	31	31	31	31	31	31	31
Fuel—Lbs./sq.in.	33	33	33	33	33	33	33	33
Barometer—In. Hg.	28.88	28.88	28.88	28.88	28.88	28.88	28.88	28.88
BAR. CORR	28.70	28.70	28.70	28.70	28.70	28.70	28.70	28.10
Calculated Data:								
Vapor Pressure—In. Hg	.18	.18	.18	.18	.18	.18	.18	.18
ADMP								
Corr. Factor	1.21	1.21	1.21	1.21	1.21	1.21	1.21	1.21
BHP—Observed	1.26	1.291	1.34	1.39	1.42	1.469	152	158
BHP—Corrected								
RPM	800	800	800	800	800	800	800	800
BMEP—Corrected								
BSFC—Lbs BHP Hr							1.18	
Torque—Ft. Lbs.—Observed								
Combustion Air—Lbs hr	21.6	21.6	22.2	22.2	22.2	22.5	22.5	22.5
Fuel Air	.0801	.0801	.0802	.0799	.0799	.0799	.0799	.0799
Stop Report No.								
Total Time—Hrs.								
AIR FLOW OBS.	17.85	17.85	18.31	18.31	18.31	18.54	18.54	18.54

REMARKS Lbs. Oil added if any. ENGINE SURGING BADLY AT 800 RPM

OPERATOR CURRENS

ERONAUTICAL RESEARCH LABORATO...

UNIVERSITY OF KENTUCKY

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Data Sheet No. 64

ENGINE LOG SHEET

ENGINE NO. 11

DATE: 11-6-52

MAKE: MER Z

OBJECT: D-7-1

Reading No.	432	433	434	435	436	437	438	439	STOP
Time of Day	11:30	11:36	11:40	11:47	11:52	11:57	12:00	12:06	12:08
Speed	2000	2000	2000	2000	2000	2000	2000	2000	
Dyn. Scale	.111	.110	.107	.102	.099	.097	.042	.083	
Fuel Flow—Lbs Hr	3.69	3.69	3.63	3.6	3.54	3.46	3.38	3.3	
Spark Advance—Deg.	30°	30°	30°	30°	30°	30°	30°	30°	
FUEL CORR	3.9	3.9	3.84	3.8	3.74	3.65	3.57	3.49	
Temperatures—°F									
Carb. Air before Heater	-57	-57	-56	-56	-55	-54	-54	-55	
Carb. Air after Heater	-56	-31	0	25	49	76	122	174	
Intake Manifold	-64	-51	-36	-23	-11	2	18	43	
Spark Plug Gasket	252	244	247	233	239	236	225	218	
Cylinder Base	-1	0	0	0	1	0	+1	+2	
Crankcase	-30	-29	-28	-28	-25	-26	-25	-25	
Water In	-50	-49	-49	-49	-49	-46	-47	-47	
Water Out	137	137	137	134	183	132	134	133	
Carburetor Fuel									
Nozzle Fuel	-55	-52	-53	-51	-50	-50	-51	-50	
Injector Fuel									
Pressure Oil	3	7	7	7	12	12	12	12	
Sump Oil	-2	0	0	0	3	3	4	7	
Engine Room Air	-55	-56	-56	-56	-55	-55	-55	-55	
Pressures.									
Carb. Air Vent Diff.—In H₂O	1.8	1.8	1.75	1.7	1.65	1.58	1.52	1.45	
Int. Man. Vac.—In. Hg.	-.1	-.1	-.1	-.1	-.1	-.1	-.1	-.1	
Oil—Lbs sq.in.—High	115	115	115	115	115	115	115	115	
Oil—Lbs./sq.in.—Low	31	31	31	31	31	31	31	31	
Fuel—Lbs/sq in.	31	31	31	31	31	31	31	31	
Barometer—In Hg.	28.88	28.88	28.88	28.89	28.88	28 88	28.88	28.88	
BAR CORR	28.70	28.70	28.70	28.70	28.70	28.70	28.70	28.10	
Calculated Data:									
Vapor Pressure—In. H.	.18	.18	.18	.18	.18	.18	.18	.18	
ADMP									
Corr Factor	1.235	1.235	1.235	1.235	1.235	1.235	1.235	1.235	
BHP Observed	4.38	4.34	4.22	4.03	3.91	3.83	3.63	3.28	
BHP—Corrected									
RPM	2000	2000	2000	2000	2000	2000	2000	2000	
BMEP—Corrected									
BSFC—Lbs BHP Hr									
Torque—Ft. Lbs.—Observed									
Combustion Air—Lbs hr	48.8	48.8	48.1	47.4	46.7	45.6	44.7	43.7	
Fuel Air	.0799	.0797	.0799	.0801	.080	.080	.0799	.0799	
Stop Report No.									
Total Time—Hrs.									
AIR OBS	39.5	39.5	38.45	38.4	37.8	36.9	36.2	354	

REMARKS- Lbs. Oil added if any.

OPERATOR CURRENS

AERONAUTICAL RESEARCH LABORATORY
UNIVERSITY OF KENTUCKY

PAGE NO. 125

Data Sheet No. 65

ENGINE LOG SHEET

ENGINE NO. 11

DATE: 11-6-52

MAKE: MERZ

OBJECT: D-7-5

Reading No.	START	440	441	442	443	444	445	446	447
Time of Day	1:25	1:46	1:55	2:00	2:04	2:07	2:12	2:14	2:21
Speed		1600	1600	1600	1600	1600	1600	1600	1600
Dyn. Scale		.118	.105	.099	.096	.094	.090	.087	.083
Fuel Flow—Lbs Hr		2.96	2.82	2.76	2.74	2.74	2.74	2.72	2.63
Spark Advance—Deg.		30°	30°	30°	30°	30°	30°	30°	30°
FUEL CORR		3.12	2.98	2.91	2.89	2.89	2.89	2.87	2.78
Temperatures—°F									
Carb. Air before Heater		-55	-56	-55	-54	-55	-55	-55	-55
Carb. Air after Heater		-54	-31	0	+27	50	80	130	175
Intake Manifold		-62	-52	-38	-27	-17	-5	+14	33
Spark Plug Gasket		220	221	234	226	225	218	216	214
Cylinder Base		0	1	2	1	1	0	0	0
Crankcase		-21	-24	-24	-25	-26	-26	-27	-27
Water In		-46	-47	-46	-47	-47	-48	-47	-42
Water Out		139	143	145	146	143	143	143	138
Carburetor Fuel		—							
Nozzle Fuel		-51	-51	-52	-51	-52	-52	-52	-52
Injector Fuel		—							
Pressure Oil		3	2	2	2	1	1	1	0
Sump Oil		2	2	1	1	1	0	1	0
Engine Room Air		-55	-55	-54	-54	-55	-55	-55	-56
Pressures:									
Carb. Air Vent Diff.—In H_2O		1.15	1.05	1.0	.98	.98	.98	.97	.91
Int. Man. Vac.—In. Hg		-.1	-.1	-.1	-.1	-.1	-.1	-.1	-.1
Oil—Lbs sq.in.—High		100	100	100	100	100	100	100	100
Oil—Lbs./sq.in.—Low		32	32	32	32	32	32	32	32
Fuel—Lbs sq.in.		31	31	31	31	31	31	31	31
Barometer—In. Hg.		28.88	28.88	28.88	28.88	28.88	28.88	28.88	28.88
BAR CORR		28.79	28.79	28.79	28.79	28.79	28.79	28.79	28.78
Calculated Data.									
Vapor Pressure—In Hg		.09	.09	.09	.09	.09	.09	.09	C9
ADMP		28.69	28.69	28.69	28.69	28.69	28.69	28.69	28.69
Corr. Factor		1.235	1.235	1.235	1.235	1.235	1.235	1.235	1.235
BHP—Observed		3.73	3.32	3.13	3.04	2.97	2.84	2.75	2.62
BHP—Corrected									
RPM		1600	1600	1600	1600	1600	1600	1600	1600
BMEP—Corrected									
BSFC—Lbs BHP Hr.		.836	.898						
Torque—Ft. Lbs.—Observed									
Combustion Air—Lbs hr		39.0	37.4	36.4	36.1	36.1	36.1	35.9	34.7
Fuel Air		.080	.0776	.080	.080	.080	.080	.080	.0801
Stop Report No.									
Total Time—Hrs.									
AIR OBS		31.6	30.25	29.5	29.2	29.2	29.2	29.05	28.15

REMARKS—Lbs. Oil added if any

OPERATOR CURRENS

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RONAUTICAL RESEARCH LABORATO

UNIVERSITY OF KENTUCKY

ENGINE LOG SHEET

Data Sheet No. 66

ENGINE NO. 11

DATE: 11-6-52

MAKE: MERZ

OBJECT: D-7-9

Reading No.	448	449	450	451	452	453	454	455	STOP
Time of Day	2:35	2:39	2:44	2:50	2:53	3:05	3:15	3:25	3:30
Speed	1200	1200	1200	1200	1200	1200	1200	1200	
Dyn. Scale	.085	.089	.092	.092	.099	.101	.104	.108	
Fuel Flow—Lbs Hr	2.12	2.14	2.19	2.19	2.19	2.21	2.28	2.3	
Spark Advance—Deg.	23°	23°	23°	23°	23°	23°	23°	23°	
FUEL CORR	2.23	2.26	2.32	2.32	2.32	2.35	2 41	2.43	
Temperatures—°F									
Carb. Air before Heater	-56	-56	-55	-55	-55	-55	-56	-55	
Carb. Air after Heater	170	128	70	48	25	0	-30	-54	
Intake Manifold	32	16	-2	-14	-24	-39	-50	-55	
Spark Plug Gasket	193	196	196	198	198	195	195	199	
Cylinder Base	-1	-1	-1	0	0	0	0	0	
Crankcase	-27	-29	-28	-28	-29	-30	-30	-30	
Water In	-48	-43	-48	-48	-48	-48	-49	-44	
Water Out	142	142	145	146	145	145	149	150	
Carburetor Fuel	—	—	—	—	—	—	—	—	
Nozzle Fuel	-55	-54	-54	-52	-53	-55	-55	-55	
Injector Fuel	—	—	—		—				
Pressure Oil	-14	-7	-7	-7	-8	-9	-10	-10	
Sump Oil	-5	-4	-4	-4	-5	-6	-6	-10	
Engine Room Air	-55	-54	-54	-54	-55	-54	-55	-56	
Pressures:									
Carb. Air Vent. Diff.—In H.O	.59	.61	.64	.64	.64	.66	.69	.7	
Int. Man. Vac.—In. Hg.	-.1	-.1	-.1	-.1	-.1	-.1	-.1	-.1	
Oil—Lbs. sq.in.—High	103	103	103	100	100	100	100	100	
Oil—Lbs. sq.in.—Low	31	31	31	31	31	31	31	31	
Fuel—Lbs. sq.in.	31	31	31	31	31	31	31	31	
Barometer—In. Hg.	28.88	28.88	28.88	28.88	28.88	28.88	28.88	28.88	
BAR CORR	28.79	28.79	28.79	28.79	28.79	28.79	28.79	28.79	
Calculated Data:									
Vapor Pressure—In. Hg.	.09	.09	.09	.09	.09	.09	.09	.09	
ADMP									
Corr. Factor	1.235	1.235	1.235	1.235	1.235	1.235	1.235	1.235	
BHP—Observed	2.01	2.11	2.18	2.30	2.34	2.40	2.465	2.56	
BHP—Corrected									
RPM	1200	1200	1200	1200	1200	1200	1200	1200	
BMEP—Corrected									
BSFC—Lbs BHP Hr.									
Torque—Ft. Lbs.—Observed									
Combustion Air—Lbs/hr	27.9	28.3	29.0	29.0	29.0	29.4	30.1	30.4	
Fuel/Air									
Stop Report No.	.080	.080	.080	.080	.080	.080	.0801	.080	
Total Time—Hrs.									
AIR OBS	22.6	22.9	23.5	23.5	23.5	23.8	24.4	24.6	

REMARKS—Lbs. Oil added if any.

OPERATOR CURRENS

RONAUTICAL RESEARCH LABORATO
UNIVERSITY OF KENTUCKY
ENGINE LOG SHEET

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Data Sheet No. 67

ENGINE NO. 11
DATE: 11-7-52
MAKE: Merg
OBJECT D-7-13

Reading No	StarT	456	457	458	459	460	461	462	463
Time of Day	9:45AM	10:15	10:22	10:27	10:35	10:41	10:45	10:50	10:56
Speed		800	800	800	800	800	800	800	800
Dyn. Scale		.112	.110	.109	.107	.104	.101	.092	.085
Fuel Flow—Lbs Hr		1.75	1.75	1.73	1.73	1.73	1.73	1.71	1.67
Spark Advance—Deg		10	10	10	10	10	10	10	10
Fuel Corr		1.85	1.85	1.83	1.83	1.83	1.83	1.81	1.77
Temperatures—°F									
Carb. Air before Heater		-57	-57	-58	-58	-58	-58	-57	-58
Carb. Air after Heater		-56	-28	+7	31	56	80	130	180
Intake Manifold		-62	-50	-38	-30	-17	-10	+12	30
Spark Plug Gasket		167	162	161	161	156	153	149	145
Cylinder Base		1	0	-1	-1	-2	-2	-2	-2
Crankcase		-34	-35	-36	-35	-35	-36	-36	-37
Water In		-50	-50	-50	-50	-50	-50	-50	-50
Water Out		140	134	132	132	132	128	127	126
Carburetor Fuel									
Nozzle Fuel		-56	-56	-56	-56	-56	-57	-56	-56
Injector Fuel									
Pressure Oil		-24	-25	-26	-27	-27	-27	-27	-27
Sump Oil		-16	-17	-16	-18	-18	-18	-18	-18
Engine Room Air		-55	-55	-55	-55	-55	-55	-55	-55
Pressures:									
Carb. Air Vent. Diff.—In H.O		.39	.39	.38	.38	.38	.38	.37	.35
Int. Man. Vac.—In. Hg.		0	0	0	0	0	0	0	0
Oil—Lbs/sq.in.—High		100	100	100	100	100	100	100	100
Oil—Lbs. sq.in.—Low		31	31	31	31	31	31	31	31
Fuel—Lbs/sq.in.		32	32	32	32	32	32	32	32
Barometer—In. Hg.		29.20	29.20	29.20	29.20	29.20	29.20	29.20	29.20
Bar. Corr		29.08	29.08	29.08	29.08	29.08	29.08	29.08	29.08
Calculated Data:									
Vapor Pressure—In. Hg		.12	.12	.12	.12	.12	12	.12	.12
ADMP									
Corr. Factor		1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
BHP—Observed		1.77	1.74	1.72	169	1.64	1.595	145	1.34
BHP—Corrected									
RPM		800	800	800	800	800	800	800	800
BMEP—Corrected									
BSFC—Lbs BHP Hr									
Torque—Ft. Lbs —Observed									
Combustion Air—Lbs hr		23.4	23.4	23.1	23.1	23.1	23.1	22.9	22.4
Fuel Air		.079	.079	.0791	.0791	.0791	.0791	.079	.079
Stop Report No.									
Total Time—Hrs.									
Air Obs.		18.7	18.7	18.5	18.5	18.5	18.5	18.3	17.8

REMARKS—Lbs. Oil added if any.

OPERATOR Currens

RONAUTICAL RESEARCH LABORATO

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ENGINE LOG SHEET

ENGINE NO. 11

DATE 11-7-52

MAKE MERZ

OBJECT: D-8-1

NG

Reading No.	464	465	STOP
Time of Day	11:19	11:22	11:33
Speed	2000	2000	*
Dyn. Scale	.121	.120	
Fuel Flow—Lbs Hr	3.84	3.84	
Spark Advance - Deg.	30°	30°	
FUEL CORR	4.05	4.05	
Temperatures—°F			
Carb. Air before Heater	-65	-66	
Carb. Air after Heater	-65	-42	
Intake Manifold	-71	-57	
Spark Plug Gasket	240	237	
Cylinder Base	-7	-6	
Crankcase	-36	-37	
Water In	-57	-57	
Water Out	146	143	
Carburetor Fuel	—	—	
Nozzle Fuel	-60	-60	
Injector Fuel	—	—	
Pressure Oil	0	0	
Sump Oil	-8	+7	
Engine Room Air	-64	-64	
Pressures.			
Carb. Air Vent. Diff.—In H O	1.8	1.8	
Int. Man. Vac.—In. Hg.	-.1	-.1	
Oil—Lbs sq in.—High	102	102	
Oil—Lbs./sq.in.—Low	31	31	
Fuel—Lbs sq.in.	32	32	
Barometer—In. Hg.	29.20	29.20	
BAR CORR	29.08	29.08	
Calculated Data:			
Vapor Pressure—In. Hg.	.12	.12	
ADMP			
Corr. Factor	1.28	1.28	
BHP—Observed	4.78	4.75	
BHP—Corrected			
RPM	2000	2000	
BMEP—Corrected			
BSFC—Lbs BHP Hr			
Torque—Ft Lbs.—Observed			
Combustion Air—Lbs hr	50.5	50.5	
Fuel/Air	.0801	.0801	
Stop Report No			
Total Time—Hrs.			
AIR OBS	39.5	39.5	

REMARKS—Lbs. Oil added if any. * FUEL FLOW STOPPED

OPERATOR Curtens

AERONAUTICAL RESEARCH LABORATORY
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Data Sheet No. 69

ENGINE LOG SHEET

ENGINE NO. 11

DATE: 11-10-52

MAKE: Merz

OBJECT: D-3-9

*N.G.

Reading No	STarT	466	467	468	464	470	471	472	STOP
Time of Day	9:37AM	10:12	10:54	11:00	11:07	11:10	11:15	11:23	11:30
Speed		1200	1200	1200	1200	1200	1200	1200	
Dyn. Scale		.108	.12	.11	.105	.1	.094	.088	
Fuel Flow—Lbs Hr		2.02	1.95	1.9	1.84	1.81	1.77	1.73	
Spark Advance—Deg		20°	20°	20°	20°	20°	20°	20°	
Fuel corr.		2.13	2.06	2.01	1.94	1.91	1.865	1.82	
Temperatures—°F									
Carb. Air before Heater		0	0	0	0	6	0	0	
Carb. Air after Heater		0	0	24	50	77	130	174	
Intake Manifold		-13	-12	-2	8	17	38	54	
Spark Plug Gasket		260	232	232	232	227	230	227	
Cylinder Base		35	36	32	37	37	37	35	
Crankcase		20	26	24	23	23	22	21	
Water In		3	4	4	4	4	4	4	
Water Out		152	150	152	154	152	154	152	
Carburetor Fuel									
Nozzle Fuel		1	1	0	0	0	0	0	
Injector Fuel									
Pressure Oil		45	56	52	52	50	50	49	
Sump Oil		35	37	46	39	38	38	37	
Engine Room Air		0	0	0	0	0	0	0	
Pressures:									
Carb. Air Vent. Diff.—In H O		.7	.65	.62	.58	.56	.53	.5	
Int. Man. Vac.—In. Hg.		-.1	-.1	-.1	-.1	-.1	-.1	-.1	
Oil—Lbs/sq.in.—High		98	.98	.98	98	98	98	98	
Oil—Lbs./sq.in.—Low		31	31	31	31	31	31	31	
Fuel—Lbs/sq.in.		32	32	32	32	32	32	32	
Barometer—In. Hg.		29.10	29.10	29.10	29.10	29.10	29.10	29.10	
Bar. Corr		28.82	28.82	28.82	28.82	28.82	28.82	28.82	
Calculated Data:									
Vapor Pressure—In. Hg.		.28	.28	.28	.28	.28	.28	.28	
ADMP									
Corr. Factor		1.085	1.085	1.085	1.085	1.085	1.085	1.085	
BHP—Observed		2.56	2.45	2.6	2.48	2.37	2.22	2.08	
BHP—Corrected									
RPM		1200	1200	1200	1200	1200	1200	1200	
BMEP—Corrected									
BSFC—Lbs BHP Hr		.833	.724	.772	.784	.806	.839	.875	
Torque—Ft. Lbs.—Observed									
Combustion Air—Lbs. hr		26.7	25.7	25.1	24.3	23.9	23.3	22.8	
Fuel Air		.0799	.0802	.0799	.080	.0798	.080	.0799	
Stop Report No									
Total Time—Hrs.									
Air obs.		24.6	23.7	23.16	22.4	22.08	21.54	21.0	

REMARKS—Lbs. Oil added if any *N.G.

OPERATOR

RONAUTICAL RESEARCH LABORATOR
UNIVERSITY OF KENTUCKY

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Data Sheet No. 70

ENGINE LOG SHEET

ENGINE NO. 11

DATE: 11-10-52

MAKE: MERZ

OBJECT: D-3-13

		★							★	
Reading No.	Start	473	474	475	476	477	478	Stop		
Time of Day	1:15	1:25	1:35	1:40	1:44	1:50	1:56	2:10		
Speed		800	800	800	800	800	800			
Dyn. Scale		.115	.109	.098	.094	.090	.070			
Fuel Flow—Lbs Hr		1.49	1.47	1.45	1.45	1.45	1.42			
Spark Advance—Deg.		10	10	10	10	10	10			
FUEL FLOW (COR)		1.57	15.5	1.53	1.53	1.53	1.50			
Temperatures—°F										
Carb. Air before Heater		-1	-1	0	-1	-1	-1			
Carb. Air after Heater		0	27	52	82	125	188			
Intake Manifold		-10	-1	7	18	33	50			
Spark Plug Gasket		188	184	191	179	157	172			
Cylinder Base		37	37	37	37	37	35			
Crankcase		32	25	23	21	21	19			
Water In		4	2	3	4	4	4			
Water Out		143	150	152	150	150	149			
Carburetor Fuel										
Nozzle Fuel		0	0	0	0	0	0			
Injector Fuel										
Pressure Oil		49	34	42	40	38	37			
Sump Oil		41	37	35	33	33	32			
Engine Room Air		0	0	0	0	0	0			
Pressures:										
Carb. Air Vent. Diff.—In H₂O		.36	.35	.34	.34	.34	.32			
Int. Man. Vac.—In. Hg.		-.1	-.1	-.1	-.1	-.1	-.1		-.1	-.1
Oil—Lbs/sq.in.—High		94	94	94	95	95	95			
Oil—Lbs. sq.in.—Low		30	30	30	30	30	30			
Fuel—Lbs sq.in.		28	28	27	27	27	27			
Barometer—In. Hg.		29.01	29.01	29.01	29.01	29.01	29.01			
BAR. COR.		28.79	28.19	28.19	28.79	28.19	28.79			
Calculated Data:										
Vapor Pressure—In. Hg.		.22	.22	.22	.22	.22	.22			
ADMP										
Corr. Factor		1,084	1.084	1.084	1.084	1.084	1.084			
BHP—Observed		1.82	1.72	1.55	1.49	1.42	1.11			
BHP—Corrected										
RPM		800	800	800	800	800	800			
BMEP—Corrected										
BSFC—Lbs BHP Hr.		.862	.902	.986	1.03	1.08	1.36			
Torque—Ft. Lbs.—Observed										
Combustion Air—Lbs hr		19.7	19.4	19.1	19.1	19.1	18.7			
Fuel Air		.0797	.0799	.0800	.0800	.0800	.0802			
Stop Report No.										
Total Time—Hrs.										
AIR FLOW OBS.		18.1	17.9	17.6	17.6	17.6	17.2			

REMARKS—Lbs Oil added if any: Note — ENGINE IS UNStable.

OPERATOR CURRENS

RONAUTICAL RESEARCH LABORATO

UNIVERSITY OF KENTUCKY

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Data Sheet No. 71

ENGINE LOG SHEET

ENGINE NO. 11

DATE: 11-11-52

MAKE: MERZ

OBJECT: D-8-1

Reading No.	START	Stop	START	479	480	481	482	483	484	STOP
Time of Day	9:30	9:45	10:45	11:30	11:34	11:37	11:44	11:49	11:55	12:00
Speed				2000	2000	2000	2000	2000	2000	
Dyn. Scale				.102	.097	.094	.087	.080	.068	
Fuel Flow—Lbs Hr				3.56	3.44	3.49	3.34	3.22	3.03	
Spark Advance—Deg				30°	30	30°	30°	30	30	
Fuel Flow CORR				3.76	3.68	3.64	3.53	3.40	3.21	
Temperatures—°F										
Carb. Air before Heater				-66	-65	-65	-66	-66	-66	
Carb. Air after Heater				-68	-40	-13	+37	108	180	
Intake Manifold				-68	-57	-43	-18	+12	45	
Spark Plug Gasket				270	268	260	261	249	238	
Cylinder Base				0	0	0	-1	-2	-3	
Crankcase				-28	-30	-32	-33	-33	-34	
Water In				-53	-55	-55	-55	-55	-56	
Water Out				152	152	154	153	152	149	
Carburetor Fuel				—	—					
Nozzle Fuel				-58	-60	-60	-61	-61	-66	
Injector Fuel				—						
Pressure Oil				+12	8	12	10	8	7	
Sump Oil				+2	2	0	0	-1	-3	
ne Room Air				-66	-66	-66	-66	-66	-66	
Pressures.										
Carb. Air Vent Diff.—In H₂O				1.55	1.52	1.48	1.4	1.3	1.15	
Int. Man. Vac.—In Hg				-.1	-.1	-.1	-.1	-.1	-.1	
Oil—Lbs. sq in.—High				102	102	102	100	100	100	
Oil—Lbs. sq.in.—Low				25	25	25	25	25	25	
Fuel—Lbs/sq in.				32	32	32	32	32	30	
Barometer—In. Hg.			29.04	29.04	29.04	29.04	29.04	29.04	29.04	
BAR. CORR			28.85	28.85	28.85	28.85	28.85	28.85	28.85	
Calculated Data:										
Vapor Pressure—In. Hg.				.19	.19	.19	.19	.19	.19	
ADMP										
Corr. Factor				1.22	1.27	1.27	1.27	1.27	1.27	
BHP—Observed				4.02	3.83	3.7	3.44	3.16	2.68	
BHP—Corrected										
RPM				2000	2000	2000	2000	2000	2000	
BMEP—Corrected										
BSFC—Lbs BHP Hr.				.935	.961	.984	1.025	1.075	1.199	
Torque—Ft. Lbs.—Observed										
Combustion Air—Lbs hr				46.5	46.0	45.4	44.2	42.5	40.2	
Fuel/Air				.0808	.080	.0801	.080	.080	.0801	
Stop Report No										
Total Time—Hrs.										
Air Flow obs				36.6	36.24	35.76	34.8	33.5	31.6	

REMARKS—Lbs. Oil added if any.

OPERATOR CURRENS

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Data Sheet No. 72

ENGINE LOG SHEET

ENGINE NO. 11

DATE 11-11-52

MAKE: MERZ

OBJECT D-8-2

D-8-3

Reading No.	START	485	486	487	488	489	490	491	492	493
Time of Day	1:05	1:30	1:34	1:40	1:48	1:55	2:00	2.38	2:50	2:52
Speed		2000	2000	2000	2000	2000	2000	2000	2000	2000
Dyn. Scale		.0765	.0258	.073	.068	.062	.054	.031	.050	.048
Fuel Flow—Lbs Hr		3.11	3.11	3.11	3.03	3.03	2.99	2.32	2.28	2.28
Spark Advance		30	30	30	30	30	30	30	30	30
FUEL FLOW CORR		3.28	3.28	3.28	3.2	3.2	3.15	2.45	2.41	2.41
Temperatures—F										
Carb. Air before Heater		-67	-67	-67	-67	-67	-67	-66	-67	-66
Carb. Air after Heater		-66	-40	-10	+38	107	180	-64	-37	-13
Intake Manifold		-69	-56	-39	-12	+20	50	-64	-51	-43
Spark Plug Gasket		246	250	241	230	221	215	206	205	205
Cylinder Base		-7	-6	-6	-7	-7	-8	-7	-8	-8
Crankcase		-38	-35	-36	-37	-37	-37	-32	-35	-35
Water In		-57	-57	-57	-57	-57	-57	-56	-56	-57
Water Out		147	150	146	141	137	136	134	134	132
Carburetor Fuel										
Nozzle Fuel		-62	-63	-62	-57	-63	-62	-63	-64	-65
Injector Fuel										
Pressure Oil		+1	2	1	5	2	2	6	5	5
Sump Oil		-6	-6	-6	-6	-4	-6	0	-3	-2
Engine Room Air		-66	-66	-66	-66	-66	-66	-66	-66	-66
Pressures		1.22	1.21	1.21	1.15	1.15	1.1	.67	65	[illegible]
Carb. Air Vent										
Int. Man. Vac. In. Hg		-.6	-.6	-.6	-6	-.6	-.6	-1.8	-1.8	-1.8
Oil—Lbs. sq. in.—High		100	100	100	100	100	100	100	100	100
Oil—Lbs. sq. in.—Low		28	28	28	28	28	28	26	26	26
Fuel—Lbs. sq. in.		32	32	32	32	32	32	32	32	32
Barometer In. Hg		29.06	29.06	29.06	29.06	29.06	29.06	29.06	29.06	29.06
BAR CORR		28.87	28.87	28.87	28.87	28.87	28.87	28.87	28.87	28.87
Calculated Data										
Vapor Pressure In. Hg		.19	.19	.19	.19	.19	.19	.19	.19	.19
ADMP										
Corr. Factor		1.27	1.27	1.27	1.27	1.27	1.27	1.27	1.27	1.27
BHP—Observed		3.02	2.99	2.88	2.68	2.45	2.13	2.02	1.97	1.90
BHP—Corrected										
RPM		2000	2000	2000	2000	2000	2000	2000	2000	2000
BMEP—Corrected										
BSFC—Lbs. BHP Hr.		1.081	1.095	1.135	1.192	1.305	1.475	1.212	1	
Torque—Ft. Lbs.—Observed										
Combustion Air—Lbs. hr.		41.1	41.0	41.0	40.1	40.1	37.4	30.6	30.	[illegible]
Fuel Air		.0744	.080	.080	.0748	.0748	.080	.080	080	.080
Stop Report No.										
Total Time—Hrs.										
AIR FLOW CORR		32.4	32.3	32.3	31.6	31.6	31.0	[illegible]	23.7	23.7

REMARKS (Oil added if any)

OPERATOR CURRENS

RONAUTICAL RESEARCH LABORATOR
UNIVERSITY OF KENTUCKY
ENGINE LOG SHEET

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Data Sheet No. 73

ENGINE NO. 11

DATE: 11-11-52

MAKE MERZ

OBJECT. O-8-3

Reading No.	494	495	496	STOP
Time of Day	3:00	3:05	3:10	3:25
Speed	2000	2000	2000	
Dyn. Scale	.046	.042	.035	
Fuel Flow—Lbs hr	2.2	2.17	2.11	
Spark Advance—Deg	30°	30°	30°	
FUEL CORR	2.33	2.29	2.22	
Temperatures °F				
Carb. Air before Heater	-67	-67	-67	
Carb. Air after Heater	+50	96	183	
Intake Manifold	-15	+5	37	
Spark Plug Gasket	216	211	207	
Cylinder Base	-9	-10	-8	
Crankcase	-36	-37	-37	
Water In	-56	-57	-56	
Water Out	130	128	127	
Carburetor Fuel				
Nozzle Fuel	-65	-63	-63	
Injector Fuel				
Pressure Oil	3	4	2	
Sump Oil	-4	-4	-5	
Engine Room Air	-66	-66	-66	
Pressures				
Carb. Air Vent Drop—in.	.61	.59	.55	
Int. Man. Vac.—In Hg	-1.8	-1.8	-1.8	
Oil—Lbs sq in.—High	100	100	100	
Oil—Lbs sq in.—Low	26	26	26	
Fuel—Lbs sq in.	32	32	32	
Barometer—In. Hg	29.06	29.06	29.06	
BAR CORR	28.87	28.87	28.87	
Calculated Data				
Vapor Pressure In. Hg	.19	.19	.19	
ADMP				
Corr. Factor	1.27	1.27	1.27	
BHP Observed	1.815	1.65	1.38	
BHP Corrected				
RPM	2000	2000	2000	
BMEP Corrected				
BSFC Lb BHP hr	1.21	1.38	1.605	
Torque—Ft Lbs Observed				
Combustion Air—Lbs hr	29.1	28.7	27.8	
Fuel Air	.0799	.0799	.080	
Stop Report No.				
Total Time Hrs.				
AIR OBS	22.9	22.6	21.9	

REMARKS—Lbs Oil added if any

OPERATOR CURRENS

RONAUTICAL RESEARCH LABORATOR
UNIVERSITY OF KENTUCKY

ENGINE LOG SHEET

Data Sheet No. 74

ENGINE NO. 11

DATE: 11-12-52

MAKE: Merz

OBJECT: D-8-4

		← N. G. →								
Reading No.	StarT	497	498	499	500	501	502	503	504	505
Time of Day	9:45AM	10:15	10:20	10:25	10:55	11:00	11:09	11:12	11:21	11:29
Speed		2000	2000	2000	2000	2000	2000	2000	2000	2000
Dyn. Scale		.025	.0245	.035	.045	.024	.023	.022	.0175	.015
Fuel Flow—Lbs Hr		2.11	2.01	2.01	1.83	1.80	1.78	1.72	1.65	1.61
Spark Advance—deg		30°	30	30	30°	30	30	30	30	30
Fuel Corr		2.23	2.13	2.13	1.93	1.89	1.88	1.815	1.741	1.7
Temperatures—F										
Carb. Air before Heater		-66	-65	-65	-65	-65	-65	-65	-65	-65
Carb. Air after Heater		-64	-32	-5	-63	-42	-14	+47	108	172
Intake Manifold		-65	-53	-43	-63	-58	-50	-13	+12	36
Spark Plug Gasket		169	167	173	166	165	165	167	165	165
Cylinder Base		-10	-10	-11	-12	-12	-12	-12	-12	-12
Crankcase		-37	-37	-37	-37	-37	-37	-37	-37	-37
Water In		-56	-56	-55	-56	-55	-55	-55	-55	-55
Water Out		112	110	109	107	107	107	104	102	102
Carburetor Fuel										
Nozzle Fuel		-64	-63	-64	-63	-64	-63	-64	-64	-64
Injector Fuel										
Pressure Oil		0	+1	+2	+2	+2	+2	+2	+2	+2
Sump Oil		-10	-9	-9	-8	-8	-8	-7	-7	-7
Engine Room Air		-65	-64	-64	-64	-64	-64	-65	-65	65
Pressures:										
Carb. Air Vent Diff.—In H G		.55	50	.50	.40	.39	.38	.35	.32	.3
Int. Man. Vac.—In Hg		-5.8	-5.8	-5.8	-7.0	-7.0	-7.0	-7.0	-7.0	-7.0
Oil—Lbs sq.in.—High		96	96	96	92	92	92	92	92	92
Oil—Lbs. sq.in.—Low		28	28	28	28	28	28	28	28	28
Fuel—Lbs sq.in.		34	34	34	34	34	34	34	34	34
Barometer—In. Hg		29.14	29.14	29.14	29.14	29.14	29.14	29.14	29.14	29.14
Bar. Corr		28.85	28.85	28.85	28.85	28.85	28.85	28.85	28.85	28.85
Calculated Data:										
Vapor Pressure—In Hg		.19	.19	.19	.19	.19	.19	.19	.19	.19
ADMP										
Corr Factor		1.27	1.27	1.27	1.27	1.27	1.27	1.27	1.27	1.27
BHP—Observed		.986	.961	1.381	.966	.949	.910	.870	.691	.592
BHP—Corrected										
RPM					2000	2000	2000	2000	2000	2000
BMEP—Corrected										
BSFC—Lbs BHP Hr		226	221	154						
Torque—Ft. Lbs.—Observed										
Combustion Air—Lbs hr		27.8	26.7	26.7	24.1	23.7	23.5	22.7	21.8	21.2
Fuel/Air		.0801	.0798	.0798	.180	.0799	.080	.080	.0799	.0801
Stop Report No										
Total Time Hrs										
Air Obs		21.9	21.0	21.0	19.0	18.7	19.5	17.85	1216	16.7
REMARKS—Lbs. Oil added if any		← N. G. →								

OPERATOR Currens

RONAUTICAL RESEARCH LABORATOR
UNIVERSITY OF KENTUCKY

ENGINE LOG SHEET

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Data Sheet No. 75

ENGINE NO. 11

DATE: 11-12-52

MAKE MERZ

OBJECT D-8-5

Reading No.	STOP	Start	506	507	508	509	510	511	512	Stop
Time of Day	11:37	—	2:15	2:21	2:33	2:40	2:49	3:04	3:21	3:23
Speed			1600	1600	1600	1600	1600	1600	1600	
Dyn. Scale			.117	.115	.112	.109	.100	.085	.082	
Fuel Flow Lbs Hr			2.72	2.72	2.73	2.64	2.61	2.44	2.32	
Spark Advance - Deg.			30	30	30	30	30	30	30	
FUEL CORR			2.88	2.88	2.88	2.79	2.75	2.58	2.45	
Temperatures—°F										
Carb. Air before Heater			-67	-67	-67	-67	-67	-67	-66	
Carb Air after Heater			-67	-44	-14	+40	+85	118	178	
Intake Manifold			-73	-63	-48	-24	0	18	45	
Spark Plug Gasket			242	225	227	218	221	238	227	
Cylinder Base			-6	-7	-5	-7	-7	-5	-5	
Crankcase			-37	-37	-37	-37	-37	-37	-34	
Water In			-57	-57	-57	-57	-57	-57	-57	
Water Out			153	152	149	149	148	154	155	
Carburetor Fuel			—	—	—	—	—	—	—	
Nozzle Fuel			-62	-62	-62	-62	-62	-63	-63	
Injector Fuel										
Pressure Oil			0	+1	+2	+1	+2	+7	+8	
Sump Oil			-11	-8	-8	-8	-8	-7	-7	
Engine Room Air			-65	-65	-65	-65	-65	-66	-65	
Pressures:										
Carb. Air Vent Diff.—In H_2O			.93	.93	.92	.88	.85	.75	.67	
Int. Man. Vac.—In. Hg			-1	-.1	-.1	-.1	-.1	-.1	-.1	
Oil—Lbs sq.in.—High			95	95	95	95	95	95	95	
Oil—Lbs. sq.in.—Low			30	30	30	30	30	30	30	
Fuel—Lbs/sq in.			24	24	24	24	24	24	24	
Barometer—In. Hg.			29.08	29.08	29.08	29.08	29.08	29.08	29.08	
BAR CORR			28.86	28.86	28.86	28.86	28.86	28.86	28.86	
Calculated Data										
Vapor Pressure—In. H.			.22	.22	.22	.22	.22	.22	.22	
ADMP										
Corr. Factor			1.27	1.27	1.27	1.27	1.27	1.27	1.27	
BHP—Observed			3.70	3.63	3.54	3.44	3.16	2.68	2.59	
BHP—Corrected										
RPM			1600	1600	1600	1600	1600	1600	1600	
BMEP—Corrected										
BSFC—Lbs BHP Hr.			.778	.793	.813	.810	.870	.902	.947	
Torque—Ft. Lbs.—Observed										
Combustion Air—Lbs hr			36.2	36.2	36.0	35.0	34.4	32.3	30.6	
Fuel Air			.0795	.0795	.0800	.0797	.0800	.0799	.0800	
Step Report No										
Total Time—Hrs.										
AIR OBS			28.5	28.5	28.3	27.6	27.1	25.9	24.1	

REMARKS—Lb Oil added if any.

OPERATOR — CURRENS —

AERONAUTICAL RESEARCH LABORATOR
UNIVERSITY OF KENTUCKY

ENGINE LOG SHEET

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Data Sheet No. 76

ENGINE NO. 11

DATE: 11-13-52

MAKE: MER Z

OBJECT: D-8-6

Reading No.	START	STOP	START	513
Time of Day	9:45	1135	12:55	
Speed				1600
Dyn. Scale				
Fuel Flow—Lbs Hr				
Spark Advance—Deg.				30°
FUEL CORR				
Temperatures—°F				
Carb. Air before Heater				
Carb. Air after Heater				
Intake Manifold				
Spark Plug Gasket				
Cylinder Base				
Crankcase				
Water In				
Water Out				
Carburetor Fuel				
Nozzle Fuel		ERRATIC FUEL FLOW		
Injector Fuel				
Pressure Oil				
Sump Oil				
Engine Room Air				
Pressures.				
Carb. Air Vent Diff.—In H₂O				
Int. Man. Vac.—In. Hg				
Oil—Lbs. sq.in.—High				
Oil—Lbs./sq.in.—Low				
Fuel—Lbs./sq.in.				
Barometer—In. Hg.				29.11
BAR CORR				28.90
Calculated Data:				
Vapor Pressure—In Hg.				.21
ADMP				
Corr. Factor				1.27
BHP—Observed				
BHP—Corrected				
RPM				
BMEP—Corrected				
BSFC—Lbs BHP Hr.				
Torque—Ft. Lbs.—Observed				
Combustion Air—Lbs hr				
Fuel/Air				
Stop Report No.				
Total Time—Hrs.				
AIR OBS				

REMARKS—Lbs. Oil added if any

OPERATOR CURRENS

RONAUTICAL RESEARCH LABORATORY
UNIVERSITY OF KENTUCKY

ENGINE LOG SHEET

Data Sheet No. 77

ENGINE NO. 11

DATE. 11-14-52

MAKE. Mers

OBJECT: D-8-6

D-8-7

Reading No	Start	514	515	516	517	518	519	520	521	522
Time of Day	9:30AM.	10:00	10:10	10:19	10:25	10:33	10:35	10:44	11:05	11:10
Speed		1600	1600	1600	1600	1600	1600	1600	1600	1600
Dyn. Scale		.087	.083	.079	.074	.071	.068	.067	.059	.057
Fuel Flow—Lbs Hr		2.65	2.64	2.61	2.52	2.52	2.48	2.39	2.15	2.14
Spark Advance—Deg		30	30	30	30	30	30	30	30	30
Fuel Corr		2.8	2.78	2.75	2.66	2.66	2.61	2.52	2.27	2.26
Temperatures—°F										
Carb. Air before Heater		-66	-65	-65	-66	-65	-65	-65	-66	-66
Carb. Air after Heater		-63	-41	-10	+38	+75	127	174	-63	-38
Intake Manifold		-66	-57	-43	-19	-2	+16	43	-60	-52
Spark Plug Gasket		246	246	256	255	240	238	241	235	237
Cylinder Base		-1	-2	-4	-5	-5	-5	-6	-7	-8
Crankcase		-26	-30	-33	-35	-36	-37	-36	-37	-38
Water In		-56	-57	-57	-57	-56	-57	-56	-57	-57
Water Out		152	152	154	152	152	154	152	150	151
Carburetor Fuel										
Nozzle Fuel		-62	-60	-63	-63	-62	-62	-62	-64	-64
Injector Fuel										
Pressure Oil		0	-9	-6	-6	-7	-8	-8	-9	-9
Sump Oil		-2	-4	-6	-6	-7	-7	-7	-8	-9
Engine Room Air		-65	-66	-65	-65	-65	-65	-66	-66	-66
Pressures:										
Carb. Air Vent. Diff.—In H O		.88	.87	.85	.8	.8	.77	.72	.58	.57
Int. Man Vac.—In Hg.		-.45	-.45	-.45	-.45	-.45	-.45	-.45	-1.15	-1.15
Oil—Lbs/sq.in.—High		100	100	100	100	100	100	100	100	100
Oil—Lbs./sq.in.—Low		30	30	30	30	30	30	30	30	30
Fuel—Lbs sq in.		31	31	31	31	31	31	31	31	31
Barometer—In. Hg.		29.08	29.08	29.08	29.08	29.08	29.08	29.08	29.08	29.08
Bar. Corr		28.88	28.88	28.88	28.88	28.88	28.88	28.88	28.88	28.88
Calculated Data:										
Vapor Pressure—In. Hg.		.2	.2	.2	.2	.2	.2	.2	.2	.2
ADMP										
Corr. Factor		1.27	1.27	127	1.27	1.27	1.27	1.27	1.27	1.27
BHP—Observed		2.73	2.62	2.49	2.34	2.24	2.15	2.12	1.815	1.799
BHP—Corrected										
RPM		1600	1600	1600	1600	1600	1600	1600	1600	1600
BMEP—Corrected										
BSFC—Lbs BHP Hr		1.02	1.06	1.105	1.135	1.186	1.214	1.179	1.215	1.258
Torque—Ft. Lbs.—Observed										
Combustion Air—Lbs hr		35.0	34.8	34.4	33.3	33.3	32.7	31.6	28.4	28.2
Fuel/Air		.080	.080	.080	.080	.080	.080	.0797	.080	.080
Stop Report No										
Total Time—Hrs.										
Air Obs.		27.6	27.46	27.10	26.2	26.2	25.72	24.9	22.4	22.26

REMARKS—Lbs. Oil added if any.

OPERATOR CURRENS

RONAUTICAL RESEARCH LABORATOR
UNIVERSITY OF KENTUCKY
ENGINE LOG SHEET

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Data Sheet No. 78

ENGINE NO. 11

DATE: 11-14-52

MAKE: Merz

OBJECT: D-8-7

D-8-8

Reading No.	523	524	525	526	527	STOP	START	528	529	530
Time of Day	11.12	11.17	11.20	11.25	11.30	11.45	1.50	2.06	2.12	2.22
Speed	1600	1600	1600	1600	1600			1600	1600	1600
Dyn. Scale	.055	.053	.048	.045	.038			.031	.029	.027
Fuel Flow Lbs Hr	2.14	2.08	2.05	2.02	1.99			1.85	1.76	1.80
Spark Advance Deg	30	30	30	30	30			30	30	30
FUEL CORR	2.26	2.2	2.17	2.13	2.10			1.95	1.86	1.90
Temperatures F										
Carb. Air before Heater	-66	-66	-66	-66	-66			-66	-66	-66
Carb. Air after Heater	-13	+42	85	128	165			-66	37	-13
Intake Manifold	-43	-20	0	+14	37			-66	-37	-39
Spark Plug Gasket	234	232	232	232	225			183	181	174
Cylinder Base	-7	-7	-7	-7	-8			-8	-8	-7
Crankcase	-37	-38	-37	-38	-37			-37	-38	-37
Water In	-57	-56	-57	-56	-56			-57	-57	-57
Water Out	148	146	146	146	143			134	128	127
Carburetor Fuel										
Nozzle Fuel	-64	-62	-64	-64	-64			-65	-65	-65
Injector Fuel										
Pressure Oil	-9	-9	-9	-11	-11			-9	-10	-8
Sump Oil	-8	-8	-8	-8	-9			-9	-10	-8
Engine Room Air	-66	-66	-66	-66	-66			-66	-66	-66
Pressures										
Carb. Air Vent. Diff.—In H O	.57	54	.52	.5	48			.41	.37	.38
Int. Man. Vac.—In. Hg.	-1.15	-1.15	-1.15	-1.15	-1.15			-4.10	-4.10	-4.10
Oil—Lbs sq.in.—High	100	100	100	100	100			107	107	105
Oil—Lbs./sq.in.—Low	30	30	30	30	30			30	30	30
Fuel—Lbs/sq.in.	31	31	31	31	31			21	21	21
Barometer—in. Hg	29.08	29.08	29.08	29.08	29.08			29.00	29.00	29.00
BAR CORR	28.88	28.88	28.88	28.88	28.88			28.73	28.73	28.73
Calculated Data:										
Vapor Pressure—In. Hg.	.2	.2	.2	.2	.2			.27	.27	.27
ADMP										
Corr. Factor	1.27	1.27	1.27	1.27	1.27			1.27	1.27	1.27
BHP—Observed	1.74	1.67	1.512	1.42	1.199			.98	.717	.834
BHP—Corrected										
RPM	1600	1600	1600	1600	1600			1600	1600	1600
BMEP—Corrected										
BSFC—Lbs BHP Hr	1.3	1.315	1.431	1.5	1.76			1.99	2.03	2.22
Torque—Ft. Lbs.—Observed										
Combustion Air—Lbs hr	28.2	27.5	27.1	26.7	26.2			24.4	23.25	23.6
Fuel Air	.080	.080	.080	.0798	.0802			.0760	.0760	.0805
Stop Report No.										
Total Time—Hrs										
AIR OBS	22.26	21.7	21.3	21.0	20.6			19.26	19.31	18.54

REMARKS- Lbs. Oil added if any.

OPERATOR Cu[illegible]

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Data Sheet No. 79

RONAUTICAL RESEARCH LABORATO
UNIVERSITY OF KENTUCKY
ENGINE LOG SHEET

ENGINE NO. 11

DATE: 11-14-52

MAKE: MCRZ

OBJECT D-8-9

D-8-9

Reading No.	531	532	533	534	535	536	537	538	537	540
Time of Day	2:27	2:32	2:37	2:42	3:04	3:08	3:12	3:16	3:20	3:25
Speed	1600	1600	1600	1600	1200	1200	1200	1200	1200	1200
Dyn. Scale	.026	.023	.021	.018	.101	.10	.099	.096	.090	.084
Fuel Flow—Lbs Hr	1.72	1.72	1.70	1.65	2.25	2.25	2.20	2.16	2.10	2.08
Spark Advance Deg.	30	30	30	30	20	20	20	20	20	20
Fuel Flow Corr	1.815	1.815	1.795	1.74	2.375	2.375	2.34	2.28	2.225	2.195
Temperatures—F										
Carb. Air before Heater	-66	-66	-66	-66	-66	-66	-66	-66	-66	-66
Carb. Air after Heater	49	90	123	170	-63	-36	-12	42	90	133
Intake Manifold	-12	7	22	38	-66	-57	-50	-25	-2	17
Spark Plug Gasket	+177	175	112	173	213	212	208	210	208	204
Cylinder Base	-2	-8	-8	-8	-4	-4	-4	-3	-3	-4
Crankcase	-37	-37	-37	-38	-39	-40	-40	-40	-36	-38
Water In	-56	-56	-56	-56	-57	-57	-57	-57	-56	-56
Water Out	127	127	123	124	149	154	153	154	153	152
Carburetor Fuel										
Nozzle Fuel	-65	-65	-66	-66	-63	-65	-65	-63	-64	-62
Injector Fuel										
Pressure-Oil	-7	-8	-8	-3	-11	-16	-15	-15	-15	-15
Sump Oil	-8	-7	-7	-10	-16	-15	-14	-14	-12	-14
Engine Room Air	-66	-66	-66	-66	-66	-66	-66	-66	-66	-66
Pressures										
Carb. Air Vent Diff—In H O	.35	.35	.34	32	.63	.63	.62	.58	[illegible]	.53
Int Man Vac—In. Hg.	-4.10	-4.10	-4.10	-4.10	0	0	0	0	0	0
Oil—Lbs sq.in—High	102	100	102	100	105	105	105	105	105	105
Oil—Lbs. sq.in—Low	30	30	30	30	30	30	30	30	30	30
Fuel—Lbs sq.in.	21	21	21	21	21	21	21	21	21	21
Barometer—In. Hg.	29.00	29.00	29.00	29.00	29.00	29.00	29.00	29.00	29.00	29.00
BAR. CORR.	28.73	28.73	28.73	28.73	28.73	28.73	28.73	28.73	28.73	28.73
Calculated Data:										
Vapor Pressure—In Hg.	.27	.27	.27	.27	.27	.27	.27	.27	.27	.27
ADMP										
Corr. Factor	1.27	1.27	1.27	1.27	1.27	1.27	1.27	1.27	1.27	1.27
BHP—Observed	.82	.727	.665	.57	2.375	2.315	2.34	2.28	2.155	1.19
BHP—Corrected										
RPM	1600	1600	1600	1600	1200	1200	1200	1200	1200	1200
BMEP—Corrected										
BSFC—Lbs BHP Hr	2.215	2.50	2.70	3.06	.99	1.00	1.00	1.00	1.04	1.1
Torque—Ft. Lbs.—Observed										
Combustion Air—Lbs hr	22.65	22.65	22.4	21.8	29.6	29.6	29.4	28.5	27.8	27.4
Fuel/Air	.0800	.0800	.0802	.0799	.0802	.0800	.0797	.0800	[illegible]	.0800
Stop Report No.										
Total Time—Hrs.										
AIR FLOW OBS	17.85	17.85	17.62	17.16	23.34	23.34	23.16	22.44	21.9	21.54
REMARKS—Lbs Oil added if any.										

OPERATOR CURRENS

RONAUTICAL RESEARCH LABORATO

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PAGE NO. 140

Data Sheet No. 80

ENGINE LOG SHEET

ENGINE NO. 11

DATE: 11-14-52

MAKE: Merz

OBJECT: D-8-9 D-8-10

Reading No.	541	Stop	START	542	543	544	545	546	547	548
Time of Day	3130	3:37	940	1012	10 15	1020	1024	1029	1037	10 43
Speed	1200			1200	1200	1200	1200	1200	1200	1200
Dyn. Scale	.078			.075	074	.071	.067	065	.060	.056
Fuel Flow—Lbs Hr	2.02			1.92	1.90	1.89	1.83	1.83	1.78	1.74
Spark Advance Deg	20°			20°	20°	20°	20°	20°	20°	20°
Fuel Flow CORR	2.13			2.03	2.01	1.99	1.93	1.93	1.88	1.835
Temperatures—°F										
Carb. Air before Heater	-66			-66	-66	-66	-66	-66	-66	-66
Carb. Air after Heater	182			-65	-37	-8	+49	+82	125	173
Intake Manifold	32			-65	-56	-46	-22	-5	+12	+30
Spark Plug Gasket	200			207	207	204	200	196	188	190
Cylinder Base	-4			-8	-7	-7	-7	-7	-8	-8
Crankcase	-38			-43	-44	-43	-43	-43	-43	-43
Water In	-56			-68	-57	-58	-58	-57	-58	-56
Water Out	153			147	150	149	149	148	143	143
Carburetor Fuel										
Nozzle Fuel	-64			-65	-65	-65	-65	-65	-65	-65
Injector Fuel										
Pressure Oil	-14			-28	-28	-25	-23	-23	-23	-23
Sump Oil	-14			-23	-25	-23	-23	-22	-22	-22
Engine Room Air	-66			-66	-66	-66	-66	-66	-66	-66
Pressures:										
Carb. Air Vent. Diff.—in H₂O	.5			.45	.44	.43	.4	.4	.38	.36
Int. Man. Vac.—In Hg.	0			-.7	-.7	-.7	-.7	-.7	-.7	-.7
Oil—Lbs sq.in.—High	103			85	85	85	85	85	85	85
Oil—Lbs. sq.in.—Low	30			30	30	30	30	30	30	30
Fuel—Lbs sq.in.	21			20	20	20	20	20	20	20
Barometer—In. Hg	29.00			29.23	29.23	29.23	2923	29.23	2923	29.23
BAR CORR	28.73			28.87	28.87	28.87	2887	2887	2887	28.87
Calculated Data:										
Vapor Pressure—In Hg	.27			.36	.36	.36	.36	.36	.36	.36
ADMP										
Corr. Factor	1.27			1.27	1.27	1.27	1.27	1.27	1.27	1.27
BHP—Observed	1.86			178	1.755	168	1.59	1.53	142	1.33
BHP—Corrected										
RPM	1200			1200	1200	1200	1200	1200	1200	1200
BMEP—Corrected										
BSFC—Lbs BHP H	1.16			1.14	1.145	1.185	1.212	1.26	1.325	1.32
Torque—Ft. Lbs.—Observed										
Combustion Air—Lbs hr	26.7			26.4	25.7	24.9	24.1	24.1	23.6	22.4
Fuel Air	.0799			.080	.080	.0799	080	080	.080	080
Stop Report No.										
Total Time—Hrs										
AIR FLOW obs	21.0			20.0	19.8	19.6	19.0	19.0	18.54	18.08

REMARKS—Lbs. Oil added if any.

OPERATOR [illegible]

RONAUTICAL RESEARCH LABORATO

UNIVERSITY OF KENTUCKY

Data Sheet No. 81

ENGINE LOG SHEET

ENGINE NO. 11

DATE: 11-16-52

MAKE MCR 2

OBJECT: D-8-11

*D-8-12

Reading No.	549	550	551	552	553	554	555	STOP	Start	556
Time of Day	11:05	11:10	11:16	11:20	11:25	11:28	11:31	11:32	1:23	1:47
Speed	1200	1200	1200	1200	1200	1200	1200			1200
Dyn. Scale	.048	.044	.040	.038	.036	.032	.028			.027
Fuel Flow—Lbs Hr	1.56	1.54	1.54	1.515	1.49	1.47	1.45			1.42
Spark Advance—Deg.	20°	20°	20°	20°	20°	20°	20°			20°
FUEL CORR	1.649	1.625	1.625	1.6	1.575	1.55	1.527			1.500
Temperatures—°F										
Carb. Air before Heater	-66	-66	-66	-66	-66	-66	-66			-66
Carb. Air after Heater	-63	-42	-17	+42	+80	129	180			-63
Intake Manifold	-68	-52	-43	-78	-5	+17	32			-63
Spark Plug Gasket	182	186	181	175	173	165	162			152
Cylinder Base	-8	-8	-7	-7	-7	-8	-8			-12
Crankcase	-43	-43	-43	-43	-43	-43	-43			-40
Water In	-57	-57	-57	-57	-57	-57	-57			-58
Water Out	138	141	139	138	137	132	131			117
Carburetor Fuel	—									—
Nozzle Fuel	-66	-66	-65	-65	-65	-65	-65			-62
Injector Fuel										—
Pressure Oil	-22	-21	-20	-18	-18	-21	-20			+18
Sump Oil	-21	-22	-21	-19	-19	-21	-20			-21
Engine Room Air	-66	-66	-66	-66	-66	-66	-66			-66
Pressures:										
Carb. Air Vent. Diff.—In H₂O	.28	.27	.27	.26	.25	.24	.23			.22
Int. Man. Vac.—In. Hg.	-1.8	-1.8	-1.8	-1.8	-1.8	-1.8	-1.8			-6.9
Oil—Lbs sq.in.—High	109	109	109	104	109	109	109			100
Oil—Lbs. sq.in.—Low	31	31	31	31	31	31	31			31
Fuel—Lbs sq.in.	21	21	21	21	21	21	21			26
Barometer—In. Hg.	29.23	29.23	29.23	29.23	29.23	29.23	29.23			29.11
BAR. CORR	28.87	28.87	28.87	28.87	28.87	28.87	28.87			28.84
Calculated Data:										
Vapor Pressure—In. Hg.	.36	.36	.36	.36	.36	.36	.36			.27
ADMP										
Corr. Factor	1.27	1.27	1.27	1.27	1.27	1.27	1.27			1.27
BHP—Observed	1.14	1.04	.946	.899	.851	.757	.664			.64
BHP—Corrected										
RPM	1200	1200	1200	1200	1200	1200	1200			1200
BMEP—Corrected										
BSFC—Lbs BHP Hr	1.443	1.56	1.72	1.78	1.85	2.05	2.30			2.32
Torque—Ft. Lbs.—Observed										
Combustion Air—Lbs hr	20.6	20.3	20.3	20.0	19.7	19.35	19.1			18.8
Fuel, Air	.0799	.0801	.0801	.080	.0799	.0811	.080			.0798
Stop Report No.										
Total Time—Hrs.										
AIR OBS	16.22	15.98	15.98	15.74	15.5	15.26	15.02			14.8

REMARKS— Lbs. Oil added if any

OPERATOR Currens

RONAUTICAL RESEARCH LABORATO

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ENGINE LOG SHEET

PAGE NO. 142

Data Sheet No. 82

ENGINE NO. 11

DATE: 11-17-52

MAKE: MERZ

OBJECT: D-8-12

* D-8-13

Reading No.	557	558	559	560	561	562			563	564
Time of Day	1:51	1:56	2 00	2.05	2:09	2:12			3 00	3 04
Speed	1200	1200	1200	1200	1200	1200			800	800
Dyn. Scale	.026	.023	.019	.013	.010	.008			.100	.099
Fuel Flow—Lbs Hr	1.40	1.38	1.37	1.37	1.35	1 31			161	1.61
Spark Advance—Deg.	20	20	20	20	20	20			10	10
FF CORR.	1.48	1.46	1.45	1.45	1.42	1.39			1.70	1.70
Temperatures—°F										
Carb. Air before Heater	-66	-67	-66	-66	-66	-66			-66	-66
Carb. Air after Heater	-42	-14	+38	82	125	177			-65	-42
Intake Manifold	-57	-45	-23	-7	10	25			-66	-62
Spark Plug Gasket	154	147	138	136	132	118			154	164
Cylinder Base	-12	-12	-12	-12	-12	-12			-8	-6
Crankcase	-41	-42	-42	-42	-42	-41			-32	-34
Water In	-58	-58	-58	-58	-58	-58			-56	-56
Water Out	118	118	113	112	108	107			111	123
Carburetor Fuel										
Nozzle Fuel	-66	-66	-66	-66	-66	-66			-65	-64
Injector Fuel										
Pressure Oil	-18	-18	-18	-21	-22	-23			-18	-18
Sump Oil	-20	-20	-19	-18	-17	-17			-17	-17
Engine Room Air	-66	-66	-66	-66	-66	-66			-66	-66
Pressures.										
Carb. Air Vent. Diff.—In H₂O	.21	.20	.20	.20	.19	.18			.3	.3
Int. Man. Vac.—In Hg.	-6.9	-6.9	-6.9	-6.9	-6.9	-6.9			0	0
Oil—Lbs sq.in.—High	100	95	95	60	65	60			100	100
Oil—Lbs./sq.in.—Low	31	33	33	30	31	31			31	30
Fuel—Lbs/sq.in.	26	25	25	25	25	25			25	25
Barometer—In. Hg.	29.11	29.11	29.11	29.11	29.11	29.11			29.11	29.11
BAR. CORR	28.84	28.84	28.84	28.84	28.84	28.84			28.84	28.84
Calculated Data:										
Vapor Pressure—In. Hg.	.27	.27	.27	.27	.27	.27			27	.27
ADMP										
Corr. Factor	1.27	1.27	1.27	1.27	1.27	1.27			1.27	1.27
BHP—Observed	.616	.474	.450	.308	.237	.190			1.58	1.56
BHP—Corrected										
RPM	1200	1200	1200	1200	1200	1200			800	800
BMEP—Corrected										
BSFC—Lbs BHP Hr	2.40	3.08	3,22	4.70	6.00	7.31			10.8	10.9
Torque—Ft. Lbs.—Observed										
Combustion Air—Lbs hr	18 3	18.15	18 15	18.15	17.8	17.3			21.2	21.2
Fuel/Air	.0809	.0804	.0797	.0797	.0797	.0803			.0801	.0801
Stop Report No.										
Total Time—Hrs.										
AIR Flow OBS.	14 5	14.3	14.3	14.3	14.0	13.6			16.7	16.7

REMARKS—Lbs. Oil added if any.

OPERATOR

RONAUTICAL RESEARCH LABORATO
UNIVERSITY OF KENTUCKY
ENGINE LOG SHEET

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Data Sheet No. 83

ENGINE NO. 11
DATE: 11-17-52
MAKE: MERZ
OBJECT: D-8-13

Reading No.	565	566	567	568	569	Stop
Time of Day	3:10	3:15	3:20	3:26	3:27	3:35
Speed	800	800	800	800	800	
Dyn. Scale	.098	.092	.085	.078	.062	
Fuel Flow—Lbs Hr	1.58	1.58	1.58	1.56	1.56	
Spark Advance—Deg.	10	10	10	10	10	
F.F. COR.	1.68	1.68	1.68	1.65	1.65	
Temperatures—°F						
Carb. Air before Heater	-66	-67	-67	-67	-67	
Carb. Air after Heater	-10	41	77	132	182	
Intake Manifold	-49	-33	-17	0	22	
Spark Plug Gasket	173	164	162	158	152	
Cylinder Base	-2	0	0	0	0	
Crankcase	-37	-37	-37	-38	-38	
Water In	-57	-57	-57	-57	-57	
Water Out	134	137	136	136	135	
Carburetor Fuel	—	—	—	—	—	
Nozzle Fuel	-65	-64	-63	-63	-63	
Injector Fuel	—	—	—	—	—	
Pressure Oil	-18	-23	-23	-23	-22	
Sump Oil	-18	-17	-18	-17	-18	
Engine Room Air	-66	-66	-66	-66	-66	
Pressures:						
Carb. Air Vent. Diff.—In H O	.29	.29	.29	.28	.28	
Int. Man. Vac.—In. Hg.	0	0	0	0	0	
Oil—Lbs. sq.in.—High	100	100	100	40	50	
Oil—Lbs. sq.in.—Low	31	31	31	30	30	
Fuel—Lbs sq.in.	25	25	25	25	25	
Barometer—In. Hg	29.11	29.11	29.11	29.11	29.11	
BAR. COR.	28.84	28.84	28.84	28.84	28.84	
Calculated Data:						
Vapor Pressure—In. Hg	.27	.27	.27	.27	.27	
ADMP						
Corr. Factor	1.27	1.27	1.27	1.27	1.27	
BHP—Observed	1.55	1.45	1.34	1.23	.98	
BHP—Corrected						
RPM	800	800	800	800	800	
BMEP—Corrected						
BSFC—Lbs BHP Hr	10.8	11.52	12.50	12.80	16.85	
Torque—Ft. Lbs.—Observed						
Combustion Air—Lbs hr	21.0	21.0	21.0	20.6	20.6	
Fuel/Air	.0799	.0799	.0799	.0800	.0800	
Stop Report No.						
Total Time—Hrs.						
AIR FLOW OBS.	16.5	16.5	16.5	16.2	16.2	

REMARKS—Lbs. Oil added if any.

OPERATOR CURRENS

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Data Sheet
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.RONAUTICAL RESEARCH LABORATOR

UNIVERSITY OF KENTUCKY

ENGINE LOG SHEET

ENGINE NO. 11

DATE: 11-18-52

MAKE: MERZ

OBJECT: D-8-14

Reading No.	START	570	571	572	573	574	575	576	STOP	START
Time of Day	9:25	9:47	9:50	9:53	9:56	9:57	10:00	10:05	10:07	10:30
Speed		800	800	800	800	800	800	800		
Dyn. Scale		.075	.070	.068	.065	.060	.055	.050	*	
Fuel Flow—Lbs Hr		1.47	1.47	1.47	1.45	1.45	1.42	1.42		
Spark Advance—Deg.		10	10	10	10	10	10	10		
FUEL FLOW CORR		1.55	1.55	1.56	1.53	1.53	1.50	1.50		
Temperatures—°F										
Carb. Air before Heater		-66	-66	-66	-66	-66	-66	-66		
Carb. Air after Heater		-65	-44	-17	+48	+85	128	177		
Intake Manifold		-65	-59	-50	-26	-12	+8	+25		
Spark Plug Gasket		158	158	161	158	157	155	150		
Cylinder Base		-8	-7	-7	-7	-7	-7	-7		
Crankcase		-42	-43	-43	-43	-43	-43	-43		
Water In		-57	-57	-57	-57	-57	-57	-57		
Water Out		116	121	120	118	119	118	119		
Carburetor Fuel		—	—	—	—	—	—	—		
Nozzle Fuel		-66	-65	-66	-66	-66	-66	-65		
Injector Fuel		—	—	—	—	—	—	—		
Pressure Oil		-23	-23	-23	-23	-23	-24	-30		
Sump Oil		-23	-23	-23	-23	-23	-24	-23		
Engine Room Air		-66	-65	-65	-65	-65	-65	-65		
Pressures:										
Carb. Air Vent Diff.—In H.O		.24	.24	.24	.23	.23	.22	.22		
Int. Man. Vac.—In. Hg		-.75	-.75	-.75	-.75	-.75	-.75	-.75		
Oil—Lbs/sq.in.—High		120	120	120	120	120	120	120		
Oil—Lbs./sq.in.—Low		5	5	5	5	5	5	0		
Fuel—Lbs/sq.in.		28	28	28	28	28	28	28		
Barometer—In. Hg.		29.10	29.10	29.10	29.10	29.10	29.10	29.10		
BAR CORR		28.74	28.74	28.74	28.74	28.74	28.74	28.74		
Calculated Data:										
Vapor Pressure—In. Hg		.36	.36	.36	.36	.36	.36	.36		
ADMP										
Corr. Factor		1.27	1.27	1.27	1.27	1.27	1.27	1.27		
BHP—Observed		1.18	1.105	1.071	1.024	.948	.869	.789		
BHP—Corrected										
RPM										
BMEP—Corrected										
BSFC—Lbs BHP Hr.		1.315	1.40	1.445	1.49	1.615	1.749	1.9		
Torque—Ft. Lbs.—Observed										
Combustion Air—Lbs hr		19.4	19.4	19.4	19.1	19.1	18.75	18.75		
Fuel/Air		.080	.080	.080	.080	.080	.080	.080		
Stop Report No.										
Total Time—Hrs.										
AF OBS		15.26	15.26	15.26	15.02	15.02	14.78	14.78		

REMARKS—Lbs. Oil added if any. * OIL PRESSURE FLUCTUATING

OPERATOR CURRENS, V. C.

RONAUTICAL RESEARCH LABORATOR
UNIVERSITY OF KENTUCKY

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Data Sheet No. 35

ENGINE LOG SHEET

ENGINE NO. 11

DATE: 11-18-52

MAKE: MER Σ

OBJECT: D-8-15

Reading No.	577	578	579	580	581	Stop	Start
Time of Day	10:59	11:00	11.05	11.07	11.15	11:30	
Speed	800	800	800	800	800		
Dyn. Scale	.052	.045	.036	.032	.008		
Fuel Flow—Lbs Hr	1.42	1.40	1.22	1.22	1.19		
Spark Advance Deg	10°	10°	10°	10°	10°		
FUEL FLOW CORR.	1.5	1.48	129	1.29	1.255		
Temperatures °F							
Carb. Air before Heater	-68	-67	-67	-68	-69		
Carb. Air after Heater	-64	-45	-12	+48	72		
Intake Manifold	-64	-56	-43	-23	-8		
Spark Plug Gasket	138	137	130	127	113		
Cylinder Base	-3	-3	-4	-6	-7		
Crankcase	-32	-35	-37	-38	-39		
Water In	-65	-55	-57	-56	-56		
Water Out	+117	117	116	114	112		
Carburetor Fuel	—						
Nozzle Fuel	-66	-66	-66	-66	-66		
Injector Fuel	—						
Pressure Oil	-18	-17	-18	-19	-19		
Sump Oil	-18	-18	-18	-19	-20		
Engine Room Air	-66	-66	-66	-66	-66		
Pressures							
Carb. Air Vent. Diff.—In H	.22	.21	.15	.15	.14		
Int. Man. Vac.—In. Hg.	-3.0	-3.0	-3.0	-3.0	-3.0		
Oil—Lbs sq.in.—High	119	119	119	119	119		
Oil—Lbs. sq.in.—Low	33	33	33	33	33		
Fuel—Lbs sq.in	28	28	28	28	28		
Barometer—In. Hg	29.10	29.10	29.10	29.10	29.10		
BAR. CORR	28.74	28.74	28.74	28.74	28.14		
Calculated Data							
Vapor Pressure—In. Hg.	.36	.36	.36	.36	.36		
ADMP							
Corr. Factor	1.27	1.22	1.27	1.27	1.27		
BHP—Observed	.820	.711	.568	.505	.1262		
BHP—Corrected							
RPM							
BMEP—Corrected							
BSFC—Lbs BHP Hr.	1.83	2.08	2.27	2.56	9.93		
Torque—Ft. Lbs.—Observed							
Combustion Air—Lbs hr	18.79	18.5	16.1	16.1	15.7		
Fuel/Air	.0779	.080	.0801	.0801	.080		
Stop Report No.							
Total Time—Hrs							
AIR OBS.	14.78	14.54	1265	12.65	12.32		

REMARKS—Lbs. Oil added if any.

OPERATOR Currens, V.E.

AERONAUTICAL RESEARCH LABORATORY
UNIVERSITY OF KENTUCKY

Data Sheet No. 86

ENGINE LOG SHEET

ENGINE NO.

DATE: 12-16-52.

MAKE: MERZ.

OBJECT: Friction Run. (Fuel injection) * (Carburetion)

Reading No.	START	582	583	584	STop.	STarT	585	586	587	588
Time of Day	8:06	8.32	8:39	8.41	8:45	9:10	9:38	9:41	10:10	10:14
Speed		2000	2000	2000			2000	2000	2000	2000
Dyn. Scale		.044	.044	.0425		—	.057	.059	.066	.068
Fuel Flow—Lbs Hr (CORR)		0	2.33	0			0	2.91	0	30
Spark Advance—Deg.		0	0	0			0	0	0	0
Temperatures—°F										
Carb. Air before Heater		68	68	68			15	15	-3	-3
Carb. Air after Heater		68.	68	68			16	16	-2	-2
Intake Manifold		70	70	70			18	16	0	0
Spark Plug Gasket		112	114	114			65	65	51	51
Cylinder Base		83	83	84			37	37	25	25
Crankcase		84	84	84			37	37	23	23
Water In		77	77	77			19	18	0	0
Water Out		95	96	96			49	47	35	35
Carburetor Fuel										
Nozzle Fuel										
Injector Fuel		70	70	70			16	16	0	0
Pressure Oil		114	117	117			75	75	63	63
Sump Oil		106	110	110			53	53	42	42
Engine Room Air		70	70	70			15	15	0	0
Pressures:										
Carb. Air Vent. Diff.—In H₂O		1.1	1.1	1.1			1.27	1.27	1.34	1.34
Int. Man. Vac.—In. Hg.		0	0	0			0	0	0	0
Oil—Lbs sq.in.—High		90	90	90			120+	120+	120+	120+
Oil—Lbs./sq.in.—Low		25	25	25			30	30	30	30
Fuel—Lbs/sq.in.		16	16	16			6	16	16	16
Barometer—In. Hg.		29.10	29.10	29.10			29.10	29.10	29.10	29.10
Calculated Data:										
Vapor Pressure—In. Hg.		.23	.23	.23			.23	.23	.23	.23
ADMP		28.87	28.87	28.87			28.87	28.87	28.87	28.87
Corr. Factor										
BHP—Observed		1.74	1.79	1.68			2.26	2.34	2.62	2.64
BHP—Corrected										
RPM										
BMEP—Corrected										
BSFC—Lbs BHP Hr										
Torque—Ft. Lbs.—Observed										
Combustion Air—Lbs hr		29.2	29.2	29.2			36.2	36.2	37.2	37.2
Fuel/Air			.0799					.0803		.0805
Stop Report No.										
Total Time—Hrs.										

REMARKS—Lbs. Oil added if any. * N.G.

OPERATOR CURRENS

AERONAUTICAL RESEARCH LABORATORY
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ENGINE LOG SHEET

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Data Sheet No. 87

ENGINE NO. 11

DATE: 12-16-52

MAKE: MERZ

OBJECT: FRICTION RUN (FUEL INJECTION) & (Carburetion)

Reading No.	589	590	591	592	593	594	Stop	Start	595	596
Time of Day	10:40	10:44	11:15	11:17	11:50	11:52	11:55	1:20	2:43	2:47
Speed	2000	2000	2000	2000	2000	2000			[illegible]	[illegible]
Dyn. Scale	.079	.076	.080	.081	.080	.081			.086	.087
Fuel Flow—Lbs Hr (CORR)	0	3.15	0	3.32	0	3.48			0	3.57
Spark Advance—Deg.	0	0	0	0	0	0			0	0
Temperatures—°F										
Carb. Air before Heater	-17	-17	-32	-32	-42	-43			-57	-57
Carb. Air after Heater	-16	-16	-29	-30	-42	-42			-56	-56
Intake Manifold	-15	-15	-29	-29	-42	-42			-56	-56
Spark Plug Gasket	42	42	38	38	27	[illegible]			+15	+15
Cylinder Base	15	15	4	5	-3	[illegible]			-17	-17
Crankcase	10	10	0	-1	-12	-12			-35	-34
Water In	-11	-11	-23	-23	[illegible]	-37			-50	-49
Water Out	25	25	18	17	12	12			0	0
Carburetor Fuel	—	—	—	—		—			—	—
Nozzle Fuel	—	—	—	—		—			—	—
Injector Fuel	-14	-14	-27	-27	-40	-41			-55	-54
Pressure Oil	+57	57	46	46	[illegible]	28			+2	+3
Sump Oil	32	32	21	21	[illegible]	7			-12	-8
Engine Room Air	-15	-15	-30	-30	-42	42			-55	-55
Pressures:										
Carb. Air Vent. Diff.—In H O	1.4	1.4	1.45	1.45	1.5	1.5			1.5	1.5
Int. Man. Vac.—In. Hg.	0	0	0	0						
Oil—Lbs sq.in.—High	120+	120+	120+	120+	120+	120+			120+	120+
Oil—Lbs./sq.in.—Low	30	30	30	30	30	30			30	30
Fuel—Lbs/sq.in.	16	16	16	16	16	16			16	16
Barometer—In. Hg.	29.10	29.10	29.10	29.10	29.10	29.10			29.06	29.06
Calculated Data:										
Vapor Pressure—In. Hg	.23	.23	.23	.23	.23	.23			.24	.24
ADMP	28.87	28.87	28.87	28.87	[illegible]	28.87			28.82	28.82
Corr. Factor	1.13	1.13	1.17	1.17	1.21	1.21			1.24	1.24
BHP—Observed	2.93	3.01	3.17	3.21	3.17	3.21			3.40	3.44
BHP—Corrected										
RPM										
BMEP—Corrected										
BSFC—Lbs BHP Hr										
Torque—Ft. Lbs.—Observed										
Combustion Air—Lbs hr	39.4	39.4	41.4	41.4	42.5	43.5			44.6	44.6
Fuel/Air		.080		.080		.080				.08
Stop Report No.										
Total Time—Hrs.										

REMARKS—Lbs Oil added if any.

OPERATOR CURRENS

Data Sheet No. 88

AERONAUTICAL RESEARCH LABORATORY
UNIVERSITY OF KENTUCKY

ENGINE LOG SHEET

ENGINE NO. 11

DATE: 12-16-52

MAKE: MERZ

OBJECT: FRICTION RUN (FUEL INJECTION & CARBURETION)

Reading No.	597	598	Stop
Time of Day	2:14	2:17	2:20
Speed	2000	2000	
Dyn. Scale	.088	.089	
Fuel Flow—Lbs Hr (CORR)	0	3.62	
Spark Advance—Deg.	0	0	
Temperatures—°F			
Carb. Air before Heater	-65	-66	
Carb. Air after Heater	-64	-64	
Intake Manifold	-64	-64	
Spark Plug Gasket	+12	+12	
Cylinder Base	-21	-20	
Crankcase	-36	-36	
Water In	-57	-56	
Water Out	0	+2	
Carburetor Fuel	—	—	
Nozzle Fuel	—	—	
Injector Fuel	-62	-63	
Pressure Oil	+4	+4	
Sump Oil	-10	-12	
Engine Room Air	-65	-65	
Pressures			
Carb. Air Vent. Diff.—In H O	1.5	1.5	
Int. Man. Vac.—In. Hg.			
Oil—Lbs/sq.in.—High	120+	120+	
Oil—Lbs/sq.in.—Low	30	30	
Fuel—Lbs/sq.in.	16	16	
Barometer—in. Hg.	29.06	29.06	
Calculated Data:			
Vapor Pressure—In. Hg.	.24	.24	
ADMP	28.82	28.82	
Corr. Factor	1.27	1.27	
BHP—Observed	3.48	3.52	
BHP—Corrected			
RPM			
BMEP—Corrected			
BSFC—Lbs BHP Hr			
Torque—Ft. Lbs.—Observed			
Combustion Air—Lbs/hr (CORR)	45.7	45.7	
Fuel/Air		.08	
Stop Report No.			
Total Time—Hrs.			

REMARKS—Lbs. Oil added if any.

OPERATOR CURRENS