

# OPERATOR'S MANUAL

FOR

E-165

E-185

E-225

## AIRCRAFT ENGINES



*Continental Motors Corporation*

PRODUCT SUPPORT CENTER

801 TOUHY AVENUE • ELK GROVE VILLAGE, ILLINOIS 60007

FORM X-30018

SUPERSEDES FORM B-E60

F.A.A. APPROVED

MAY 1968

## RECIPROCATING AIRCRAFT ENGINE WARRANTY

Continental Motors Corporation warrants each new or remanufactured reciprocating aircraft engine to be free from defects in material and workmanship, under normal use and service, for six months, subject to the following conditions:

1. The warranty period shall end six months from the date upon which the engine was first operated for any use other than necessary flight test and required ferry or delivery flight by the most direct route.
2. The obligation of the Company, under this warranty, is limited to repairing or replacing, as the Company may elect, any part or parts which shall have been returned to a **Distributor or licensee**, of the Company, authorized to handle the engine covered by this warranty and which examination shall disclose, to the Company's satisfaction, to have been defective in material or workmanship. The Company reserves the right to replace the defective part or parts with new or remanufactured parts, however, such replacement is not to be construed to extend warranty beyond the original six months warranty coverage.
3. The Company assumes neither the cost of shipping the engine or any part or parts to the Company or to any **Distributor or licensee of the Company**, nor the cost of returning the engine or any part to the **owner** or to any **Distributor or licensee of the Company**.
4. This warranty shall not apply to any engine in which parts not manufactured or **approved** by the Company have been used, nor to any engine which shall have been altered, converted, modified, repaired, neglected, installed, used in any way or operated in a manner not recommended by the Company.
5. This warranty shall not provide the Purchaser with normal maintenance services (such as engine tune up) or replacement of normal service items (such as filters).
6. THIS WARRANTY SHALL ONLY APPLY TO ENGINES ON WHICH THE OWNER HAS FOLLOWED THE INSPECTION AND MAINTENANCE INSTRUCTIONS CONTAINED IN THE APPROPRIATE OWNER'S MANUAL AND OPERATOR'S MANUAL. AS A CONDITION TO THE WARRANTY, THE OWNER MUST HAVE THE MAINTENANCE SERVICES SET FORTH IN THE APPLICABLE OWNER'S MANUAL AND SERVICE BULLETINS PERFORMED AND VALIDATED IN THE OWNER'S MANUAL BY A CERTIFICATED POWER PLANT MECHANIC.
7. Continental Motors Corporation will not warrant accessories installed on the engine (such as magnetos, carburetors, superchargers, starters, generators, alternators, voltage regulators) where the manufacturer has its own warranty.

8. The Company reserves the right to modify, alter and improve any engine or parts without incurring any obligation to replace any engine or parts previously sold with such modified, altered, or improved engine or part.

9. THIS WARRANTY, AND THE COMPANY'S OBLIGATION THERE-UNDER, IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, and all other obligations or liabilities, including consequential damages or contingent liabilities arising out of the failure of any engine or part to operate properly, and no person is authorized to give any other warranty or to assume any additional obligation on the Company's behalf unless made in writing and signed by an officer of the Company.

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## FOREWORD

This booklet is intended to serve pilots and maintenance men as a pocket size reference book and guide to operation and maintenance requirements of models E-165, E-185 and E-225. Accordingly, its topics are limited to engine operation, inspection and minor maintenance procedures. Careful observance of these suggested procedures will help the engines to serve faithfully.

The world wide use of Continental Engines in personal aircraft has placed upon each factory department a serious responsibility in our endeavor to produce the finest possible engines at fair and reasonable prices. Our responsibilities now extend to many thousands of owners and service organizations. As a result, it has become impossible to advise individuals by direct mail, except through the medium of Service Bulletins, which may be obtained under our annual subscription plan or read at Continental Approved Service Stations.

In most parts of the United States, Continental Approved Service is as close as your nearest airport. The name and address of your nearest Approved Service Station will be sent on request. It is suggested that you become acquainted with that firm, where mechanics and others will gladly give you the benefit of their thorough knowledge of Continental Engines.

No engine leaves our factory until it has passed a rigid operation test and inspection, therefore each new engine is believed to be free from defects. If any Continental Engine or part is suspected of failure, advise your nearest Continental Approved Service Station, giving model and serial number, hours operated and complete details. Do not attempt repairs without factory authorization if adjustment is expected.

## SPECIFICATIONS

MODEL	E165	E185	E225
Type Certificate Number	246	246	267
Bore (inches)	5.00	5.00	5.00
Stroke (inches)	4.00	4.00	4.00
Piston Displacement (cubic inches)	471	471	471
Rated Brake Horsepower (continuous)	165	185	225
Rated Brake Horsepower (take-off)	165	205†	225
Rated RPM	2050	2300	2650
Take-Off RPM	2050	2600†	2650
Recommended Cruising RPM Maximum	1900	2150	2300
Recommended Cruising Manifold Pressure in. Hg. Maximum	24	23	23
Minimum Fuel Octane Rating	80	80	80
Oil Pressure(Cruising)(lbs./sq.in.)	30-60	30-60	30-60
Oil Pressure (Idling, Minimum) (lbs./sq.in.)	10	10	10*
Fuel Pressure (Stromberg Carburetor) (lbs./sq.in.)	9-15	9-15	9-15
Fuel Pressure (Marvel Carburetor) (lbs./sq.in.)	1.5-9	1.5-9	1.5-9
Oil Inlet Temperature (for take-off) (°F.) Minimum	75	75	75
Recommended	90	90	90
Maximum Oil Inlet Temperature (°F.)	215	225	225
Maximum Cylinder Head Temperature (°F.)	525	525	525
Approx. Oil Consumption (lbs./hr. .018* per BHP per hr.)	-	-	-
Oil Sump Capacity (quarts)	10	10	10
Compression Ratio	7.0:1	7.0:1	7.0:1
Firing Order	1-6-3-2-5-4	1-6-3-2-5-4	1-6-3-2-5-4
Valve Rocker Clearance: Deflated (inches)	.030 - .110	.030 - .110	.030 - .110
Effective Valve Event Angles (no adjustment)	15° BTC	15° BTC	36° BTC
Intake Opens	60° ABC	60° ABC	72° ABC
Intake Closes	55° BBC	55° BBC	72° BBC
Exhaust Opens	15° ATC	15° ATC	36° ATC
Exhaust Closes			
Ignition Timing (Magneto Points Open)	26°	26°	26°
Right Magneto (upper plugs) B, T. C.			
Left Magneto (lower plugs) B, T. C.	26°	26°	26°

† Not applicable to engines with serial numbers below 5122D.

E-225 Series 2 and 8 are dry sump engines.

\* E-225 Series 4 and 9 are wet sump with capacity as shown.

**NOTE**

Due to addition of the **E225** models to the "E" Series line of engines all references to E165 and E185 engines should be understood as **including** the **E225** Series when not so specifically stated.

The E225 engine differs from the E185 engine in the following major parts.

**BASIC DIFFERENCE BETWEEN  
E185 AND E225 ENGINES**

1. Crankshaft (5th and 6th order dampers).
2. Cylinders (natural choke).
3. Pistons (slipper type skirt).
4. Camshaft (greater valve overlap).
5. Carburetor (higher flow rate).

These changes indicate that field conversion of older E185 Engines to the E225 is not economically feasible.

E-165

# SEA LEVEL PERFORMANCE CURVES

ENGINE MODEL: E165

MIN. FUEL GRADE: 80

COMP. RATIO: 7 TO 1

INLET AIR: STD. ATMOSPHERE WITHOUT RAM

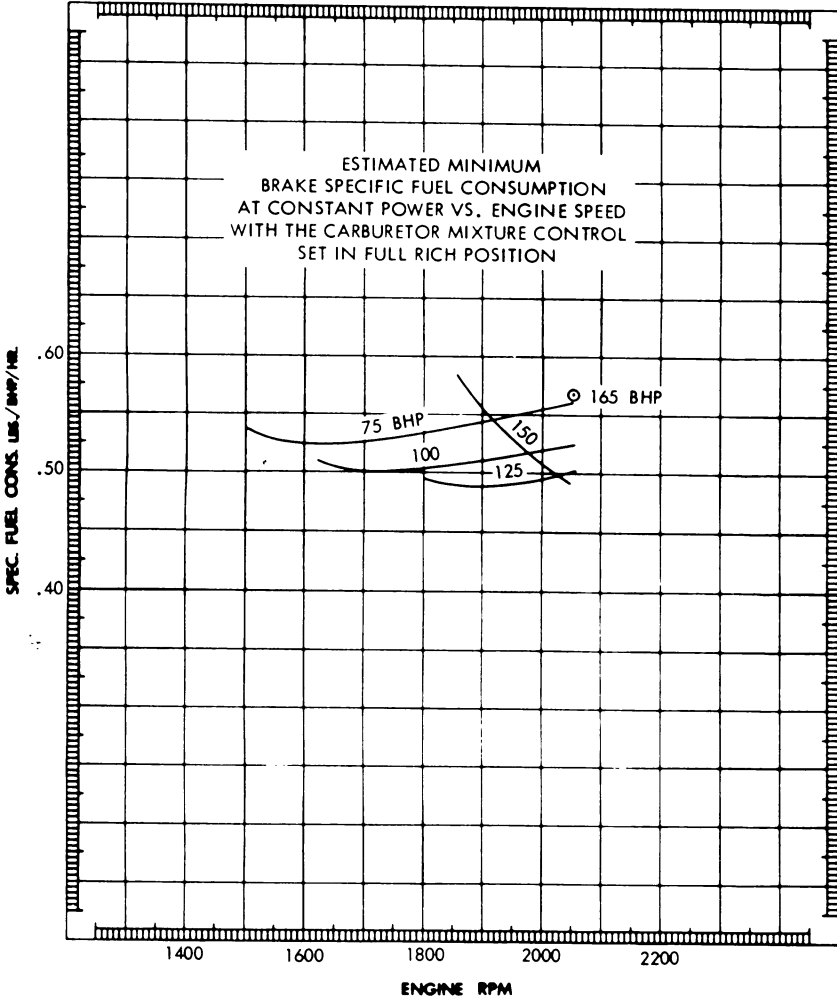


Figure 1. SEA LEVEL PERFORMANCE CURVES, E-165



E-165  
PERCENTAGE OF POWER

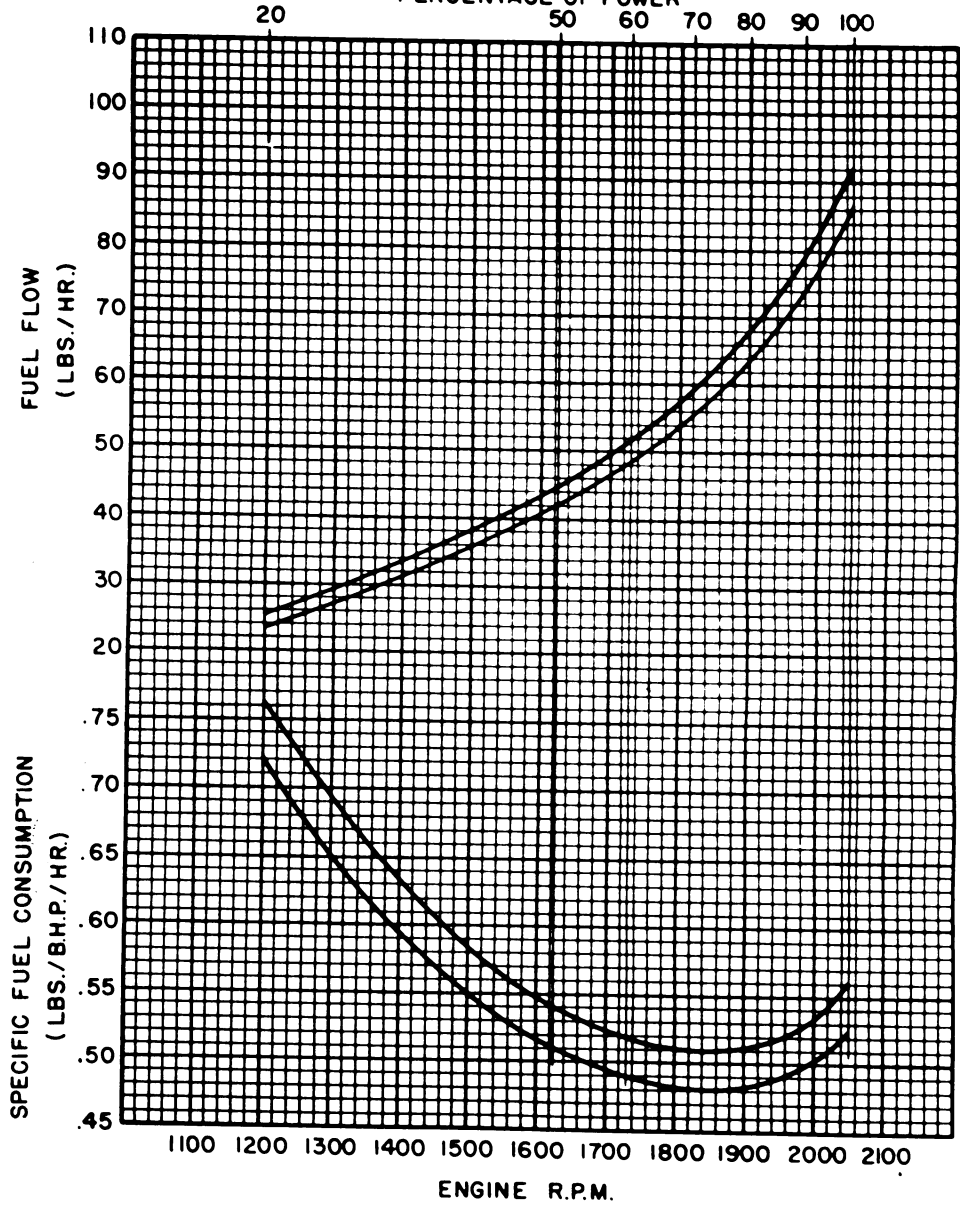
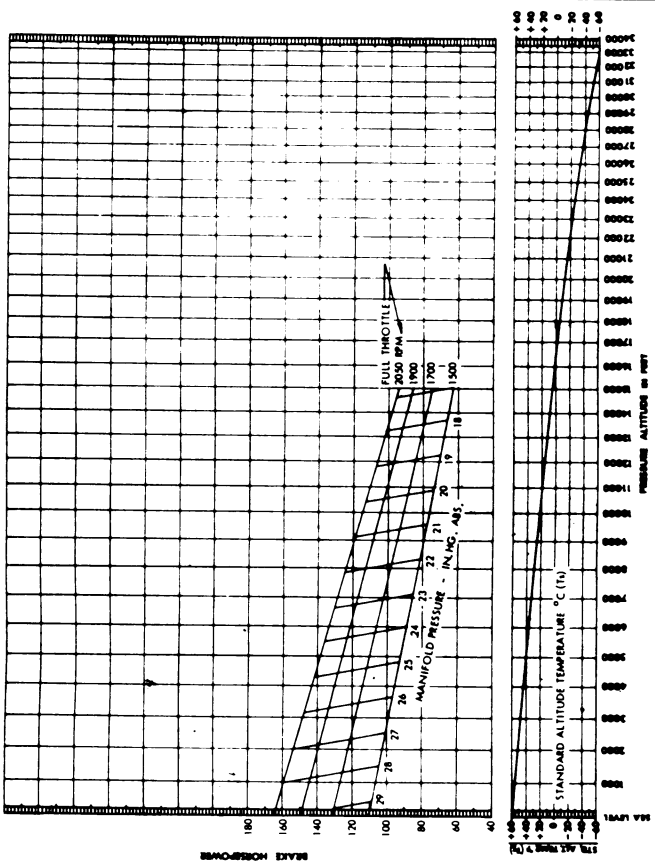


Figure 2. FUEL FLOW VS. BRAKE HORSEPOWER, E-165

**ALTITUDE PERFORMANCE**



**SEA LEVEL PERFORMANCE**

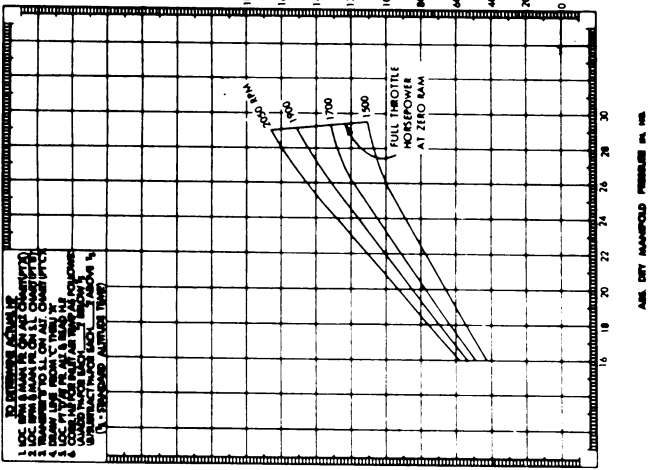


Figure 3. ALTITUDE PERFORMANCE CURVES, E-165

# SEA LEVEL PERFORMANCE CURVES

E-185

ENGINE MODEL: E185  
 MIN. FUEL GRADE: 80      COMB. RATIO: 7 TO 1  
 INLET AIR: STD. ATMOSPHERE WITHOUT RAM

H.P. & MANIFOLD PRESSURE PLUS OR MINUS 2-1/2% VARIATION

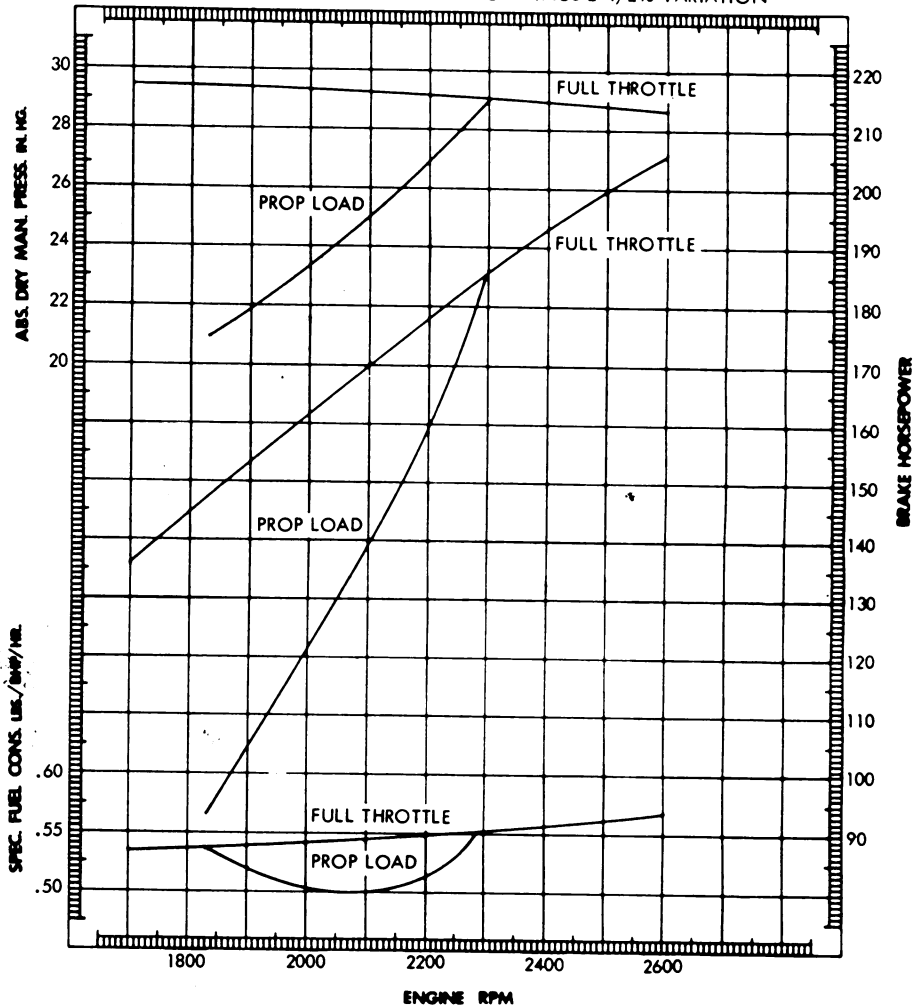


Figure 4. SEA LEVEL PERFORMANCE CURVES, E-185

E-185

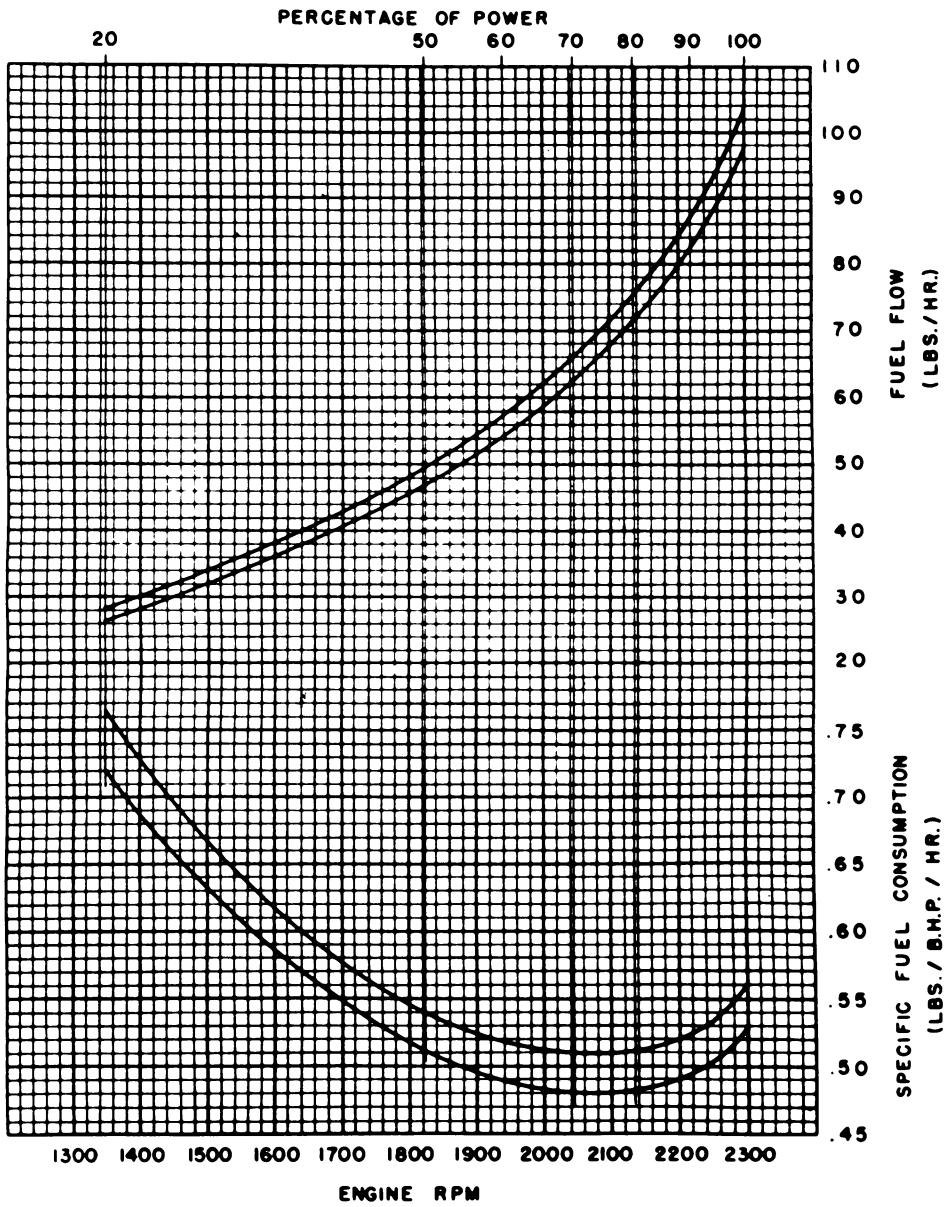
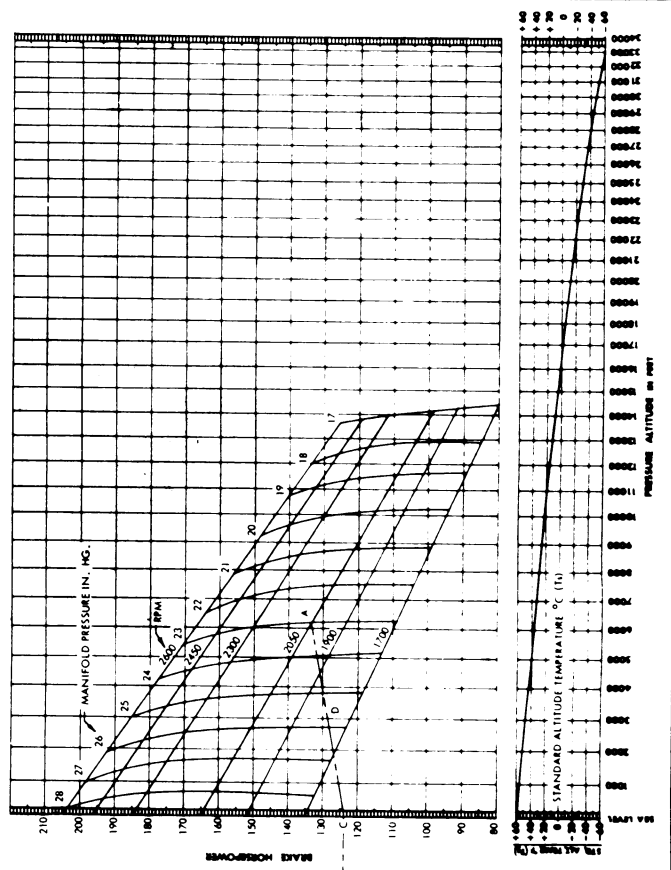


Figure 5. FUEL FLOW VS. BRAKE HORSEPOWER, E-185

**ALTITUDE PERFORMANCE**



**SEA LEVEL PERFORMANCE**

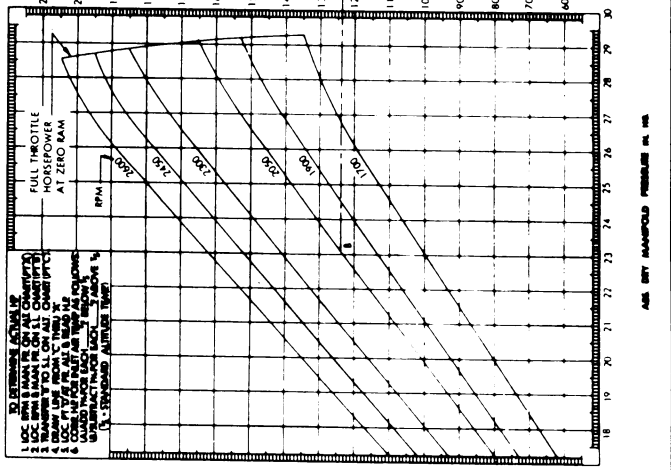


Figure 6. ALTITUDE PERFORMANCE CURVES, E-185

# SEA LEVEL PERFORMANCE CURVES

**ENGINE MODEL:** E225  
**MIN. FUEL GRADE:** 80      **COMP. RATIO:** 7 TO 1  
**INLET AIR:** STD. ATMOSPHERE WITHOUT RAM

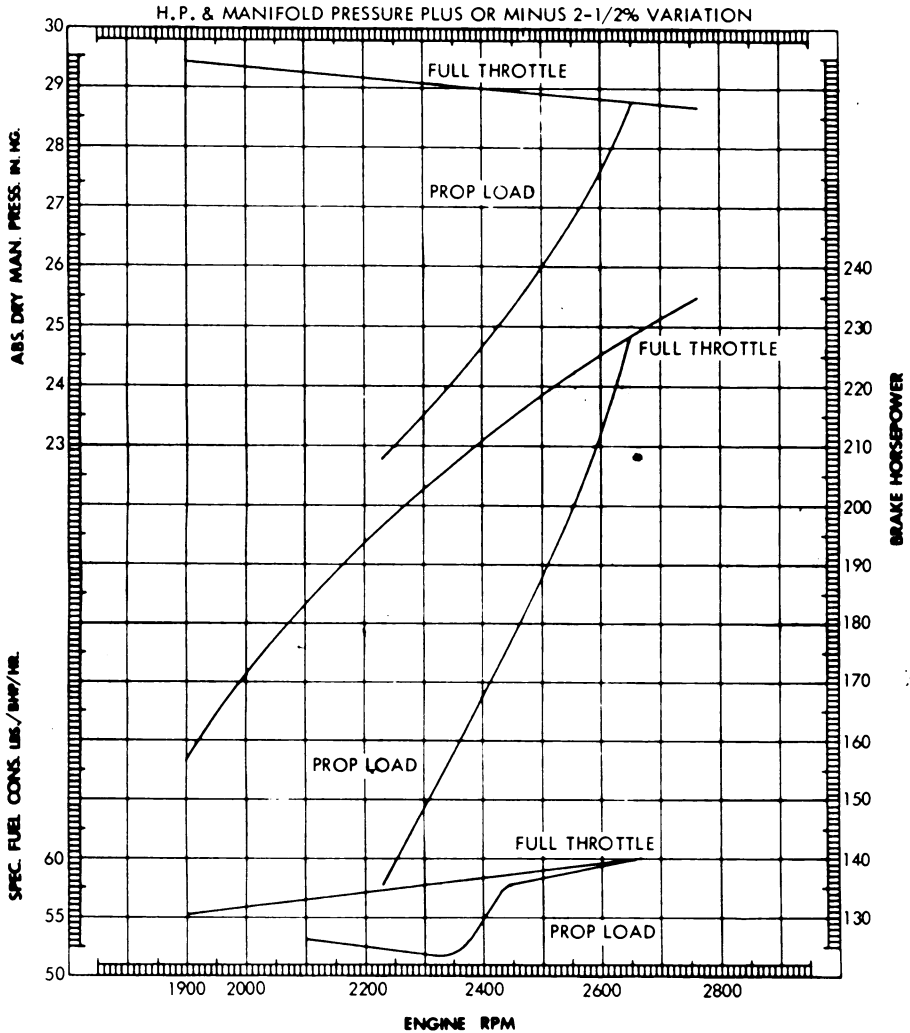


Figure 7. SEA LEVEL PERFORMANCE CURVES, E-225

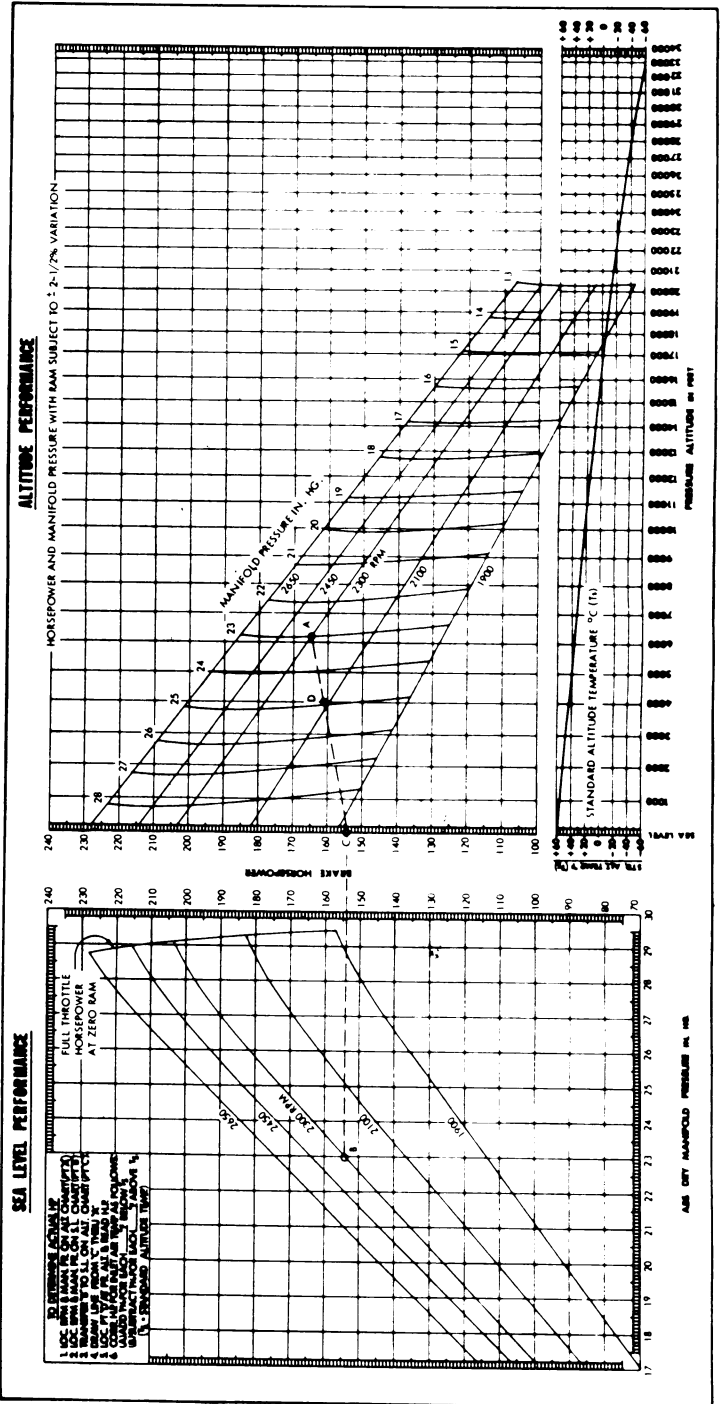


Figure 8. ALTITUDE PERFORMANCE CURVES, E-225

## OPERATING INSTRUCTIONS

This section describes correct operating procedures for models E165 and E185. Follow these instructions carefully to obtain maximum engine life, economy and performance.

### 1. BEFORE STARTING

- a. Perform the Daily Inspection outlined herein.
- b. Make sure that mixture control is in "IDLE CUT-OFF" position and ignition switch "OFF". Open throttle wide.
- c. Turn propeller several revolutions to loosen congealed oil, check compression and observe unusual noises.
- d. Make sure that carburetor air heat control is in "COLD" position and propeller control in full "INCREASE RPM" position. Open cowling flaps, if installed.

### 2. STARTING

- a. Open fuel supply valve from fuel tank.
- b. Set throttle approximately 1/10 open from idle stop.
- c. Operate wobble pump, if installed, only enough to obtain 9-11 psi indicated fuel pressure.
- d. Turn ignition switch to "BOTH" position.
- e. Move mixture control to "FULL RICH" position, and immediately engage starter and operate priming pump until engine starts.
- f. Adjust throttle for 800 RPM, and check oil and fuel pressures.

#### CAUTION

Never engage starter while propeller is turning. If either oil or fuel pressure is below normal after 30 seconds of running, stop and determine cause.

### 3. WARM-UP AND GROUND TEST

- a. Maintain 800 RPM for at least 1 minute.
- b. In cold weather prime, as required, to keep engine running only as long as it takes to make engine run smooth without prime.



- c. All ground testing of the engine should be done with the carburetor mixture control at the "FULL RICH" position.
- d. After engine has been run at 700 to 800 RPM for two or three minutes, advance the throttle gradually until tachometer shows between 1200 and 1500 RPM. Allow engine to run at the increased RPM from three to five minutes, depending on atmospheric temperatures. The warm-up time may be used in taxiing to the take-off point.
- e. Do not run the engine on the ground at a high RPM longer than is necessary for sufficient warm-up and take-off. Proper engine cooling depends upon the forward speed of the airplane as well as the propeller.

#### 4. TAKE-OFF

Immediately before taking off, set the brakes and check the following:

- a. Oil Pressure: Gage should show between 30 and 60 psi in operating speed range.
- b. Oil Temperature: Gage should indicate at least 75° F. and preferably 90° F.
- c. Mixture Control: "FULL RICH" position.
- d. Magneto Test: Test magnetos separately for RPM and proper firing. Speed of engine, with a fixed throttle position, should not drop off more than 75 RPM on either single magneto from a "BOTH" magneto operating position.
- e. Carburetor Air Heat: "COLD" position.
- f. Propeller Control: High RPM position.
- g. Fuel Pressure: 9-15 psi (Stromberg).

NOTE

Check pressures, magnetos at ~~2000~~ 3000 RPM.

#### 5. OPERATION IN FLIGHT.

After a safe altitude has been reached, adjust throttle to the cruising RPM and adjust propeller pitch to cruising manifold pressure. (See page 2)

Instruments: Indications of sub-normal oil or fuel pressure or of abnormal cylinder head or oil temperature or a sudden or persistent drop in RPM will usually warn you of trouble. Land immediately to correct such conditions.

**Carburetor Air Heat:** Use only under severe icing conditions.

**Fuel-Air Mixture:** At altitudes of more than 5000 ft. above sea level, if a Stromberg PS-5C carburetor is installed, and at all cruising altitudes, if a Marvel-Schebler MA-4-5 carburetor is installed, adjust fuel-air mixture to best rich power by moving the mixture control toward the "LEAN" position until maximum RPM is obtained, with fixed throttle and propeller pitch, then back toward "FULL RICH" position until RPM drops just perceptibly. Re-adjust the mixture with each change in altitude or power setting. Return the control to "FULL RICH" position before letting down. Avoid excessively lean mixtures to prevent overheating and damage.

**CAUTION**

Continuous operation at RPM and/or manifold pressure in excess of those recommended may cause overheating and abnormal wear or serious damage.

6. LANDING

- a. During long glides and when making an approach for landing, set the mixture control in the "FULL RICH" position.
- b. From cruising operation, slowly close throttle to approximately 1000 RPM.
- c. **During** the descent partially open the throttle periodically to clear the cylinders and prevent spark plug fouling, so as to insure maximum engine acceleration if it should be necessary. Close throttle when about to land.

7. STOPPING THE ENGINE

After landing allow the engine to run at 700 to 900 RPM until the engine has cooled appreciably below cruising temperatures. The resulting temperatures during this period will vary according to climatic conditions and the amount of power that was required for taxiing. After engine has cooled proceed as follows:

- a. Move the carburetor mixture control to the "IDLE CUT-OFF" position. This will cut off the fuel supply at the carburetor and stop the engine.
- b. When the engine stops, turn the ignition switch to "OFF". Stopping the engine in this manner will prevent after-firing.
- c. Leave carburetor mixture control in "IDLE CUT-OFF" position until engine is again started.

## LUBRICATING OIL AND GASOLINE

Like any other fine mechanism, your engine needs lubricating oil of proper viscosity and good quality. Likewise, an aviation grade of gasoline will give you better results than any other type of fuel. The accompanying chart gives the proper viscosity of lubricating oils, for all engines covered by this handbook. Gasoline, having an octane rating of not less than 80 and with lead content of not greater than 1/2 cc per gallon should be used, except that we recommend 90 octane, leaded fuel for the first two hours after an overhaul.

### NOTE

The use of automotive types of fuel is to be avoided due to a tendency to vapor lock under high output conditions

#### RECOMMENDED OIL VISCOSITY

SAE No. 50  
SAE No. 30

#### AMBIENT AIR TEMPERATURE

Above 40° F.  
Below 40° F.

When average ambient air temperature is approximately at the dividing line of the above temperature ranges, use the lighter oil. It is recommended that oil be changed each 20 to 30 hours.

## TROUBLES AND REMEDIES

### 1. ENGINE WON'T START

#### a. Lack of fuel.

- (1) Check for adequate fuel supply.
- (2) Make certain vent holes in fuel tank caps are open.
- (3) Check fuel shut-off valve position.
- (4) Check for sufficient fuel pressure.

#### b. Improper Priming.

- (1) Weak intermittent explosions, followed by puffs of black smoke from the exhaust pipe, indicate over-priming or flooding. Excess fuel can be cleared from the combustion chambers by setting carburetor mixture control at "IDLE CUT-OFF", throttle at "FULL OPEN" and ignition switch "OFF" then cranking the engine through at least six revolutions.
- (2) If the engine is underprimed, which is most likely in cold weather and with a cold engine, repeat the instructions given under "Starting".

c. Defective Ignition.

- (1) Inspect the ground wire between the magnetos and switch. Grounding of this wire will prevent magnetos from firing.
- (2) Check all spark plugs for gap setting. Correct setting is .015-.018 inch for all approved types. (See Service Bulletin M68-4)
- (3) Check magnetos for fouled breaker points.
- (4) Check magneto timing. If the magneto is incorrectly timed, the engine will usually fire but will not run.

d. Cold Oil.

- (1) With ignition switch in "OFF" position, **turn propeller over several times by hand.** This will break the drag **caused by cold oil between the pistons, rings and cylinder walls.** At near or below zero temperatures, it is advisable to pre-heat engine oil before trying to start the engine.

## 2. LOW OIL PRESSURE

- a. Check quantity and quality of lubricating oil in oil sump. At least 5 quarts must be carried at all times.
- b. Check for clogged oil screen. Must be thoroughly clean.
- c. Check for foreign matter on oil pressure relief valve and for sticking plunger.
- d. Check for worn bearings.
- e. Check for defective pressure gage.
- f. Check for leaks in oil supply line or oil inlet tube. Air leaks prevent the pump from drawing oil.

## 3. HIGH OIL TEMPERATURE

- a. Check quantity of lubricating oil in sump or external oil tank.
- b. Check for broken cylinder fins or loose baffles.
- c. Check engine operation for lean mixture.
- d. Check for defective temperature gage.
- e. Make certain that oil cooler shutters, if installed, are open.

f. Check airplane trim for flying at high RPM, or if being mushed along. See recommended cruising conditions.

g. Is fuel 80 octane or better?

#### 4. LOW POWER

a. Check for full opening of throttle valve and full closing of carburetor air heat valve.

b. Check ignition system thoroughly.

c. Inspect carburetor air scoop. Must be open.

d. Inspect air filter. See instructions printed on filter.

e. Check for correct propeller pitch.

f. Check compression in cylinders.

g. Check for incorrect operation of hydraulic valve lifters.

#### 5. ENGINE RUNNING ROUGH

a. Check propeller for balance, track and tightness of hub on crankshaft.

b. Remove spark plugs. Clean, set gaps. (See page 16.) Bomb test plugs at 100 lbs. per sq. in. pressure with dry air.

c. Check magneto operation and check ignition cables for high tension leaks.

d. Check engine mountings for cracks; proper installation of vibration isolators and secure mounting.

e. Inspect carburetor control linkage.

f. Inspect for broken valve springs, leaking valves, and incorrect valve lifter operation.

#### 6. ENGINE FAILS TO ACCELERATE PROPERLY

a. Make certain engine is sufficiently warm.

b. Check carburetor mixture control linkage; mixture control must be at "FULL RICH" position when on ground.

c. Check for leak from primer pump causing mixture to be too rich.

- d. Check fuel pressure at full throttle.
- e. Propeller should be in low pitch for ground operation.

#### 7. ENGINE FAILS TO IDLE PROPERLY

- a. Check for incorrect idle speed and mixture adjustments.
- b. Check for leaking primer jets.
- c. Check for air leaks in intake system.
- d. Check carburetor idle valve. May be plugged or set too lean.
- e. Check for incorrect spark plug gaps.
- f. Check for low compression which may be caused by leaking valves, stuck or worn piston rings, defective valve lifters.
- g. Check for worn intake valves and guides.

### INSPECTION AND MAINTENANCE

#### 1. DAILY INSPECTION - POWER PLANT

The daily pre-flight inspection should be made either at the end of a day's flight or prior to flying activities the following day. This inspection is not designed to be sufficiently thorough to detect wear or minor maladjustments but only to determine the general condition of the engine and any damage or incorrect adjustments or control connections that might interfere with flight safety.

- a. Check propeller for nicks, cracks and secure mounting.
- b. Check for full range opening and closing of carburetor throttle and air heat control valves.
- c. Check fuel filter bowl for sediment and water; if necessary clean and resafety.
- d. Check lubricating oil for quality and quantity.
- e. Check for oil or fuel leaks.
- f. Make certain carburetor air filter is not clogged.
- g. Check all ignition wiring for condition and tight connections.

h. Check engine for loose or missing nuts, palnuts and for proper safetying of all plugs.

i. Refer to "Carburetor" section for instructions covering carburetor inspection.

## 2. 100-HOUR INSPECTION - POWER PLANT

The 100-hour inspection is a complete and thorough examination of the engine and the operator should bear in mind that this inspection is complete only so far as the engine is concerned.

a. Check the general condition of the propeller, security of mounting to hub on crankshaft. Check for proper safetying. The propeller blades must track within 1/8 inch of each other.

b. Remove engine cowling and inspect for good condition.

c. Check intake system for leaks and secure mounting.

d. Remove carburetor air filter. Clean by washing in clean gasoline. After element is thoroughly dry, cover front and rear with a light grade of oil.

e. Remove spark plugs, clean and set gaps (see page 16). Bomb test plugs and reinstall with new, solid copper gaskets. If spark plug electrodes are worn replace with new plugs. Use thread lubricant on plugs and tighten with a torque wrench to 225 inch pounds for 14 mm. plugs or 330 inch pounds for 18 mm. plugs.

f. Inspect all ignition wiring for good condition and security of brackets and terminals.

g. Check baffles for holes, cracks, proper fit around cylinders and secure mounting.

h. Check all cylinders for cracked or damaged fins. Check compression of hot engine.

i. Check magnetos. Clean and dry breaker mechanism to insure that oil will not touch the breaker points. See Magneto Manual for instructions on breaker point gap and proper timing.

j. Check for full range operation of carburetor throttle, mixture control and air heater control.

k. Remove oil screen, wash in clean gasoline, replace and safety.

- l. Remove rocker box covers and inspect the valve mechanism. To insure that all oil passages are open, interior of rocker box covers should show complete coverage with engine oil. Install new gaskets under covers.
- m. Remove fuel filter bowl, clean, replace and safety.
- n. Check the exhaust system for cracks or looseness of mounting and connections. Check for blown gaskets. Check cabin heater for exhaust gas leaks.
- o. Check starter and generator for oil leaks and secure mounting. Oil leak at generator indicates a defective oil seal. Wipe or wash off any oil seepage at the pinion gear shaft in starter adapter. Should the oil seal ever need replacing, replace only with a seal furnished by the manufacturer of the starter.
- p. Inspect Delco-Remy starter solenoid linkage adjustment (except E185-8, -9) for 9 16 inch pinion travel and for full release (1/32 inch space between lever and clutch shaft end).
- q. Check all engine instruments for secure mounting and proper functioning. (See operating data, page 2)
- r. Refer to "Carburetor" section for instructions covering carburetor inspection.
- s. This inspection should coincide with an oil change.

### MAJOR OVERHAUL OR RE-MANUFACTURE

Continental E Series Aircraft Engines, when operated within the prescribed limitations, can be operated for 1200 hours between major overhauls. The proper use and maintenance of oil and air filters and adherence to the recommended oil change periods are important contributing factors.

This recommended period is made on provision that normal periodic inspections are properly carried out and that in the opinion of a qualified, certificated mechanic, the engine is operating normally at the time of the periodic inspection, paying particular attention to throttle response, power, smooth running, and oil consumption.

### MAGNETO INSTALLATION AND TIMING

Continental E165 and E185 Engines are equipped with Eisemann LA-6 or Scintilla S6LN-21 Magnets. To give an intensified spark for easy starting, an impulse starter is installed on each magneto, which also automatically retards the timing of the ignition spark to prevent engine "kicking".



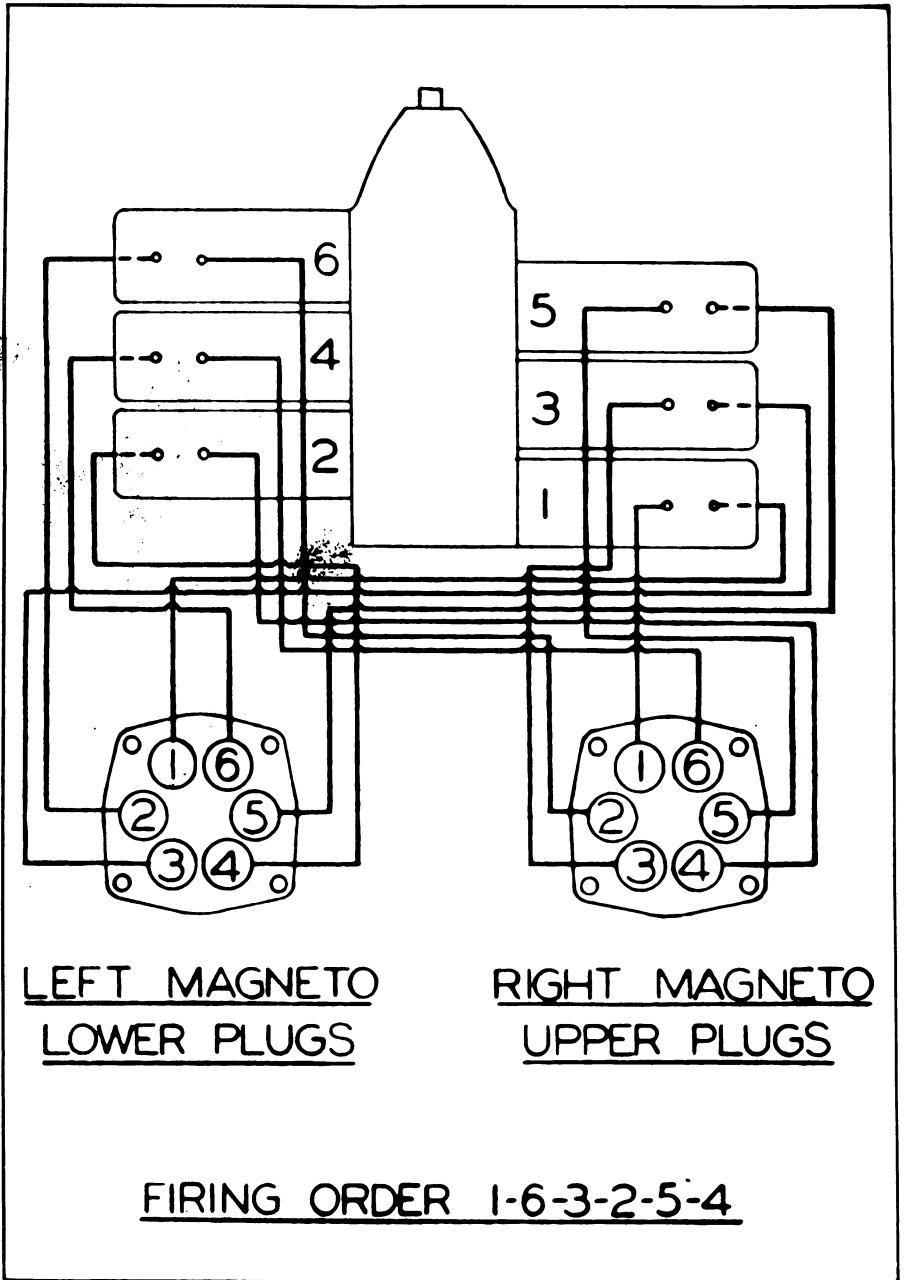


Figure 9. IGNITION WIRING DIAGRAM

## 1. TIMING PROCEDURE

To achieve accuracy in timing, it is important that the device used for arriving at the prescribed setting be reliable and accurate. Continental Motors Corporation recommends the use of a positive top dead center locator similar to that employed with the "Universal Engine Timing Indicator" described in our Service Bulletin M60-16. Top dead center locators can be locally manufactured from old spark plugs or per Service Bulletin M60-16. (See figure 10.) We also recommend the following basic timing procedure. Remove all spark plugs. Install top dead center locators in No. 1 cylinder top spark plug hole. Install timing disc of indicator being used on propeller spinner or hub. (See figure 11.) Turn propeller slowly in direction of rotation until position lightly touches T. D. C. locator. Rotate disc of timing indicator until top center mark is under pointer.

Slowly turn prop in opposite direction until the piston lightly touches T. D. C. locator. Observe reading on the disc under the pointer and move disc to exactly  $1/2$  of the number of degrees observed toward the top center mark.

Remove T. D. C. locator from cylinder and find the compression stroke on No. 1 cylinder by either placing finger over spark plug hole or any other adequate method. You have now found top center on the compression stroke.

To either check the magneto timing or to time the magnetos to the engine, move the propeller in the opposite direction of rotation past the specified magneto timing setting and then back in direction of rotation until the desired setting before top center is under the pointer (this removes the factor of gear backlash).

The breaker points should just be starting to open at this setting. Breaker point opening should be checked with a suitable device, preferably a timing light.

We recommend, when setting magnetos that a tolerance of plus zero minus two degrees be used on all our engines.

## 2. SCINTILLA MODEL S6LN-21

The procedure is the same as for the Eisemann magneto. The only difference is that the distributor timing mark is a chamfered tooth on the large distributor gear. Before installing the magneto, remove the  $11/16$  inch hex head aluminum plug from the top of the housing. Beneath the plug hole will be seen a stationary white index line. Rotate the drive coupling backward until the chamfered tooth of the distributor gear is aligned with the white mark. This is the No. 1 firing position and the breaker points are just open. Install the magneto with these marks aligned and with the crankshaft in the correct firing position. Check the timing as for the Eisemann Model LA-6. Replace the hex head aluminum plug after timing the magneto.

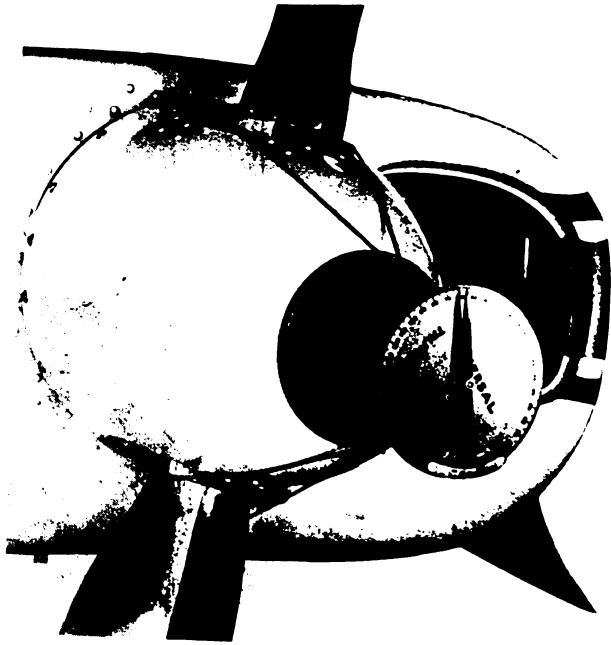


Figure 10. Universal Timing Indicator.

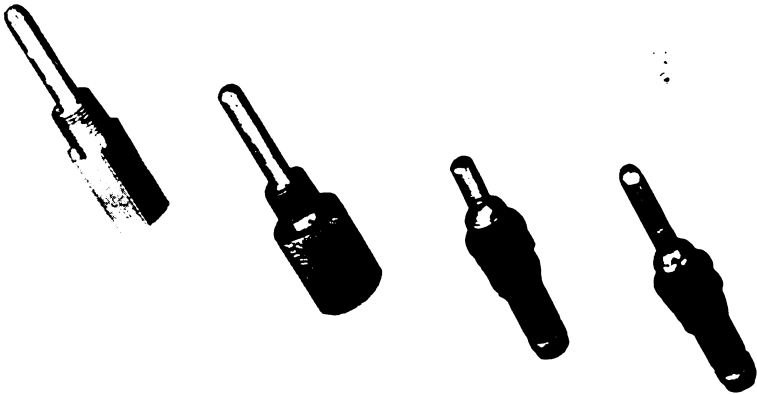


Figure 11. Top Dead Center Locator.

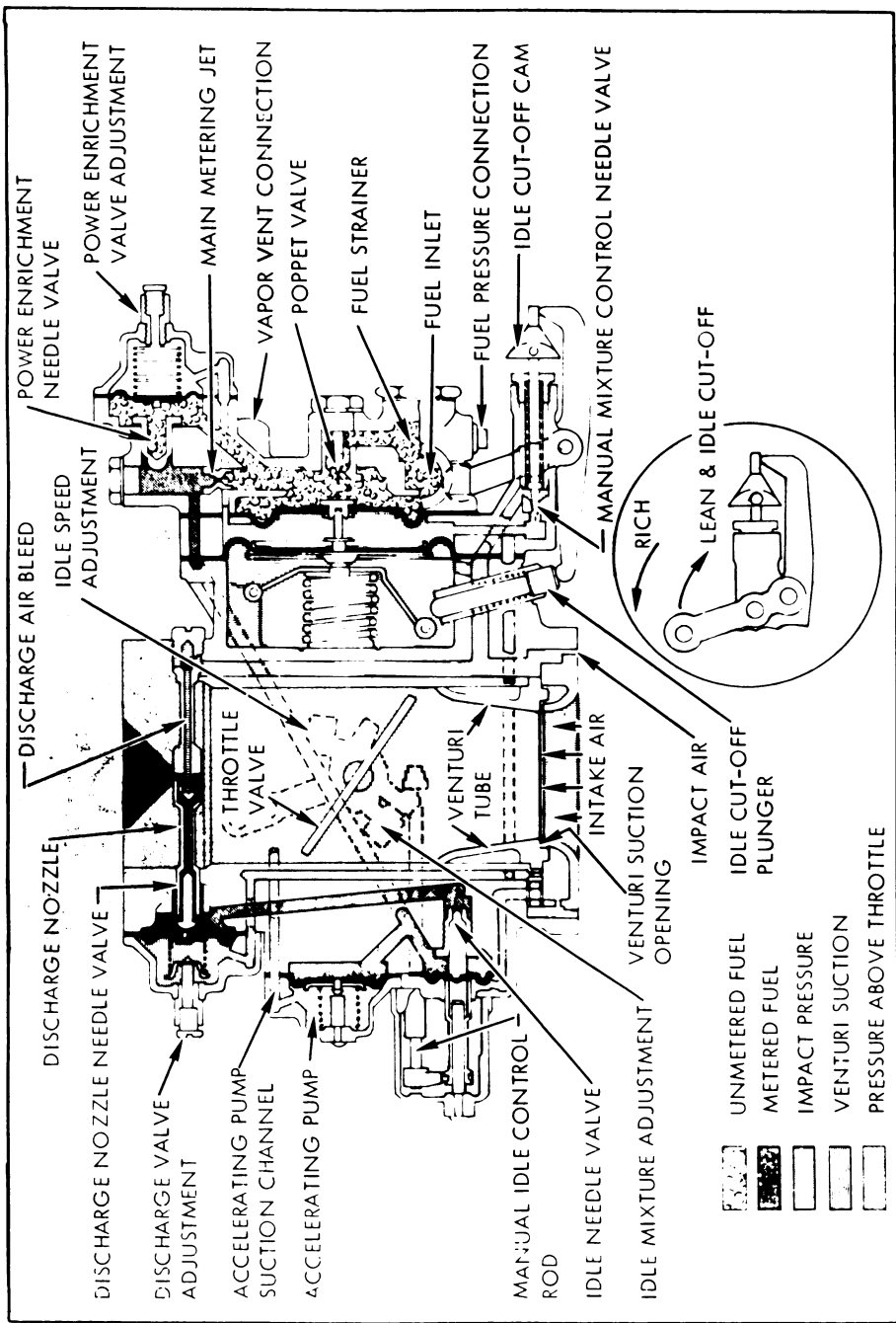


Figure 12 SCHEMATIC DIAGRAM OF THE MODEL PS-5C CARBURETOR

## CARBURETOR

All models, except E165-2, -3 and E185-2, -5, are equipped with Stromberg PS type carburetors, which offer many improvements over previous carburetors. Stromberg PS type carburetors have a fuel feed system that is closed and under pressure from fuel pump to discharge nozzle, instead of a vented float chamber or suction pick-up from a discharge nozzle placed within a venturi tube, as in previous types of carburetors.

PS type carburetors have non-icing characteristics, freedom from gravity effects in dives, climbs and banks. They are regularly equipped with a vacuum operated, single diaphragm accelerating pump, and a combination manual mixture control and idle cut-off.

During engine inspections the following carburetor inspections should also be made:

The daily inspection should include the removal, inspection and cleaning of the fuel strainer.

the 100-hour inspection should include the following carburetor inspections:

- a. Check all fuel connections for leaks.
- b. Check security and safetying of carburetor to engine.
- c. Check security and safetying of air scoop to carburetor.
- d. Remove drain plug from rear of carburetor and drain completely. Replace plug and safety.
- e. Remove and clean fuel strainer.
- f. Inspect throttle for freedom of movement and excessive backlash.
- g. Check carburetor for leakage.

### CAUTION

Do not use compressed air to clean drain opening or any other opening on an assembled carburetor.

Do not alter the setting of the metered fuel pressure adjustment except where carburetor is being adjusted on a flow bench.

Do not change any carburetor adjustments until unsatisfactory engine operation has been definitely traced to the carburetor.

## TROUBLES AND REMEDIES

### 1. IDLE IS TOO RICH

- a. Check for correct idle adjustment.
- b. Remove accelerating pump cover and check for leaking accelerating pump diaphragm.
- c. Check for leaking discharge nozzle by observing if fuel drains into air scoop when engine is stopped.

### 2. IDLE IS TOO LEAN

- a. Check for low fuel pressure.
- b. Check for correct idle mixture adjustment.
- c. Check for air leaks in manifold or intake pipes.

### 3. ENGINE DOES NOT STOP IN "IDLE CUT-OFF" POSITION

- a. Check for leakage through primer.
- b. See if linkage permits full travel into "IDLE CUT-OFF" position.

#### NOTE

If it is difficult to keep engine running after it has been started, remove the fill vent plug located near the top of the diagonal channel in the regulator cover, above and to the right of the fuel pressure gage connections. Operate the wobble pump until the fuel stands level with the plug opening. This will eliminate air which may be trapped in the line between the tank and carburetor. Replace the plug.