# Performance of Wright "Whirlwind" Engines

## COST OF OPERATION

IT is difficult to give general figures on costs of operation as there are variable factors and special conditions which will naturally alter the general estimates. From the information compiled from data supplied by many operators of Wright "Whirlwind" engines, the following figures should represent the average cost of operation for normal flying at an assumed cruising speed of 100 miles per hour:

| | *Per Mile* |
|---|---|
| Fuel 9-12 gal. per hr., @ 25c per gal. .... | $.0250 |
| Lubricating oil 2 qt. per hr., @ 70c per gal. | .0035 |
| Engine spare parts and overhaul for first 50,000 miles ..... | .0100 |
| Probable direct cost per mile ..... | $.0385 |

If it is desired to figure the cost of depreciation, it is generally believed that the Wright "Whirlwind" may be counted on for 1,500 hours of normal service. This figure is based on proper periodic overhauls—approximately each 200-300 hours—and gives a depreciation charge of about $.03 per mile.

The above figures are approximate, but there are many cases on record where the costs are less than the estimates given above. For instance. the J-5C "Whirlwind" in the World's Record Endurance Flight averaged 7½ gal. of fuel and less than a pint of lubricating oil per hour. One "Whirlwind" operator using nine engines averaged 10½ gal. of fuel per hour for over 3000 hours and with a cost for replacement parts for the first overhaul (300 hours) of only $6.30 per engine. Another operator averaged $16 per engine for replacement parts on about 300 hours per engine. Obsolescence depreciation has not proved an expensive item as ready sales at good prices have been made on the few used "Whirlwinds" offered for sale.

## MAINTENANCE AND REPAIR

Owners of Wright "Whirlwind" engines may return their engines to the factory for general overhaul where reconditioning is done on an hourly basis and the excellence of workmanship is assured. If desired, the engines will be given a standard running test, tear-down and check run at additional cost.

A complete set of overhaul tools for reconditioning Wright "Whirlwind" engines is also available to operators whose requirements warrant such equipment. This list may be obtained by request from the Service Department.

## POWER CURVE

A power and propeller load curve of the Wright "Whirlwind" Models J-5C and J-5CA engine is included to assist in determining the power and fuel consumption of the engine under various conditions of operation.

The curve marked "Full Throttle Power" shows the average maximum power at the speeds indicated. An individual engine may vary from 2 to 3 per cent. above or below this value.

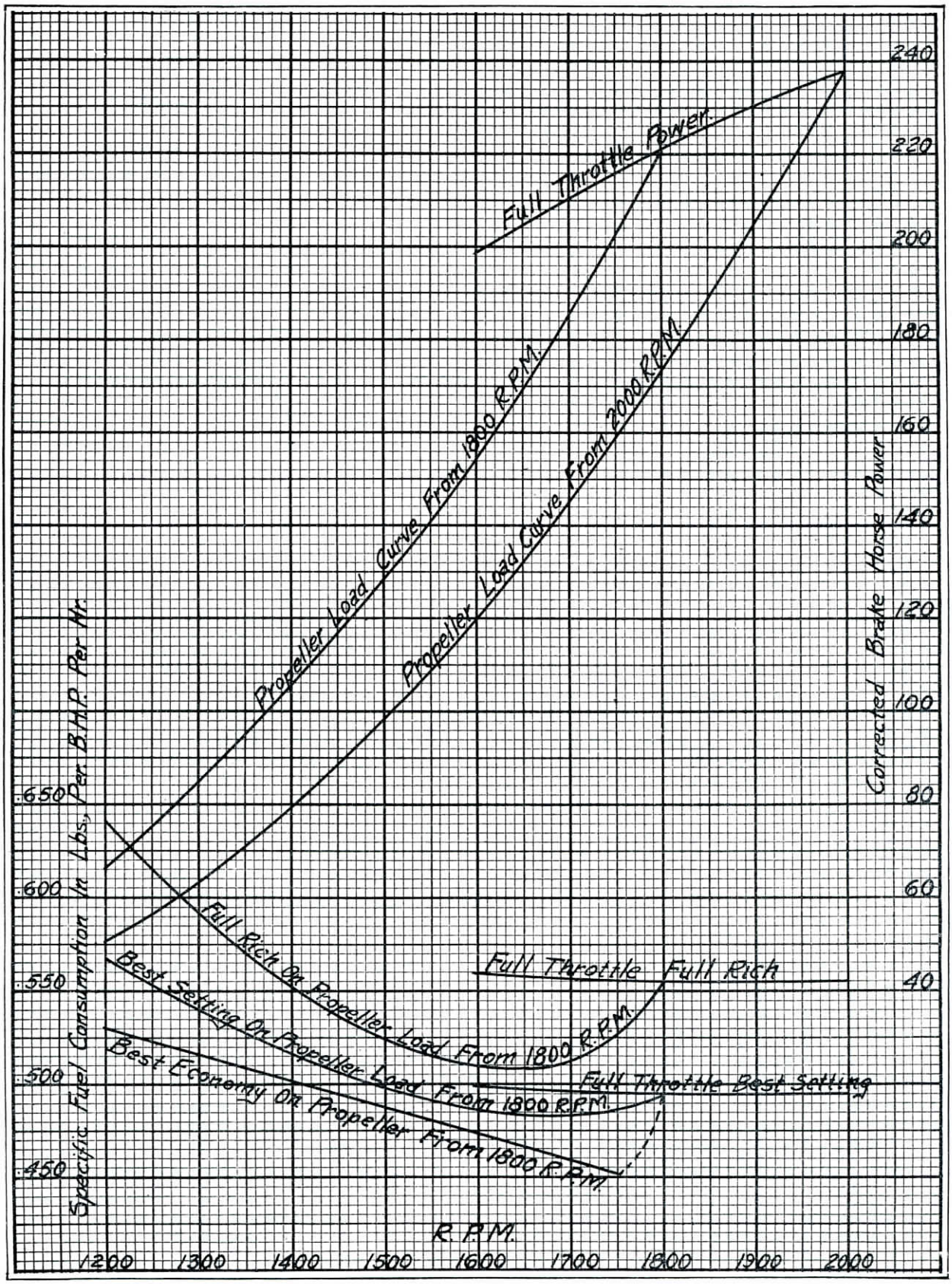
At the full rich setting of the mixture control, the fuel consumption at full throttle is indicated by the curve marked "Full Throttle Rich." The leanest position of the mixture control at which the engine turns maximum R.P.M., is shown by the curve marked "Full Throttle Best Setting." Hence, by the use of the mixture control, at full throttle, with the engine turning 1800 R.P.M., the fuel consumption can be varied between .555 and .495 lbs. per horsepower hour without losing any revolutions.

An engine fitted with a propeller turning 1800 R.P.M. at full throttle, when throttled to any given speed, will develop the power shown on the propeller load curve. If the full throttle power is not 1800 R.P.M., the propeller load curve will start from the point on the power curve corresponding to the maximum R.P.M. and will be similar in form to the propeller load curve drawn from 1800 R.P.M.

The fuel consumption on the propeller load curve is given by the three curves marked "Propeller Load." The upper curve shows the consumption obtained when the mixture control is left in the full rich position. The middle curve indicates the fuel consumption when the mixture control is set to the leanest possible position with the engine still turning maximum R.P.M. and left in this position while running at part throttle. The lowest curve gives the lowest gasoline consumption at which the engine will operate smoothly. To obtain these lowest readings the throttle must be set with the mixture control at full rich to give a speed of 30 R.P.M. above the desired speed. The mixture control should then be pulled back until the engine loses 30 R.P.M. The fuel reading will then correspond to the lowest of the propeller load fuel consumption curves.

The maximum R.P.M. on the fuel consumption curve must correspond with the full throttle R.P.M. of the propeller load curve. From this point the fuel consumption curves will be similar in form to the curves drawn from 1800 R.P.M.

To convert the specific fuel consumption into gallons per hour, multiply the specific consumption (in pounds per horsepower per hour) by the horsepower which the engine is developing and divide by 6, the weight in pounds of one gallon of gasoline.


Full Throttle Power.
Propeller Load Curve From 1800 R.P.M.
Propeller Load Curve From 2000 R.P.M.
Full Throttle Full Rich
Full Rich On Propeller Load From 1800 R.P.M.
Best Setting On Propeller Load From 1800 R.P.M.
Full Throttle Best Setting
Best Economy On Propeller From 1800 R.P.M.
Specific Fuel Consumption In Lbs. Per B.H.P. Per Hr.
Corrected Brake Horse Power
R.P.M.
.650
.600
.550
.500
.450
240
220
200
180
160
140
120
100
80
60
40
1200
1300
1400
1500
1600
1700
1800
1900
2000