INSTRUCTIONS FOR O.S. TYPE 20C AUTOMATIC CARBURETOR

This carburettor, as fitted to the new O.S. MAX-32SX-H helicopter engine, incorporates an automatic mixture control device which ensures that the engine receives a correctly balanced mixture of fuel and air at all throttle settings. It ensures steady revolutions and a smooth response for reliable helicopter ascent and descent.

Two adjustable controls are provided on this carburettor.

• The Needle Valve:
  When set to produce maximum power at full throttle, this establishes the basic fuel/air mixture strength. This is then maintained by the carburettor’s automatic mixture control system to cover the engine’s requirements at reduced throttle settings.

• The Mixture Control Valve (Mixture Control Screw):
  For adjusting the mixture strength at part-throttle and idling speeds, to obtain steady idling and smooth acceleration to medium speeds. The Mixture Control Valve has been factory set for the approximate best result. First, run the engine as received, and re-adjust the Mixture Control Valve only when necessary.

A PROVISIONAL SETTING

- Open the Needle Valve 1-1/2 turns from the fully closed position.

- Be sure to use a muffler-pressurized fuel feed.

Note: This carburettor is not fitted with a throttle stop screw. Instead, idling speed is adjusted by means of the throttle trim lever on the transmitter. This enables the full r.p.m. range, from idling to full power, to be controlled by the throttle stick, and then allows the engine to be stopped, from the transmitter, by closing the throttle completely with the trim lever. Set up the throttle linkage as follows:

With the transmitter throttle trim lever fully retarded, adjust the throttle servo linkage so that the throttle rotor is (a) fully open when the transmitter throttle stick is fully advanced and (b) fully closed (i.e. engine stopped) when the stick is fully retarded.

The idling speed is then set by advancing the throttle trim lever to the point where the engine runs, steadily and reliably, at the desired idling speed.

REALIGNMENT OF MIXTURE CONTROL VALVE

In the course of making carburettor adjustments, it is just possible that the Mixture Control Valve may be inadvertently screwed in or out too far and thereby moved beyond its effective adjustment range. Its basic setting can be re-established as follows:

The basic (factory) setting is as shown in the main sketch, i.e. with the shoulder portion ‘A’ exactly at a tangent to the throttle rotor hole.

To return the Mixture Control Valve to its original position, first screw in the Mixture Control Valve, while looking into the rotor hole. Then gradually unscrew the Mixture Control Valve until ‘A’ is precisely tangential to the rotor hole (i.e. so that ‘A’ and ‘B’ are superimposed) as in the main sketch.

ADJUSTMENT

The following adjustments are approximately correct when using a fuel containing 25% lubricant and 10—30% nitromethane.

Bear in mind that fuels containing relatively large percentages of power-boosting nitromethane operate at richer mixture settings than are needed for mild fuels and will, therefore, require the Needle Valve to be readjusted accordingly. The type and percentage of lubricant used is also a factor here, as noted later in these instructions.

B As a safety measure, first check the transmitter controls, including the throttle stick and trim lever positions, and hold the main rotor securely before starting the engine.

C Warm the engine by allowing it to idle for about 30 seconds. If the engine stops, advance the throttle trim lever slightly to increase the idling rpm. Then open the throttle sufficiently to ‘float’ the model above the ground.
If, at this time, the engine is slow to pick up and produces an excess of exhaust smoke, the mixture is too rich. Correct this condition by turning the Mixture Control Screw clockwise. If the mixture is extremely rich, engine rpm will become unstable: opening the throttle will produce a great deal of smoke and rpm may drop suddenly or the engine may stop. This condition may also be initiated by an excessively prolonged warming-up period.

If, on the other hand, the mixture is too lean, this will be indicated by a marked lack of exhaust smoke and a tendency for the engine to cut out when the throttle is opened. In this case, turn the Mixture Control Screw counter-clockwise to enrich the mixture.

If satisfactory hovering flight has been achieved, land the model again and re-check the engine’s idling qualities. After about 10 seconds of idling, open the throttle to ‘float’ the model. If the transition is smooth, the idle mixture is O.K. If the symptoms of either rich or lean running are observed, readjust the Mixture Control Screw accordingly.

Now adjust the Needle Valve to achieve the best performance when the model is flying at full throttle. If, at full throttle, acceleration is poor, the exhaust unduly smoky and the model fails to reach expected straight line speed, the mixture is too rich and the Needle Valve setting will need to be reduced.

If, however, after smoothly accelerating to satisfactory high-speed straight and level flight, power is lost when the model is pulled up into a climb, the mixture is too lean. In this case, land the model immediately and re-adjust Needle Valve to a richer setting.

Now re-check hovering performance and, if necessary, fine-tune the mixture for hovering flight.

For helicopters, good throttle response at medium revolutions (e.g. hovering speeds) is most important, since this is a power range widely used in helicopter flight. The optimum fuel/air mixture at medium speeds is dependent on obtaining balanced adjustment of both the Needle Valve and the Mixture Control Valve. If both controls are already at their optimum setting, some modification to these settings may be necessary to achieve satisfactory mid-range throttle response, but such readjustments should only be made within the range where idling reliability and high-speed performance are not unduly compromised.

Adjustments should therefore be carried out as follows:

If the mid-range throttle response is not rapid and positive (indicating a rich mid-range mixture), turn the Needle Valve 2 or 3 clicks clockwise, or turn the Mixture Control Screw 10—20 degrees clockwise.

If, on the other hand, the response to mid-range throttle movement is too sensitive (indicating a lean mid-range mixture), turn the Needle Valve 2 or 3 clicks counter-clockwise or turn the Mixture Control Screw 10—20 degrees counter-clockwise.

Throttle response at hovering speeds is also affected by the relationship of the main rotor pitch angle to throttle opening. If the optimum mid-range throttle response cannot be obtained by the carburettor adjustments described above, try adjusting the helicopter’s pitch control characteristics.
### SUBSEQUENT READJUSTMENTS

Once the engine has been run-in (see engine instructions) and the carburettor controls properly set up, it should be unnecessary to alter the mixture settings, except to make minor adjustments to the Needle Valve occasionally, to take account of variations in climatic conditions. The use of a different fuel, however, particularly one containing more, or less, nitromethane and/or a different type or proportion of lubricating oil, is likely to call for some readjustment of the Needle Valve.

Remember that, as a safety measure, it is advisable to increase the Needle Valve opening by an extra half-turn counter-clockwise, prior to establishing a new setting. The same applies if the silencer type is changed. A different silencer may alter the exhaust pressure applied to the fuel feed and call for a revised Needle Valve setting.

The use of a different glowplug, or changes to the main rotor and its pitch angles may also require compensating carburettor readjustments.

### CARBURETTOR CLEANLINESS

The correct functioning of the carburettor depends on its small fuel orifices remaining clear. The minute particles of foreign matter that are present in any fuel can easily partially obstruct these orifices and upset mixture strength so that engine performance becomes erratic and unreliable. It is recommended that fuel is passed through a filter when the tank is filled and that a good in-line filter is installed between the fuel tank and carburettor and, furthermore, that this filter is frequently cleaned to remove dirt and lint that accumulates on the filter screen. Finally, occasionally remove the needle-valve holder from the carburettor as shown in Photo 2 and extract any remaining foreign matter that may have lodged in the location shown in Photo 3.
**INSTALLATION**

After fitting the engine in the helicopter, please observe the following recommendations when linking the throttle servo to the carburettor.

**CORRECT** - Throttle lever movement should be disposed symmetrically, as shown.

1. **Locate the servo** so that its output arm and the throttle pushrod are, as closely as possible, directly in line with the carburettor’s throttle arm, as shown.

2. **When the throttle is fully open or fully closed,** the throttle lever angle should not be more than 45° either side of the mid-point of its travel (and where it is at a 90° angle to the pushrod), otherwise throttle rotor movement may become inhibited or may even lock up.

Also, some lubricants may affect the throttle rotor movement.

Please note that the throttle lever angles of the O.S. Type 20C carburettor are well within these limits, requiring only 75° from the fully open to fully closed positions.

**INCORRECT** - One-way throttle lever movement should not be more than 45°.

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**PARTS LIST**

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※ The specifications are subject to alteration for improvement without notice.