

PILOTS' NOTES

Bristol

CENTAURUS XVIII ENGINES

IN

SEA FURY MK. X AIRCRAFT

**These Notes are complementary to information given in
official publications.**

*Issue No. 1.
March, 1947.*

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FLYING CONDITIONS

	FOR	R.P.M.	BOOST p.s.i.	GEAR RATIO (See 'Running Notes')	ENGINE COOLING SHUTTERS	CYLINDER TEMP.	OIL TEMP.		
1	TAKE-OFF AND INITIAL CLIMB (5-min. limit)	2,700	+9½	'M'	Fully open	Not more than 230°C. at start	Over 15°C. (5°C. Min. in emergency)		
2	MAXIMUM CLIMBING	2,400	+4	Change to 'S' when boost fallen to approx. +1½ p.s.i.	ADJUST to keep cylinder temperatures within limits quoted.	300°C. Maximum. 310°C. Emergency (5-min. limit).	90°C.		
3	MAX. CONTINUOUS WEAK CRUISE	2,250	+2½	'M' unless boost fallen below approx. +¾ p.s.i.				If 'S' gear engaged, warning light will show when aircraft below 6,000 ft. (±1,000 ft.).	80°C.
4	MAX. CONTINUOUS RICH CRUISE	2,400	+4	'M' unless boost fallen below approx. +1½ p.s.i.				80°C.	
5	ALL OUT (5-min. limit)	2,700	+9½	'M' unless boost fallen below approx. +4¾ p.s.i.				100°C.	
6	DIVE	3,120 (5-sec. limit)	+9½	Preferably 'M'				—	
MAXIMUM TEMPERATURES FOR GROUND CHECKS								Should not exceed 280°C	100°C.

AIR INTAKE. For take-off set CARB. WARM AIR INTAKE lever to OFF. CLEAN AIR should be selected during all flight in dust-laden atmosphere ; otherwise select RAM AIR. CARB. WARM AIR INTAKE lever should be moved ON during cruising or gliding in damp atmosphere, clouds, rain or snow.

KEY TO FLYING CONDITIONS.

Unless otherwise stated, data apply to both 'M' and 'S' supercharger gear ratio.

- 1 Boost and r.p.m. quoted should be used only for shortest period consistent with safe take-off. Propeller override lever should be set at ~~MAXIMUM~~
AUTO. If full power not required use ~~+6½ p.s.i. boost.~~
- 2 Throttle should not be opened beyond position giving 2,400 r.p.m. Increasing airspeed by reducing rate of climb will improve cooling.
- 3 With override lever at AUTO, throttle should not be opened beyond position giving 2,250 r.p.m. ; otherwise engine will operate in rich mixture. For better control during formation flying, set override lever to give an r.p.m. not exceeding 2,400 and vary boost alone by means of throttle.
- 4 Throttle should not be opened beyond position giving 2,400 r.p.m.
- 5 To avoid running engine at max. r.p.m. in weak mixture keep throttle fully open, even if altitude causes boost to drop. Propeller override lever should be set at ~~MAXIMUM~~
AUTO.
- 6 During dive, throttle should be at least one-third open.

OIL PRESSURES Ground setting : 110 p.s.i. at 70°C. and 2,400 r.p.m.
 Normal in flight : 100 p.s.i. at over 1,400 r.p.m. at normal oil temp.
 Minimum : 80 p.s.i. at over 1,400 r.p.m.
 Oil pressure reading is subject to tolerance of ± 5 p.s.i. to compensate for inaccuracies of gauge and slight variations in pressure. Pressures will be higher when oil is cold.

FUEL Use only 100/130 grade. Speci. D.E.D.2475 (American Speci. AN-F-28).
 Pressures :—

Normal : 30 p.s.i. at 2,400 r.p.m.

Emergency Minimum : 25 p.s.i.

STARTING.

1. Ensure FUEL CUT-OFF lever at CUT-OFF.
2. Turn main fuel cock ON. Move DROP TANKS lever ON ; if drop tanks not filled, ensure lever OFF.
3. Turn battery master-switch to FLIGHT, or GROUND if external batteries are in use.
4. Press button for 30 sec. to prime carburettor.
5. SET PROPELLER OVERRIDE lever at MAXIMUM.
6. Ensure supercharger control set to 'M' gear.
7. Ensure CARB. WARM AIR INTAKE lever OFF.
8. Set engine-cooling shutters fully open, but if temp. below 0°C. wait until engine has run for a few min.
9. With ignition OFF, have propeller hand turned two complete revs. If free rotation impeded, stop turning and suspect hydraulic locking.
10. Set throttles $\frac{1}{2}$ in. to 1 in. open.
11. With low pressure priming system press doping button for 10 secs. in normal temp. ; in very cold conditions longer will be required. If possible, high volatility fuel should be used below 0°C.
12. Move FUEL CUT-OFF lever to NORMAL.
13. Pull toggle to load cartridge starter.
14. Switch ON magnetos.
15. Press starter button and keep depressed until engine running smoothly ; if cartridge fails to fire wait at least one minute before engaging fresh cartridge. When engine fires, continue doping as necessary.

16. Have ground starter-battery disconnected and turn master switch to FLIGHT.

NOTE.—If difficulty experienced in priming carb. or doping engine, ensure CUT-OFF lever firmly at CUT-OFF ; also check circuit breaker depressed.

WARMING UP AND GROUND RUNNING.

In cold damp conditions CARB. WARM AIR INTAKE lever should be moved ON during warming up.

If oil pressure does not rise immediately after starting, shut down. If satisfactory, run for about one minute at ~~lowest steady speed~~ ^{1,200 r.p.m.}. While warming up, test each magneto in turn (at ~~1,000~~ ^{1,200} r.p.m.) as a precaution before increasing power further. If engine newly installed, momentarily switch off both magnetos together in order to check their earth wires are properly connected ; for this check engine speed must on no account exceed 1,200 r.p.m.

Before take-off, and when engine has reached normal operating temperatures, perform checks as follows :—

1. With override lever at MAXIMUM, set throttle to give Zero p.s.i. boost. Ensure all cylinders are operating correctly by verifying that r.p.m. within 50 of figure normally recorded on particular engine-propeller combination at these control settings.

NOTE.—This check is sufficient in the British Isles but in localities of different atmospheric pressure, it is suggested that for approx. every 20 millibars decrease in atmospheric pressure an increase of 1% in r.p.m. may be expected, and vice versa.

2. Change to 'S' gear, noting flicker of boost-gauge needle; then return to 'M' gear. ~~Observe momentary drop in oil pressure at each change.~~ See also 'Supercharger Checking.'
3. Switch off each magneto in turn. If there is

4. Check and exercise propeller by moving lever to automatic position and returning it fully forward. Ensure response to movements satisfactory and original r.p.m. restored.

and r.p.m.; then throttle back to 70% power boost. Now switch off each magneto in turn; faulty ignition is indicated by rough running or if drop in r.p.m. exceeds 50. Perform check quickly, but pause for 5 sec. between operation of switches.

Watch cylinder temp. carefully at all times and if rising unduly, run engine at 800/900 r.p.m. until cooled down.

SUPERCHARGER CHECKING AND EXERCISING.

If considered necessary, comprehensive check to ensure proper engagement of 'S' gear clutches should be performed as follows: before changing back to 'M' gear, move override to AUTO, then open throttle to $+6\frac{1}{2}$ p.s.i. boost and check this pressure maintained without fluctuation. Throttle back to Zero p.s.i. boost before changing back to 'M' gear.

When changing from 'M' to 'S' or from 'S' to 'M' gear on the ground, it is essential that boost be reduced to Zero p.s.i. or below. When changing in flight Zero boost and 2,400 r.p.m. should not be exceeded. If flight exceeds 3 hours' duration,

exercise gears about every 2 hours to clear sludge from clutches.

LANDING AND SHUTTING DOWN.

Before approaching to land, or before shutting down exercise supercharger by running for about 30 sec. in 'S' gear, changing at boost and r.p.m. not exceeding Zero and 2,400. Before landing, propeller override lever should normally be set at AUTO, ~~but when max. retarding effect necessary, set lever at MAXIMUM.~~ Before lowering undercarriage ensure supercharger in 'M' gear. After landing and before taxiing, open engine cooling shutters fully. After last flight of day or night, perform r.p.m. and ignition checks with engine at normal operating temp. (see checks before take-off, Nos. 1 and 2): To avoid overheating ignition leads, allow engine to cool off before stopping by running at 800/900 r.p.m. for approx. 2 mins. Shut down head to wind whenever practicable and leave engine cooling shutters fully open for at least 10 min. after switching off. To stop engine, close throttle, move FUEL CUT-OFF lever to CUT-OFF and when engine has stopped, close main fuel cock and switch OFF ignition.

OIL DILUTION (when required).

1. Shut down as above, then top-up oil tanks.
2. Restart when oil-inlet temp. fallen to 20/40°C.
3. Run engine at 800 r.p.m. for 4 min. with dilution button depressed.
4. Close throttle. Move FUEL CUT-OFF lever to CUT-OFF.
5. When engine has stopped, release dilution button, switch OFF ignition and close main fuel cock.

NEVER

- . . . exceed 230 C. cylinder temperature when taxiing, or begin take-off when temperature above this figure.
- . . . run engine on ground at maximum boost except to perform specific checks, which must be of shortest duration to prevent burning of ignition leads.
- . . . leave CARB. WARM AIR INTAKE lever in a midway position.
- . . . ground test with cockpit hood open.
- . . . run up to climbing boost or more without anchoring tail.

ALWAYS

- . . . allow engine to cool by running at 800/900 r.p.m. after periods of high-power running on ground.
- . . . report excessive periods of running at maximum conditions.
- . . . endeavour to have aircraft head-to-wind during ground running, and shutting down.
- . . . set engine cooling shutters fully open after landing, for taxiing, during all ground-running and after shutting down.