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1. GENERAL INFORMATION

1.1 READING AND UNDERSTANDING THE MANUAL

Some paragraphs in the manual containing information of particular importance for safety and operation are highlighted at various levels of emphasis, and signify the following:

or

NOTE

IMPORTANT

These give details or further information on what has already been said, and aim to prevent damage either to the engine or other damages.

WARNING!

others.

Non-observance will result in the risk of injury to oneself or

DANGER! Non-observance will result in the risk of serious iniurv or death to oneself or others.

NOTE All indications. "front", "rear", "right" and "left", are to be taken as referring to the engine positioned with the spark plug facing forwards with respect to the observer.



2. GENERAL SAFETY STANDARDS

(to be strictly applied)

A) TRAINING

1) Carefully read the instructions contained in this manual and the instructions of the machine on which this engine is installed. Learn how to stop the engine quickly.

2) Never allow people unfamiliar with these instructions to use the engine.

3) Never use the engine while people, especially children, or pets are nearby.

4) Remember that the operator or user is res-

The number before the paragraph title refers to the text references and their related figures (shown inside front and back covers).

1.2 SAFETY SYMBOLS

Your engine should be used with due care and attention. Symbols have therefore been placed on the engine to remind you of the main precautions to be taken. Their full meaning is explained later on.

You are also asked to carefully read the safety regulations in the applicable chapter of this handbook.



Warning! - Read and follow Operating Instructions before running engine.



Warning! - Gasoline is flammable. Allow engine to cool at least 2 minutes before refuelling.



Warning! - Engines emit carbon monoxide. DO NOT run in enclosed area.

ponsible for accidents or hazards occurring to other people or their property.

B) PREPARATION

1) Do not wear loose-fitting clothing, dangling drawstrings, jewels or items that could become caught; tie up long hair and keep at safe distance while starting the lawnmower.

2) Switch off the engine and let it cool down before removing the fuel tank cap.

3) WARNING: DANGER! Ethanol is highly inflammable.

- store the fuel in suitable containers:
- add fuel, using a funnel, only outdoors; do not smoke during this operation and each

time fuel is handled;

- add fuel before starting the engine. Never remove the fuel tank cap or add fuel while the engine is running or when the engine is hot;
- if you have spilt some fuel, do not attempt to start the engine but move the machine away from the area of spillage and avoid creating any source of ignition until the fuel has evaporated and fuel vapours have dissipated.
- always put the fuel tank and container caps back on and tighten well.

4) Replace faulty silencers and the guard, if damaged.

C) OPERATION

1) Do not operate the engine in a confined space where dangerous carbon monoxide fumes can collect.

2) Do not use starting fluids or similar products.

3) Do not change the engine governor settings or overspeed the engine.

4) Do not tilt the machine onto its side to the point where fuel leaks from the fuel tank cap.
5) Do not touch the cylinder fins and/or the silencer guard until the engine has cooled down.

6) Stop the engine and disconnect the spark plug cable before checking, cleaning or servicing the machine or the engine.

7) Do not crank the engine with spark plug removed.

8) Transport the machine with an empty fuel tank.

D) MAINTENANCE AND STORAGE

1) A routine maintenance is essential for safety and for keeping a high performance level.

2) Do not store the machine with fuel in the tank in an area where the fuel vapors could reach an open flame, a spark or a strong heat source.

3) Allow the engine to cool before storing in any enclosure.

4) To reduce fire hazards, keep the engine, exhaust silencer and fuel storage area free of grass, leaves, or excessive grease.

5) If the fuel tank has to be emptied, this should be done outdoors once the engine has cooled down.

6)On safety ground, never use the engine with either worn or damaged parts. Parts are to be replaced and not repaired. Use genuine spare parts. Parts that are not of the same quality can damage the engine and impair your safety.

3. COMPONENTS AND CONTROLS

3.1 ENGINE COMPONENTS

- 1. Oil fillercap with dipstick
- 2. Oil drain plug
- 3. Air cleaner cover
- 4. Spark plug cap
- 5. Engine code



Note your engine serial number here

3.2 ACCELERATOR CONTROL

The throttle trigger (generally a lever), fitted to the machine, is connected to the engine by a cable.

Consult the machine's Instructions Manual to identify the throttle trigger and its positions, usually marked by symbols, corresponding to:

- **CHOKE** = to be used for starting from cold.
- FAST = corresponds to maximum revs; to be used when working.
- SLOW = corresponds to minimum revs.

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4. WHAT YOU NEED TO KNOW

The engine performance, reliability and life are influenced by many factors, some external and some strictly associated with the quality of the products used and with the scheduled maintenance.

The following information allow a better understanding and use of your engine.

4.1 ENVIRONMENTAL CONDITIONS

The operation of a four-stroke endothermic engine is affected by:

a) Temperature:

- Working in low temperatures could lead to a difficult cold starting.
- When operating at very high temperatures, a warm start could prove difficult due to evaporation of fuel in the float chamber of the carburettor or in the pump.
- In any case, the right kind of oil must be used, according to the operating temperatures.

b) Altitude:

- The higher the altitude (above sea level), the lower the max power developed by an endothermic engine.
- When there is a considerable increase in altitude, the load on the machine should be reduced and particularly heavy work avoided.

4.2 FUEL

A good quality fuel is the major issue for the engine reliability of operation.

- a) Use unleaded gasoline, with a minimum of 90 octane.
- b) Use clean, fresh fuel; purchase fuel in quantity that can be used within 30 days, to prevent gum from forming inside the container or the tank.
- c) Do not use fuel which contains Methanol.
- d) Do not add neither oil nor any kind of fuel additive.

4.3 OIL

Use always high quality oils, choosing their viscosity grade according to the operating temperature.

- a) Only use SF-SG quality classified detergent oil.
- **b)** Choose the SAE viscosity grade of oil from this chart:
 - from 5 to 35 °C = SAE 30 – from -15 to + 35 °C = 10W-30

(Multi-viscosity)

- c) The use of multi-viscosity oils in hot temperatures will result in higher than normal oil consumption; therefore, check oil level more frequently.
- d) Do not mix oils of different brands and features.
- SAE 30 oil, if used below +5°C, could result in possible engine damage due to inadequate lubrication.
- f) Oil should be at «MAX» mark (see 5.1.1): do not overfill. Overfilling with oil may cause:
 - Smoking;
 - Spark plug or air filter fouling, which will cause hard starting.

4.4 AIR FILTER

The air filter must always be in perfect working order, to prevent debris and dust from getting sucked into the engine, reducing the efficiency and life of the machine.

- a) Always keep the filtering element free of debris and in perfect working order (see 6.5).
- b) If necessary, replace the filtering element with an original spare part. Incompatible filtering elements can impair the efficiency and life of the engine.
- c) Never start the engine without mounting the filtering element properly.

4.5 SPARK PLUG

Not all the spark plugs for endothermic engines are the same!

- a) Use only spark plugs of the recommended type, with the right heat range.
- b) Check the length of the thread, because if too long – it will damage the engine beyond repair.
- c) Make sure that the electrodes are clean and their gap is correct (see 6.6).

5. STANDARDS OF USE

5.1 BEFORE EVERY USE

Before every use, perform the following checking procedures in order to assure a regular operation.

5.1.1 Check oil level

See the specific chapter (8.1) for the oil to be used.

- a) Place engine level.
- b) Clean around oil fill.
- c) Unscrew the cap (1), clean the end of the dipstick (2) and replace it, resting the cap on the filler, as seen in the illustration, without tightening it.
- d) Remove the cap with the dipstick and check the oil level that must be between the «MIN» and «MAX» marks.
- e) If oil is required, add oil of the same kind up to the «MAX» mark, being careful not to spill any outside the oil fill.
- f) Fully tighten the fillercap (1) and wipe off any spilled oil.

5.1.2 Check air cleaner

The efficiency of the air filter is fundamental for the engine to work properly. Do not start the engine if the filtering element is missing or broken.

- a) Clean around the filter cover (1).
- b) Remove the cover (1) by unscrewing the two knobs (2 - TRE0701 - TRE0801), or by pressing the tabs (2a - TRE0702).
- c) Check the condition of the filtering element (3). It must be intact, clean and in perfect working order; if not, either carry out maintenance or replace it (see 6.5).
- d) Put the cover (1) back.

5.1.3 Refuelling

IMPORTANT Do not drip fuel onto the plastic parts of the motor or the machine to prevent damaging them and remove all traces of spilt fuel immediately. The warranty does not cover damage to plastic parts caused by fuel.

The fuel characteristics are given in the specific paragraph (see 4.2 and 8.1).

Refuelling must be made when the engine is cold, following the instructions contained in the machine's Instructions Manual.

5.1.4 Spark plug cap

Firmly connect the cable cap (1) to the spark plug (2), making sure that there are no traces of dirt inside the cap and on the spark plug terminal.

5.2 STARTING THE ENGINE (cold)

The engine must be started in the way described in the machine's Instruction Manual, always making sure that any device (if present) that could cause the machine to advance or the engine to stop is disengaged.

- a) Move the throttle to «CHOKE».
- b) Turn the starter key as described in the machine's instruction manual.

After a few seconds, slowly move the throttle from «CHOKE» to either «FAST» or «SLOW».

5.3 STARTING THE ENGINE (hot starting)

•) Follow the whole cold-starting procedure with throttle control in «FAST» position.

5.4 USE OF THE ENGINE IN OPERATION

Maximum revs must be used to optimise the engine's yield and performance, by setting the throttle trigger to «FAST».

WARNING: Keep your hands away from the silencer and surrounding areas that can become extremely hot. With the engine running, do not get loose-fitting clothing (ties, scarves, etc.) or hair closer to the top part of the engine.

IMPORTANT Do not operate on over 20° inclines to prevent malfunctioning of the engine.

5.5 STOPPING THE ENGINE DURING MOWING

- a) Move the throttle to «SLOW».
- Allow the engine to run at minimum speed for at least 15-20 seconds.
- c) Stop the engine following the instructions contained in the machine's Instructions Manual.

5.6 STOPPING THE ENGINE AFTER MOWING

- a) Move the throttle to «SLOW».
- b) Allow the engine to run at minimum speed for at least 15-20 seconds.
- c) Stop the engine following the instructions contained in the machine's Instructions Manual.
- d) When the engine is cold, disconnect the spark plug (1) and remove the starter key (if present).
- e) Remove any debris from the engine and especially around the exhaust silencer to reduce the risk of fire.

5.7 CLEANING AND STORAGE

- a) Do not spray with water or use hydraulic lances to clean the exterior of the engine.
- **b)** Use a compressed air gun (max. 6 bars) for preference, thus preventing debris and dust from penetrating inside.
- c) Store the lawnmower (and the engine) in a dry place, sheltered from severe weather conditions and sufficiently ventilated.

5.8 LONG STORAGE (over 30 days)

In case the engine has to be stored for a long time (for example at the end of the season), a few precautions are needed to help the future start-up.

- a) To prevent the formation of deposits inside the tank, empty it of fuel by unscrewing the carburettor float chamber plug (1) and collecting all the fuel in a suitable container. At the end of the operation remember to screw the plug (1) back on and fully tighten it.
- b) Remove the spark plug and pour about 3 cl of clean engine oil into the spark plug hole, then, having blocked the hole with a rag, run the starter motor briefly to turn the engine for a few revs and distribute the oil over the inner surface of the cylinder. Finally replace the spark plug without connecting the cable cap.

6. MAINTENANCE

6.1 SAFETY RECOMMENDATIONS

WARNING! Remove the spark plug cap and read instructions before carrying out any cleaning, repair or maintenance operation. Wear proper clothing and working gloves whenever your hands are at risk. Do not perform maintenance or repair operations without the necessary tools and technical knowledge.

IMPORTANT Never get rid of used oil, fuel or other pollutants in unauthorised places.

6.2 MAINTENANCE SCHEDULE

Follow the hourly or calendar – whichever occur first – maintenance schedule shown in the following table.

Operation	After First 5 hours	Every 5 hours or daily	Every 50 hours or every season	Every 100 hours
Check oil level (see 5.1.1)		~	-	-
Change oil ¹⁾ (see 6.3)		-	~	-
Clean silencer and engine (see 6.4)		~	-	-
Air filter cleaning ²⁾ and check (see 6.5)		~	-	-
Air filter replacement (see 6.5)		-	~	-
Check spark plug (see 6.6)		-	~	-
Replace spark plug (see 6.6)		-	-	~
Fuel filter check ³⁾	-	-	-	~

- ¹⁾ Change oil every 25 hours if the engine is operating under heavy load or in ht weather.
- ²⁾ Clean air cleaner more frequently if the machine is operating in dusty areas.
- ³ To be carried out by a specialized Centre.

6.3 CHANGE OIL

See the specific chapter (8.1) for the oil to be used.

WARNING: Drain oil while the engine is warm, being careful not to touch the hot engine nor the drained oil.

Unless otherwise stated in this machine Instruction Manual, to drain the oil it is necessary to:

- a) Place the machine on a flat surface.
- b) Clean the area around the filler cap and unscrew the cap with dipstick (1).
- c) Provide a suitable container for collecting the oil and unscrew the drain plug (2).
- d) Refit the drain plug (2) and fully tighten it having made sure that the gasket is in the right position.
- e) Fill up with fresh oil (see 5.1.1).
- f) Check that the oil level has reached the «MAX» notch on the dipstick (3).
- g) Close the cap (1) again and clean up any traces of oil that was possibly spilt.

IMPORTANT The engine holds a maximum of 1.2 litres of oil. Topup gradually adding small amounts of oil at a time; check that the oil level never exceeds the «MAX» notch on the dipstick.

6.4 CLEAN SILENCER AND ENGINE

Silencer must be cleaned when the engine is cold.

- a) Use a jet of compressed air to remove any debris and dirt that could cause a fire from the silencer and its protective cover.
- b) Make sure that the cooling air intakes (1) are not blocked.
- c) Clean the plastic components with a sponge (2) soaked in water and detergent.

6.5 AIR FILTER MAINTENANCE

- a) Clean the area around the filter cover (1).
- b) Remove the cover (1) by unscrewing the two knobs (2 - TRE0701 - TRE0801), or by pressing the tabs (2a - TRE0702).

- c) Remove the filtering element (3a + 3b).
- d) Remove the pre-filter (3b) from the cartridge (3a).
- e) Tap the cartridge (3a) on a solid surface and blow it from the inside with compressed air to remove dust and debris.
- f) Wash the sponge pre-filter (3b) with water and detergent and leave it to dry in the air.

IMPORTANT Do not use water, petrol. detergents or any other products to clean the cartridge.

IMPORTANT The sponge pre-filter (3b) must NEVER be oiled.

- g) Clean the inside of the filter housing (4) from dust and debris, making sure to block the inlet duct with a rag (5) to prevent them from entering the engine.
- h) Remove the rag (5), install the filtering element (3b + 3a) in its housing and refit the cover (1).

6.6 SPARK PLUG SERVICE

- a) Remove the spark plug (1) using a spark plug socket wrench (2).
- b) Clean the electrodes (3) with a metal brush and remove any carbonaceous build-up.
- c) Using a thickness gauge (4), check for the right gap (0.6 - 0.8 mm) between the electrodes.
- d) Install the spark plug (1) and tighten with a socket wrench (2).

Replace the spark plug if the electrodes are burnt or if the porcelain is broken or damaged.

WARNING!

Fire hazard! Do not check the ignition system with spark plug removed.

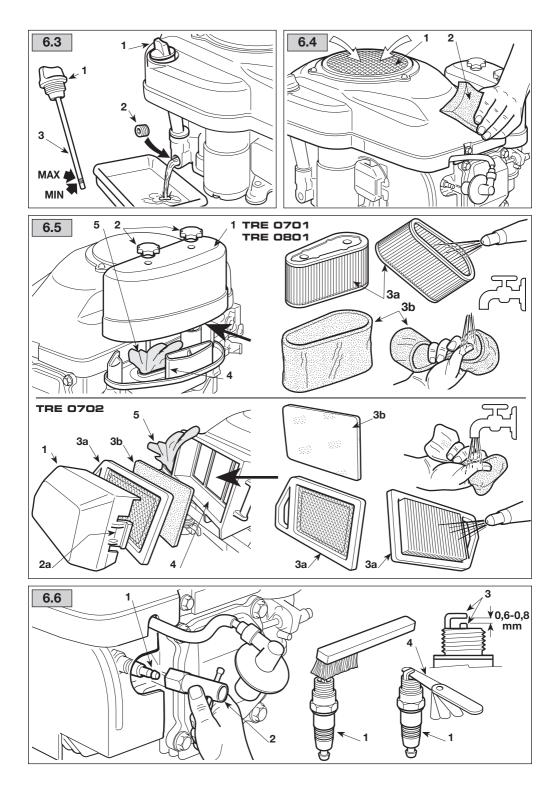
IMPORTANT Use only spark plugs of the recommended type (see 8.1).

7. TROUBLESHOOTING					
PROBLEM	LIKELY CAUSE	SOLUTION			
a) Hard starting	- No fuel	- Check and top up (see 5.1.3)			
	- Old fuel or deposits in the fuel tank	- Empty the fuel tank and add fresh fuel			
	 Incorrect starting procedure 	 Perform the starting procedure correctly (see 5.2) 			
	- Spark plug disconnected	 Check that the spark plug cap fits well over the plug terminals (see 5.1.4) 			
	 The spark plug is wet or the spark plug electrodes are dirty or placed inadequately 	- Check (see 6.6)			
	 Air filter clogged 	- Check and clean (see 6.5)			
	 Incorrect oil for the season 	- Replace with proper oil (see 6.3)			
	 Fuel evaporation in the carburetor (vapor lock) due to high temperatures 	 Wait for a few minutes then start agair (see 5.3) 			
	- Fault in carburation	- Contact a Licensed Service Centre			
	- Hard starting	- Contact a Licensed Service Centre			
b) Inconsistent	 Dirty electrodes or incorrect gap 	- Check (see 6.6)			
working	 The spark plug cap is inserted incorrectly 	 Check that the cap is fitted correctly (see 5.1.4) 			
	 Air filter clogged 	- Check and clean (see 6.5)			
	- Throttle trigger in «CHOKE» position	- Move the lever to the «FAST» position			
	- Fault in carburation	- Contact a Licensed Service Centre			
	- Fault in ignition	- Contact a Licensed Service Centre			
c) Loss of power	– Air filter clogged	- Check and clean (see 6.5)			
whilst operating	- Fault in carburation	- Contact a Licensed Service Centre			

8. TECHNICAL SPECIFICATIONS

8.1 REFILLING AND OPERATION MATERIALS

Fuel	Unleaded gasoline, minimum 90 octane
Engine oil: from 5 to 35 °C	SAE 30
from -15 to +35 °C	
Oil capacity	1.2 liter
Spark plug QC12	2YC / RC12YC (Champion) or equivalent
Oil capacity Spark plugQC12 Spark plug gap	0.6 - 0.8 mm



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