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WARNING – ATTENTION

Responsibility rule - *The engines must not be modified. All the modifications will make the engine unstable in tuning and weaker in operation. Novarossi World s.r.l. will not be responsible for any modification on its engines.*

BEFORE USING THIS ENGINE PLEASE READ CAREFULLY THIS INSTRUCTION HANDBOOK.

SAFETY RULES – This product is not a toy but a competition engine. It can be dangerous and it can cause damages if these safety rules are not followed and the instructions specified in this workbook are not followed. In particular:

- This engine cannot be used under 14 years of age;
- The engine must not be started before having fixed it on the model with 4 screws as explained on the model's manufacturer hand book;
- Do not manipulate or modify the engine in order to avoid dangerous situations. Use it only with suitable pipes. Novarossi World S.r.l. will not guarantee the safety level of operating certified by the CE mark if any modification/manipulation is made on the engine itself.
- Only high quality radio controls and components must be used in order to assure a perfect and sure control of the model. In particular the propeller must be of very high quality to minimize risk of breakage and unpredictable damages.
- The engine must be used only for model purposes.

For a complete list of safety rules see point "safety instructions".

0. INTRODUCTION.

Novarossi World S.r.l. engines are the result of extensive technological research in materials, of high precision CNC and of 55 years of experience in the model field. These instructions have been prepared to:

- obtain the best performances from the engines guaranteeing them longer life;
- prevent mistaken maintenance before, during and after the use from generating damages to the engine;
- guarantee a high safety use level of the engine.

1) WARRANTY AND RESPONSIBILITY.

The warranty covers eventual manufacturing defects (material) but does not cover damages due to wrong or non correct use which does not correspond to the specifications required at the order of the item. See indications given and limitations specified at point 9 of this workbook. **Any attempt to manipulate or any particular modification will cause the end of the warranty.**

2) IDENTIFICATION OF THE ENGINE:

DESCRIPTION AND TECHNICAL DATA.

In the engine box you will find these following documents:

- Identification sheet of the product, it includes batch number of the engine. This number is fundamental to track back the production date of the engine and must always be transmitted in case of service's request;
- Exploded design of the engine and its carburettor: It includes an exploded design of all spare parts which are part of the engine and carburettor and their referring part numbers or eventual optional parts.
- Factory carburettors settings

Novarossi World reserves the right to modify products without notice.

3) CONNECTIONS–IGNITION STARTING AND STOP.

3.1 CONNECTIONS.

Must be made properly following the instructions given by the model manufacturer.

- 1st Connect the manifold and the pipe to the tank;
- 2nd connect the fuel tube to the carburettor;
- 3rd connect the uniball of the carburettor to the servo control;
- 4th connect the crankshaft to the model clutch and/or propeller.

3.2 IGNITION AND STARTING.

- 1st Connect the glowplug to the 1.2-Max 1,5 Volt igniter;
- 2nd Throttle by radio-control after you have opened the carburettor to a quarter of its total travel;
- 3rd Make the engine flywheel run in counter clock-wise direction according to the model. On Direct drive and Outboard engines the rotation is clock-wise

Car version – Put the model on the starter box where an electric motor through a rubber wheel transmits the starting movement to the engine.

Plane version – The model must be put on a safety stand and started through an electric motor on which terminal part there is a rubber spinner.

Marine version – The ignition and starting system could be different: it could be like car or plane version,

Helicopter version – See attached sheet (User Manual)

Attention – Please be careful to all moving parts.

3.3 STOP.

Stop the engine by closing the needle valve through the remote radio control or use a rag to cover the exhaust tip. Be careful! The exhaust is extremely hot so be sure you are using a thick rag. Be aware that the rag is not covering the air filter, otherwise dirt could be pushed inside the motor.

Attention – Never stop the fly wheel with your hand

4) RUNNING-IN.

Novarossi World S.r.l. suggests to run in properly the engine in order to settle all its mechanical parts.

The carburettor is set at the factory and it only needs adjustments to control the base and full speed needle to get the best tuning.

- a) Car – Fix the engine on the car and run it in at low rpm for at least 30 minutes;
- b) Plane – Fix the engine on the plane (or test bench after fitting a propeller to the crankshaft) and run it at low rpm for at least 30 minutes.
- c) Helicopter – See attached sheet (User Manual)

Attention – It is necessary to pay attention to all moving parts.

- d) Boat – Fix the engine to the boat and run it in water at low rpm for at least 30 minutes.

The first time you run the engine, let it run for about 30 minutes at 15.000-20.000 rpm. The longer is the running in period, the better the engine will adjust itself and will perform during competitions.

5) WHICH TYPE OF FUEL MUST BE USED.

You must use high quality fuel because good fuel grants good performances and long life to the engine. In our opinion the best lubricant is castor oil (sale code 1N1) which prevents overheating and assists the lubrication of all moving parts such as bearings, crank pins, pistons and sleeves. Small quantities of synthetic oils are allowed (sale code 1T2).

Fuel composition for running:

14% de gummed castor oil (first pressure acidity lower than 0.5) or 7% castor oil +7% synthetic oil + 80% pure methanol + 6% nitro.

Note= For Plane: 10% nitro + 10% castor oil + 10% synthetic oil + 70% pure methanol

- Be aware that the compression ratio could vary accordingly to the engine's operation level, to weather temperature and pressure.

Please follow these steps to optimize your engine in case of temperature fluctuations:

- In a case of a temperature increase, add 0.05 / 0.1 mm head shim.
- In case of a temperature reduction remove 0,05/0,1mm head shim.

Remember to compress your engine removing 0,05/0,1 mm head shims when the altitude increases compared to your normal operating level.

Fuel composition after the running:

1/8 ON ROAD / RALLY-GT:

SHIM UNDERHEAD STANDARD: See enclosed exploded view
25% nitro + 6% castor oil + 4% synthetic oil + 65% pure methanol

1/10 TOURING: See enclosed exploded view

16% nitro + 6% castor oil + 4% synthetic oil + 74% pure methanol

1/8 OFF ROAD: See enclosed exploded view

25% nitro / 3% castor oil / 7% synthetic oil / 65% pure methanol
33% nitro / 3% castor oil / 7% synthetic oil / 57% pure methanol

MARINE: See enclosed exploded view

25-30% nitro / 6% castor oil / 4% synthetic oil / 60-65% pure methanol

PLANE: See enclosed exploded view

10% nitro / 10% castor oil / 10% synthetic oil / 70% pure methanol

HELICOPTER: See sheet attached (User Manual)

6) BEST RUNNING-IN CONDITIONS FOR THE ENGINE.

It is very important to wisely control the acceleration of the engine in order to make the pipe resonating as quietly as possible avoiding useless skidding to the model; very often engines break during warm up due to sharp accelerations and to the driver's frenzy. Sharp acceleration causes the skidding of the balls of the ball bearing into their sliding guides and consequently wear. **NOTE** – Novarossi World S.r.l. has been cooperating with the best companies specialized in micro ball bearings, obtaining the best quality.

7) MAINTENANCE/CLEANING/CONSERVATION OF THE ENGINE.

7.1 MAINTENANCE OF THE ENGINE AFTER USE.

Before the engine is stored after use, we recommend the following procedure:

1st Ensure that no fuel remains inside the engine: disconnect the fuel feed line (using a clip or a tape) and wait until it burns out completely. This is very important in order to prevent oxidation and rusting inside the engine, if fuel is left inside the engine for any length of time, it will create an acid solution containing alcohol, water and nitro which will heavily ruin the engine. The con-rods for instance, will turn a lead color, crankshaft and bearings will be darker in the affected areas.

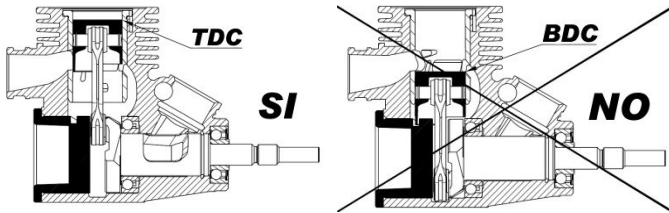
Attention—Please be careful to all moving parts.

2nd Outside cleaning of the engine.

For this you can use petrol mixed with 5-10% lubrication oil and a small brush to remove dirt. **Attention – You must proceed when the engine is stopped and cold to avoid contact with moving parts or dangerous high temperatures.**

3rd Inside cleaning of the engine. The same mixture can be used to clean the inside of the engine but before doing this remember to remove air filter, glow-plug and backplate.

Place the piston in the top dead center (TDC) before removing the backplate. If you do not follow this advice you could break the piston against the backplate's groove.



Do not clean the silicone tuned crankshaft with solvent or gasoline.

Attention – You must proceed when the engine is stopped and cold to avoid contact with moving parts or dangerous high temperatures.

We recommend to use the following anti-dust covers (cod. 29064 2,1cc/2,5cc – cod. 29065 3,5cc/4,66cc) on your crankcase, carburettor and fuel intake. A very important procedure to make the engine properly run is air filter cleaning which should be done as following:

1st take out the air filter;

2nd wash it with petrol mixed with 10% oil;

3rd blow from inside to outside to eject all the collected dirt;

4th cover it with Novarossi oil (sale code 30021);

5th fix again the air filter on the carburettor, ensuring that the retention band is firmly fixed.

A correct maintenance of the air filter avoids dust sucking in the engine which is very dangerous for the engine itself.

7.2 PROTECTION OF THE ENGINE.

Dust – Sand.

Dust and sand can cause engine wear. Most of all on piston (which wears), ball bearing, crankshaft (which scratches on the aspiration area), on the crankpin (which can become smaller of 0.10mm on the Ø). With the pin in these conditions you risk to break the con-rod. In order to avoid this kind of problem you should carefully and correctly maintain the air filter.

Rust –Oxidation.

Rust and oxidation can be avoided using good quality fuel. Alcohol can contain a high percentage of water or it can absorb it from the atmosphere being it hygroscopic.

The engine can rust even if nitro is not first quality as well. If you note oxidation in your engine, we strongly suggest to stop using your present nitro and run the engine using only a mixture of alcohol and oil. A good fuel is composed of alcohol without water, good nitro and de-gummed castor oil of first pressure (acidic lower than 0.5%). Parts mostly exposed to oxidation and rust due to bad fuel are:

ball bearing, shaft and con-rod. **Attention – Do not drink fuel or its components and do not inhale vapors.**

Overheating.

Overheating can be avoided not using a too lean mixture (low fuel/air ratio). Overheating the engine can cause an increase of temperature on the engine and the crankpin could turn blue. This means that it reached 200° Celsius. With the crankpin also the con-rod overheats over 180° Celsius, losing its mechanical characteristic.

In this case we suggest to replace them. Generally when the piston has been exposed to overheating it will seize near the exhaust and the sleeve will no longer be usable. Overheating can also lead to failure of the piston and the combustion chamber.

Overdrive.

Many of the causes of overdrive are due to failures of the gear, clutch or radio control. In this case the rear cover should always be removed to check for any damage on the crankpin, which could get excessive play, if this happened you must replace these parts.

8) SAFETY INSTRUCTIONS.

Many indications referring the right and safe use of the engine have been supplied in this workbook. In this chapter we resume and complete them with other ones pointing out that the user is the only responsible for a safe conduct towards himself, third parties, animals and locations. **Being the engine part of a complex model which can be potentially dangerous, it must be started up after having checked the model responses to the most important safety requirements. This check must be made by the manufacturer of the model and assured by the presence of the logo on the product.**

8.1 Everybody who can be damaged by the model (above all children) must be kept away from the operator and from the model. Spectators must always respect safety distances.

8.2 The engine must be carefully fixed on the model. Be aware that the engine during its operations could generate high temperatures on itself and on the model where it is installed. The noise is reduced thanks to a silenced pipe. You cannot start the engine without this pipe.

8.3 The pipe, size of the propellers and blades, must be suitable to the engine and to the model and must be of high quality. Ask to the manufacturer of the models for detailed information and for installation ways.

8.4 When you start the engine you must keep your face, body and hands away from moving parts (propellers, gears, wheels,...). Do not touch the engine: there could be very high temperatures.

8.5 All adjustments must be made using instruments (screw drivers) of correct dimensions.

8.6 You must use a radio control and components of high quality, this allows a perfect control of the engine (acceleration and stop).

8.7 Pay attention to electric lines.

8.8 Use safety glasses and gloves anytime you are working in presence of propellers.

8.9 Propeller can cut, but could be dangerous for many other reasons such as:

- on sandy soil: propeller can blow sand in eyes;

- ties, pens and other hanging objects could be attracted by the propeller.

Even when the engine is stopped, for the helicopter, the blades continue to move some time. Be careful.

8.10 Keep fuel in a suitable and sure place.

8.11 Follow with care the safety rules given by different federations, basing on category and use of model.

8.12 Ask always to the shop for any requirements, information and/or to signal any anomalies.

9) CONCLUSION – WARRANTY RESTRICTIONS

Novarossi World S.r.l. will always try to use the best materials available to maintain the high quality and reliability of products. We reserve the right to make changes without notice.

No warranty is given for damaged ball bearings, con-rods and couplings installed on the engine.

In fact ball bearing can be ruined by rust and oxidation, caused by the use of bad quality alcohol.

Con-rods break for sudden leanings by bad lubrication for incorrect working of gearbox due to over drive happened also in a previous moment and, above all, for the use of improper fuel. The same damaging causes to the con-rod may cause an irreparable failure of the sleeve due to the high temperature reached.

Novarossi World does not guarantee the wear of the pin of the shaft caused by dust which comes into the engine. To avoid this trouble we suggest to you use air filters (sale code 30001 off road / sale code 30002 on road).

In any case we cannot replace under guarantee any engines or spare parts which after examination present manipulation of one of the defaults above listed.