



McGill

1/4 Scale Tractor Team



μ trac MR19

Owner's Manual





Using this Manual

- Read and understand this manual before the assembly and operation of the machine.
- Be familiar with all the driving parts and know how to stop the unit quickly.
- Go through the safety checklist before each operation.

If situations occur that are not covered by this manual, act with care and good judgment. Call professional assistance if needed.



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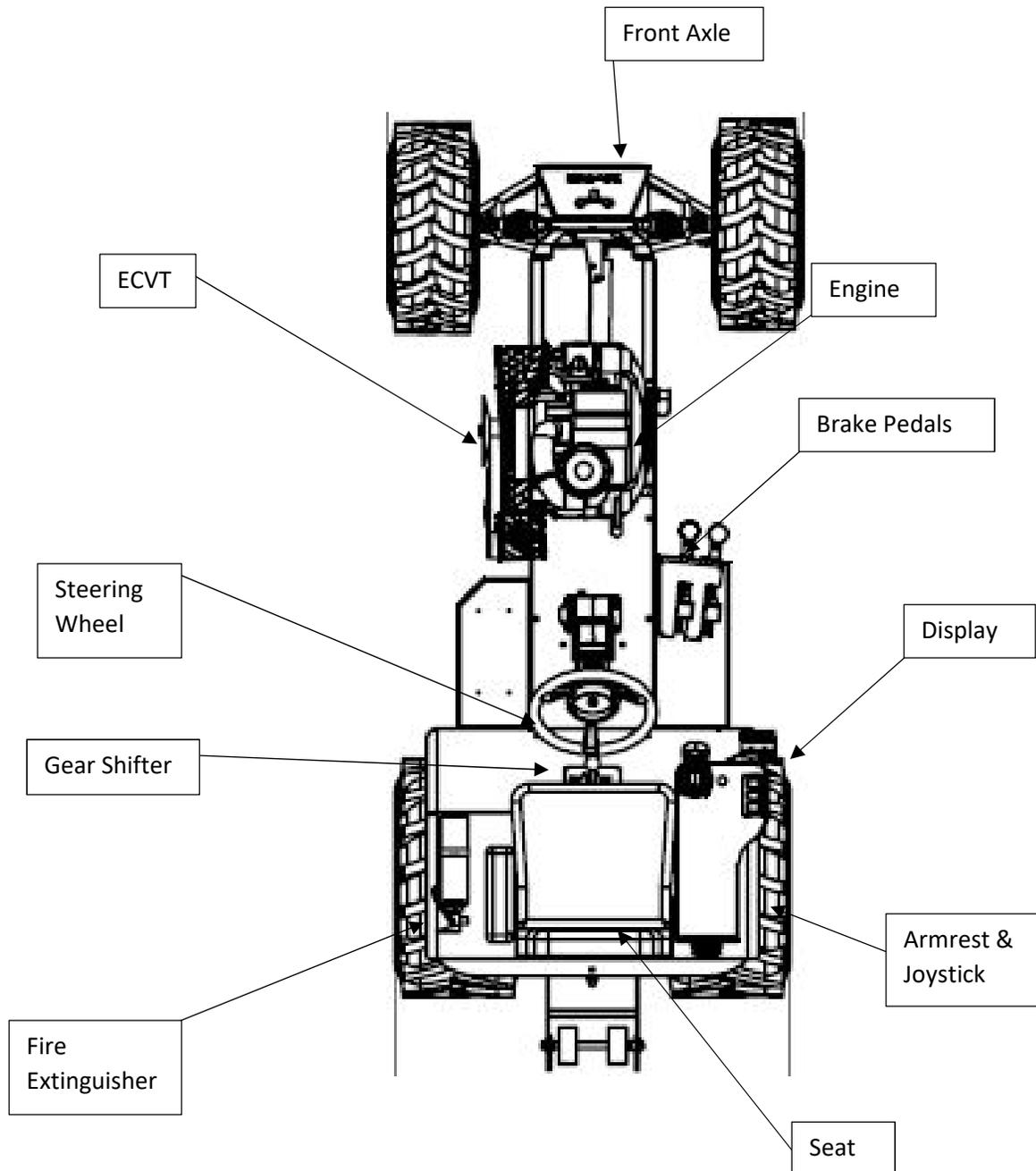
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Overview of the Vehicle





Safety Equipment and Practices

Seat Adjustment

The MR19's driver seat can be slid forward and backward using the lever located under the seat on the left-hand side. It is strongly recommended for the driver to adjust the seat in a comfortable and safe position before driving the tractor.

Safety Decals

To make sure that every MR19 driver is aware of all warnings and danger zones on and around the tractor, multiple warning labels complying with ASABE/ISO 3767-1⁽²⁾ are positioned at strategic locations. These labels advertise the following (Figure 25):

- Hot surfaces
- Moving parts
- Missing shields
- Battery warning
- When to read owner's manual





Knowing your MR19

Fuel Cap

To remove the filler cap, turn it counterclockwise. To replace the filler cap, turn it clockwise until it is snugly held in the tank.

Warning

Fuel sprays can happen where there is pressure in the fuel tank and the fuel cap is removed too quickly. When removing the fuel cap, loosen the cap slightly and wait for any hissing to stop and then remove it.

Vapor from the fuel could be ignited by sparks or flames, causing serious burns and injuries. Before refueling, stop the engine. Always keep sparks and flames away from the filler neck.

Adjusting the Steering Wheel

To change the tilt of the steering column, pull on the red lever located at the top of the steering column and adjust the angle to your comfort. The steering wheel can also telescope in and out by turning the quick release lever on the left-hand side of the column and pulling the steering column to the desired position. It can be telescoped by 4 inches.

Rigid Display

The MR19 is equipped with a DP-720 rigid display from Danfoss. This display is equipped with a touch screen as well as buttons to navigate between pages. It will display the diagnostics of the tractor while in use.



Protecting your MR19

Pre-Operation Safe Use Checklist

- Clothing: Full coverage
 - Long sleeves and pants or full-body suit
 - Full-closed shoes
- Helmet: Approved DOT and/or CSA tested helmets
- Eye protection: If helmet does not have visor use goggles or safety glasses
- Visual inspection must include, but is not limited to:
 - Making sure all components look in proper condition
 - Making sure that there are not any obstructing objects in the wheels/axles/exhaust
 - Check for proper levels of gasoline and oil, as well as secure tightening of the caps
- Check that the belt is not visually worn out at any place
- Check proper working of the kill switch

Operations Safe Use Guidelines

- Be aware of the location of the fire extinguisher and driving controls
- Remain seated while driving the MR19
- Always drive at a safe and prudent speed
 - Slow down before turning and avoid erratic operation
 - Operator must never drive at any speed at which there are difficulties in maneuvering, stopping, or possible danger to observers or other personnel
 - Do not operate under the influence of alcohol or drugs
- Never carry passengers
- Turn off the engine beforehand if getting off the machine
- Avoid contact with spinning parts and hot components
 - Shields and safety devices should not be removed during operation of the MR19
- MR19 is not provided with any type of lights, use only during day or fully lit areas
- Never use indoors or in poorly ventilated areas



Fuel Requirements

The fuel should meet the following requirements:

- Only use clean and fresh unleaded gasoline, this will reduce exhaust emissions and keep spark plug fouling to a minimum.
- A minimum of 87 octane/87 AKI (91RON).
- Gasoline with up to 10% ethanol or up to 15%MTBE (methyl tertiary butyl ether) is acceptable

Note

To protect the fuel system from gum formation, mix a fuel stabilizer into the fuel.

Caution

Do not use unapproved gasoline, such as E85. Do not mix oil in gasoline or modify the engine to run on alternate fuels. This will damage the engine components and void the engine warranty.

Never use leaded fuel. This could result in a malfunction of the emission control system, causing poor performance.

Engine Exhaust

Warning

Engine exhausts Carbon Monoxide which can be dangerous. CO is colorless, odorless and poisonous. If inhaled, it can cause loss of consciousness and death.

Running the engine inside an enclosed area is dangerous. Too high concentrations of Carbon Monoxide could cause Loss of consciousness or even death.

Fire Hazard

- Use extra caution when handling fuel and oils
- Never put fuel in the tank while the engine is running
- If possible, refuel the tank when the engine is cool
- Always make sure the exhaust exit is unblocked and clean from debris



Special Driving Conditions

When driving on ice or in water, snow, mud, sand or similar hazard be cautious and allow for extra distance for braking. In those situations, it is also recommended to avoid sudden braking and quick steering. Brake with the pedal by using a light up-down motion. Don't hold the pedal down constantly. If you get stuck, shift to 1 or 2 and accelerate slowly.

Money Saving suggestions

Use the following suggestions to help save money on fuel and repairs.

- Avoid long warm-ups
- Once the engine runs smoothly, begin driving
- Avoid fast starts
- Keep the tires properly inflated
- Don't carry unnecessary weight
- Keep the wheels in correct alignment

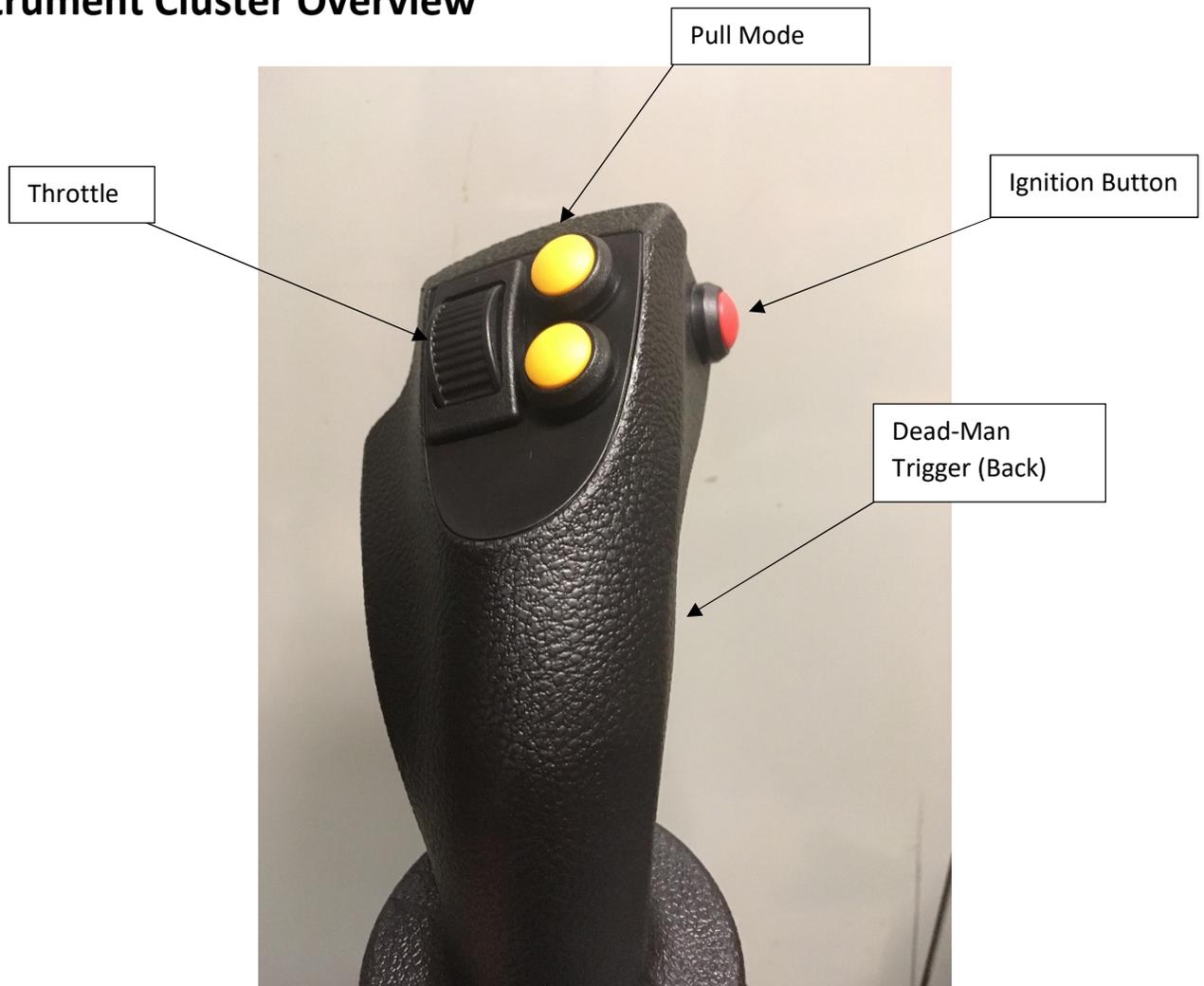
Warning

Turning off the engine to coast down a hill can be dangerous. This could cause the loss of the electrical steering and cause an accident.



Using your MR19

Instrument Cluster Overview





Entering Standby Mode

To start the electrical systems of the MR19, turn the switch on the armrest on. The operator must then be properly seated and the hitch tether switch properly attached. From this mode, it is possible to start the engine.

Starting the engine

Once the system has entered standby mode, it is now possible to start the engine. To do so, the conditions listed below must be met.

- The CVT guard must be in place
- Both brakes pedals must be depressed
- The operator should be seated properly
- Operator present switch must be depressed
- The hitch tether switch must be attached (to the tractor or the load)

Once all of these conditions are met, it is possible to press the ignition button and start the engine.

Caution

If at any time the engine is running, the operator is off the seat for more than 1 second or the hitch is detached, the engine will shut down and the tractor will revert back to prompting for the key.

Changing the throttle

The throttle can be adjusted on the joystick, using the throttle roller. The throttle will increase by rolling the roller forward. Once the desired RPM is achieved the operator must release the throttle roller and the engine will remain at the desired. To decrease the RMP the roller must be rolled towards the user.

Manual Transmission and CVT

The MR19's transmission is operated via a normal 3 gears and reverse manual transmission, selected from the shifter knob below the operator's seat, which is coupled to a CVT transmission at the front of the tractor.

The CVT can be controlled in the automatic mode, where the computer controls it. This mode will optimize the performance of the MR19, and can be turned on by pressing the Auto button, as illustrated here on the top right.

Otherwise, the CVT is controlled by the back and forth axis on the joystick, which controls the CVT ratio. The farther it is pushed forward, the faster the tractor will move.



Automatic Pull Mode

Automatic pull mode can be activated by pressing the automatic pull mode button located on the top right of the rollers. The mode adjusts the engine to provide optimum conditions for pulling.

Caution

Due to the presence of the CVT it is highly recommended not to change gears while the tractor is in movement. This could cause damage to the transmission.

Foot Brakes

The MR19 has two hydraulic brakes. Both are depressible by the right-hand foot and each control an individual rear wheel, on the same side as it is relative to the driver.

Electrically Actuated Steering

Electrically Actuated Steering uses energy from the engine's electrical system.

No maintenance is required for the linear actuator.

Warning

If the engine is off or if the electrical steering system becomes inoperative, it will become impossible to steer. It is then imperative to stop the tractor.

Heads-Up Display (HUD)

The display attached to the armrest presents information about the systems running on the MR19. Navigation between pages is done with the use of buttons and same page adjustments are done using the touch screen.

In Case of Emergency

Overheating

If the temperature gauge indicates overheating, if you experience power loss or if you hear a loud knocking or pinging noise, the engine is probably too hot.

In case this happens, drive to any area where it is safe to stop and set the transaxle in neutral position, and then follow these steps:



1. Check whether steam is escaping from the engine compartment
2. If steam is coming from the engine compartment, don't go near the front of the tractor
3. Stop the engine and let it cool

Emergency Starting

Jump-starting is dangerous if done incorrectly. It is recommended to follow the following procedure carefully:

1. Make sure the booster battery is 12 volts and that its negative terminal is grounded
2. If the booster battery is in another vehicle, don't allow the vehicles to touch. Turn off the engine of the vehicle with the booster battery and all unnecessary electrical loads in both vehicles
3. Connect the jumper cables in the exact sequence as listed below:
4. Connect one end of one cable to the positive terminal (red) on the discharged battery
5. Attach the other end of this cable to the positive terminal (red) on the booster battery
6. Connect one end of the other cable to the negative terminal (black) of the booster battery
7. Connect the other end to the negative terminal (black) of the discharged battery
8. Start the engine of the booster vehicle and run it a few minutes. Then start the engine of the other vehicle
9. When finished, carefully disconnect the cables in the reverse order described in step 3

Note

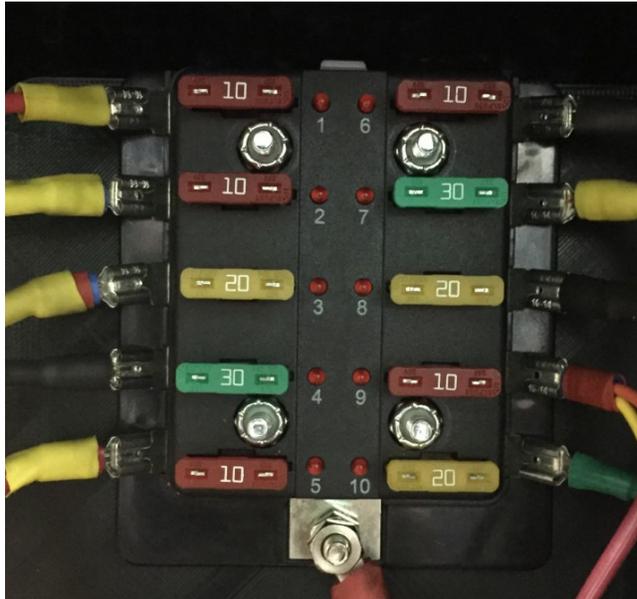
It is not possible to push start the MR19.

Fuses

The MR19 is protected by 4 blade type fuses, which can be easily individually replaced. If any accessories or controls don't work, inspect the appropriate circuit protector. If a fuse has blown the inside element will be melted.



The fuses and their respective uses are shown below (cover removed for visibility purposes):



Block

- | |
|---------------------------|
| 1. TEC PIN POWER |
| 2. LIMIT SWITCHES |
| 3. SASA POWER |
| 4. RELAY POWER IN |
| 5. 12V-5V CONVERT PIN36 |
| 6. DISPLAY/JOYSTICK POWER |
| 7. MOTOR SHIELD POWER |
| 8. REGULATOR |
| 9. CPU POWER |
| 10. CARBURATOR |

To replace the fuses, follow these steps:

1. Turn of the tractor completely
2. Open the fuse panel on the under the hinged seat
3. Pull the fuse straight out
4. Inspect it and replace if it's blown
5. Push in a new fuse of the same rating, and make sure it fits tightly

Caution

Always replace a fuse with one of the same rating. Otherwise you may damage the electric system.

Towing

- Use only with a machine that has a hitch for towing. Attach equipment only using the hitch point located at the front of the tractor
- Follow manufacturer recommendations for weight limits and equipment
- Avoid exceeding weight limit
- Use extra care on slopes; the weight of towed equipment may cause loss of traction
- Drive and stop slowly
- Never shift to neutral and coast downhill



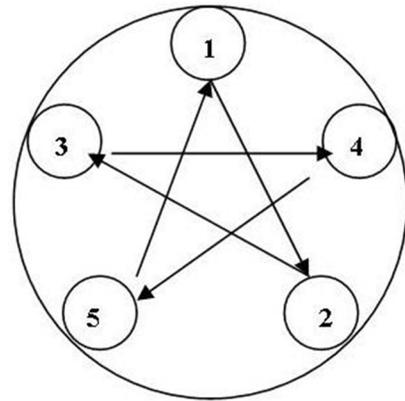
Flat Tire

Front Tires

The front wheels can be easily removed with a long nose plier to be replaced or to be maintained

Rear Tires

1. Use a hydraulic jack and place it under the transmission
2. Pump the hydraulic jack just enough to raise the tractor
3. Stop pumping and make sure the jack has good and safe contact with the tractor, as well as good contact with the ground
4. Keep pumping until the wheel is about 5 inches from the floor
5. Unscrew the nuts with a lug wrench.
6. Replace tire
7. Screw back the nuts in a star order (opposite sides, as seen in the following figure)
8. Drop the tractor slowly to the ground and remove the jack





Appearance Care

Minimizing Paint Damage

Environmental hazards can harm the MR19's paint's protective properties. Here are some tips on how to prevent this:

- It is necessary to wash and wax your vehicle to preserve its finish. This should be undertaken immediately after you suspect that acid rain has settled on your vehicle's finish or after finding watermarks on the tractor's finish
- Bird droppings, insects and tree sap are best removed with a soft sponge and water or a commercially available chemical cleaner
- Keeping a safe distance between you and the vehicle ahead reduces the chances of having your paint chipped by flying gravel

Maintaining the Finish

To help protect the finish from rust and deterioration, wash your MR19 thoroughly and frequently, at least once a month, with lukewarm or cold water. If the tractor is washed improperly, the paint surface could be scratched, here are some examples of how scratching could occur:

- The tractor is washed without first rinsing off dirt and other foreign matter
- The tractor is washed with a rough, dry or dirty cloth
- Cleansers or wax containing abrasives are used

To minimize scratches on the tractor's paint finish:

- Rinse off any dirt or other foreign matter using lukewarm or cold water before washing
- Use plenty of lukewarm or cold water and a soft cloth when washing the vehicle. Do not use a nylon cloth
- Rub gently when washing or drying the tractor
- Don't use abrasive cleansers or wax that contain abrasives



Maintenance

Scheduled Maintenance

<u>First Five Hours</u> Change Oil
<u>Every 8 Hours or Daily</u> Check engine and transmission oil Clean area around muffler and controls
<u>Monthly</u> Check the fire extinguisher for the present pull pin, damage to the hose or valve and proper pressure
<u>Every 100 Hours or Annually</u> Clean air filter* Change engine oil and filter Replace spark plugs Check muffler and spark arrester Check valve clearance**
<u>Every 250 Hours or Annually</u> Change transmission oil
<u>Every 400 Hours or Annually</u> Change air filter Replace fuel filter Clean air cooling system*
<u>Every 600 Hours or Annually</u> Change safety filter (if equipped) Make a thorough check of the fire extinguisher; it may need to be refilled

* In dusty conditions or when airborne debris is present clean more often

** Not required unless engine performance problems are noted



Genuine Engine Parts Recommendation

We recommend using genuine parts from authorized Briggs & Stratton distributors such as the following:

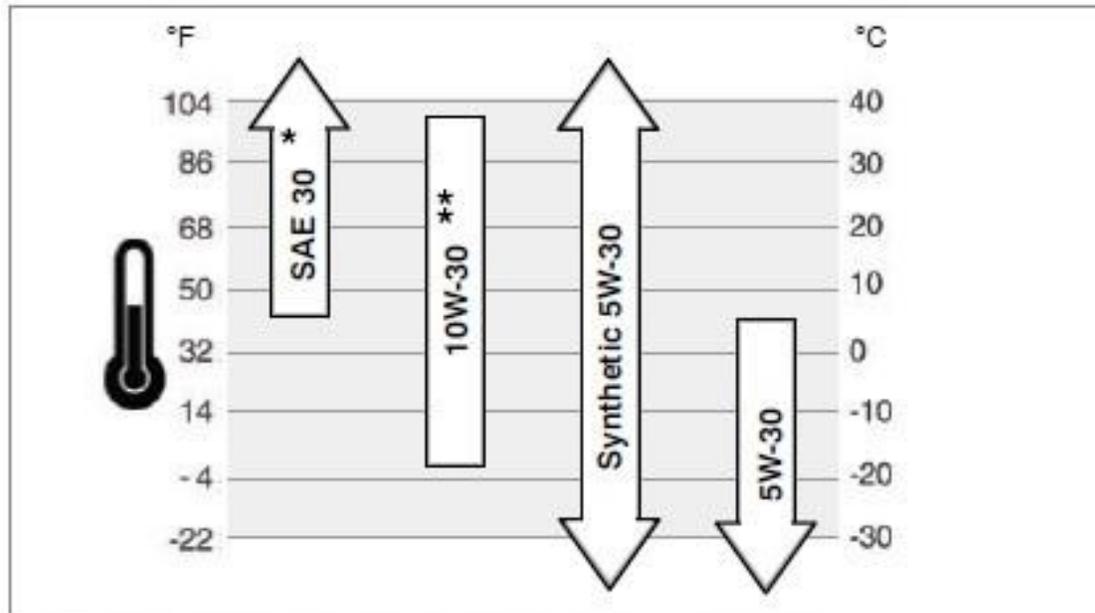
Service Part	Part Number
Air filter (cyclonic):	841497
Safety Filter (cyclonic):	821136
Air filter (low-profile):	692519
Oil- SAE 30:	100028
Oil Filter:	842921
Fuel Filter:	691035
Fuel Additive:	5041, 5058
Resistor Spark Plug:	491055
Long Life Platinum Spark Plug:	5066
Spark Plug Wrench:	19374



Engine Oil

Mutrac engineers recommend the use of Briggs & Stratton Warranty Certified oils for best performance. Other high-quality detergent oils are acceptable if classified for service SF, SG, SH, SJ or higher. Do not use special additives.

Oil type depends on the ambient temperature; choose the right kind of oil with the following chart:

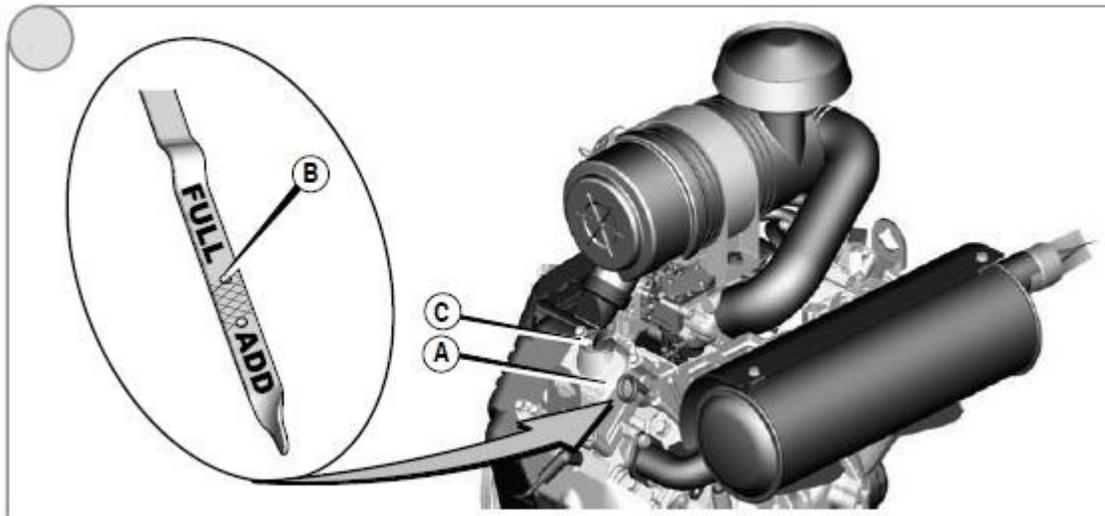


* Below 40°F (4°C) the use of SAE 30 will result in hard starting.

** Above 80°F (27°C) the use of 10W-30 may cause increased oil consumption. Check oil level more frequently.

Caution

Used oil is a hazardous waste product and must be disposed of properly. Do not discard with household waste. Check with your local authorities for directions of the proper disposal.

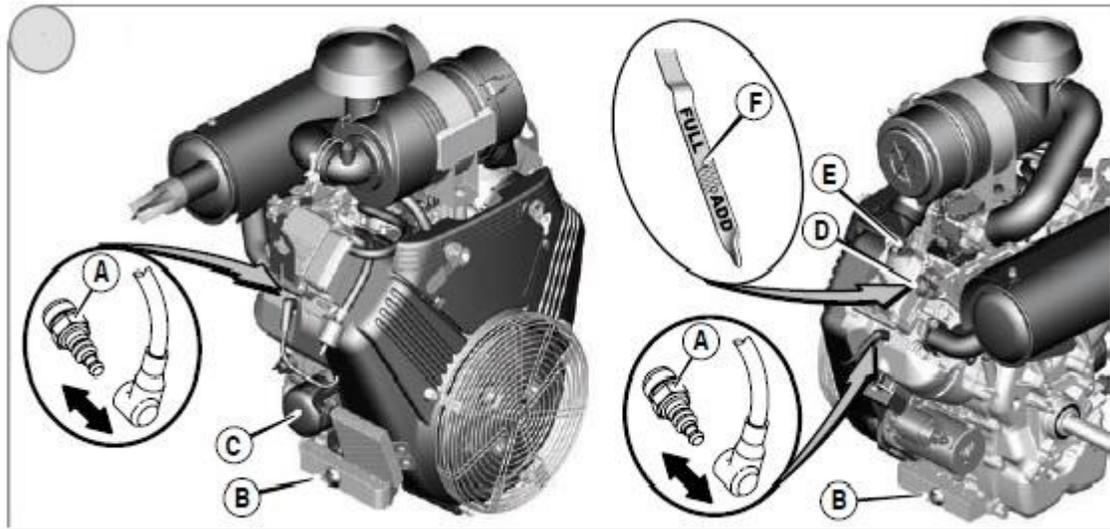


How to check/add oil

1. Remove the dipstick (A) and wipe with a clean cloth
2. Insert and tighten the dipstick
3. Remove the dipstick and check oil level. It should be at the FULL mark (B) on the dipstick
4. If low add oil slowly into the engine oil fill (C). DO NOT OVERFILL.
5. Wait 1 minute and recheck oil level
6. Replace and tighten the dipstick



How to Change the Oil



Oil Removal

1. With engine off but still warm, disconnect the spark plug wire (A), and keep it away from the spark plug
2. Remove oil drain plug (B). Drain the oil into an approved container
3. After the oil has drained, install and tighten the oil drain plug

Change Oil Filter

1. Drain the oil from engine (section above)
2. Remove the oil filter (C) and dispose of properly
3. Before installing the new oil filter, lightly lubricate the oil filter gasket with fresh, clean oil
4. Install the oil filter by hand until the gasket contacts the oil filter adapter, then tighten the filter $\frac{1}{2}$ to $\frac{3}{4}$ turns
5. Add oil (See section below)
6. Start and run the engine. As the Engine warms up, check for oil leaks
7. Stop the engine and check the oil level. It should be at the FULL mark on the dipstick

Addition of Oil

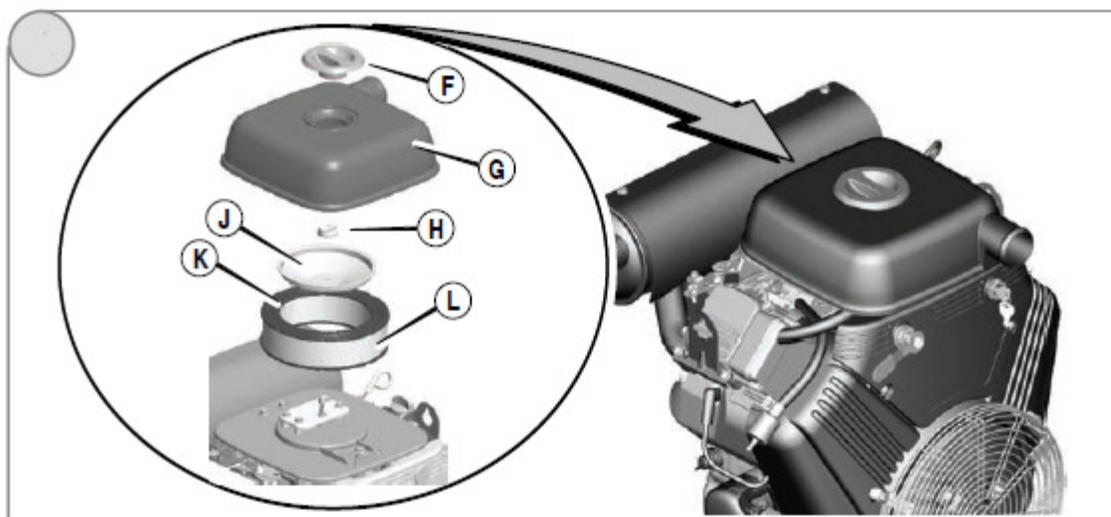
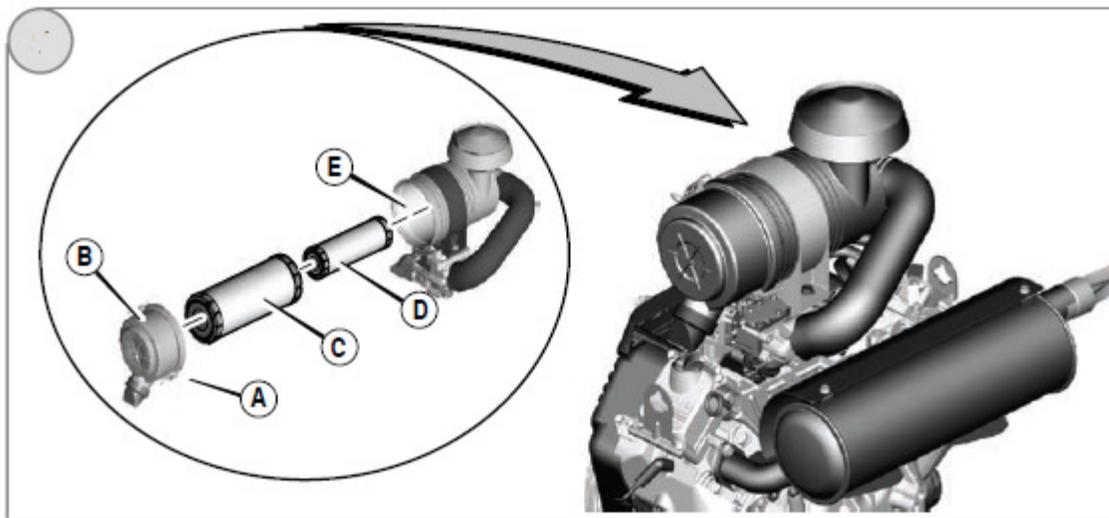
1. Place engine level
2. Clean the oil fill area of any debris
3. Remove the dipstick (D) and wipe with a clean cloth
4. Pour the oil slowly into the engine oil fill (E). Do NOT overfill
5. Install and tighten the dipstick

6. Remove the dipstick and check the oil level. It should be at the FULL mark on the dipstick
7. Install and tighten the dipstick

Air Filter

How to Change Air Filter

Never start or run the engine without the air filter.





Caution

Do not use pressurized air or solvents to clean the filter. Pressurized air can damage the filter and solvents will dissolve the filter.

Cyclonic Air Filter System

1. Open the latches (A) and remove the cover (B)
2. Remove the air filter (C)
3. To loosen debris, gently tap the air filter on a hard surface. If the air filter is excessively dirty, replace with a new air filter
4. The cyclonic air filter system also has a safety filter (D) (if equipped)
5. To remove, carefully pull the safety filter away from air cleaner body (E) and discard. Make sure that dirt or debris does not enter the engine
6. Install the new safety filter in the air cleaner body
7. Install the air filter over the safety filter
8. Install the cover and close the latches

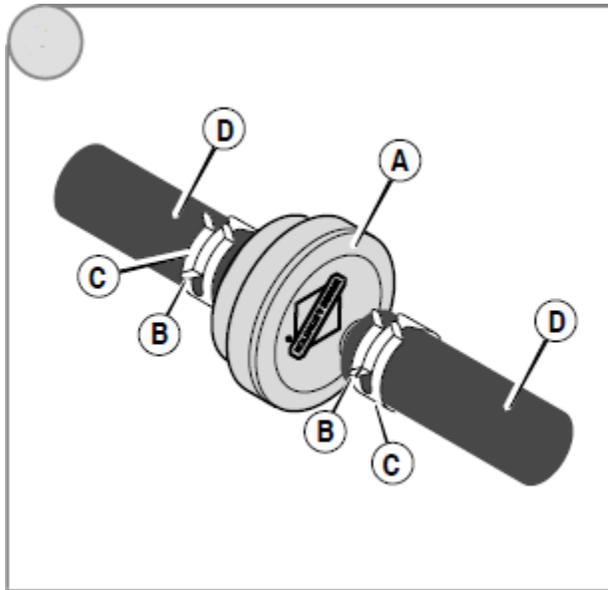
Low Profile Air Filter System

1. Remove the knob (F) and the cover (G)
2. Remove the nut (H) and the retainer (J)
3. Remove the air filter (K)
4. Remove the pre-cleaner (L), if equipped from the air filter
5. To loosen debris, gently tap the air filter on a hard surface
6. If the air filter is excessively dirty, replace with a new air filter
7. Wash the pre-cleaner in liquid detergent and water. Then allow it to thoroughly air dry. Do NOT oil the pre-cleaner.
8. Assemble the dry pre-cleaner to the air filter.
9. Install the air filter and secure with retainer and nut.
10. Install the cover and secure with knob.



Fuel Filter

How to Change the Fuel Filter



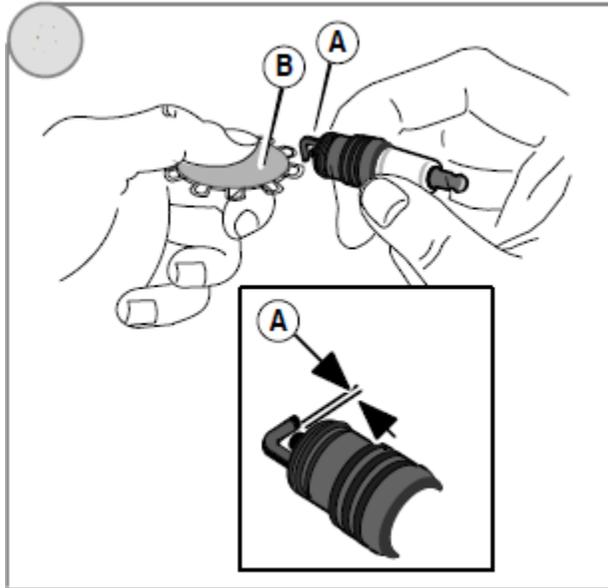
1. Before replacing the fuel filter (A), if equipped, drain the fuel tank or close the fuel shut-off valve. Otherwise, fuel can leak out and cause a fire explosion.
2. Use pliers to squeeze tabs (B) on the clamps (C), then slide the clamps away from the fuel filter. Twist and pull the fuel lines (D) off the fuel filter.
3. Check the fuel line for cracks or leaks. Replace if necessary.
4. Replace the fuel filter with an original equipment filter.
5. Secure the fuel lines with the clamps as shown.

Caution

If fuel spills, wait until evaporates before starting engine. Replacement of parts must be the same and installed in the same position as the original parts.



Spark Plugs



How to Replace the Spark Plug

Check the gap (A), with a wire gauge (B). If necessary, reset the cap. Install and tighten plug to the recommended torque.

Recommended Tune-up Specifications	
Spark Plug Gap	0.03in (0.76mm)
Spark Plug Torque	180lb-in (20Nm)
Armature Air Gap	0.005-0.008in (0.13-0.20mm)
Intake Valve Clearance	0.004-0.006in (0.10-0.15mm)
Exhaust Valve Clearance	0.004-0.006in (0.10-0.15mm)



Specifications

Tractor Type

Mid-Engine,
Rear-Wheel Drive,
One Driver and No Passengers.

Features

Drive-by-wire, MFWD, Front Locking Differential, Front Suspension, Electronic CVT, Onboard Microcontrollers, Electronic Throttle System, Disk Brakes, Adjustable brake pedals and Push Start Ignition.

Chassis

Chassis Type: Ladder
Body Material: HRPO Steel

Engine

Air Cooled V-twin Big Block
Horizontal Shaft, Electric Start
Bore/Stroke: 86/78 mm
Displacement: 896cc
Carburetor: Two-Barrel Float Feed
Redline: 3600 rpm (governor limited)

Drivetrain

Cub 3-Speed Manual
Transmission & ECVT, Modified for MFWD
Muttac Engineered Drop Box
CVT Minimum Ratio : 3.4:1
CVT Max Ratio : 1:1

Dimensions

Wheelbase: 1806 mm
Length: 2636 mm
Width: 1151 mm
Front Track: 889 mm
Rear Track: 750 mm
Ground Clearance: 171 mm

Linkage

Hitch Height: 330 mm adjustable \pm 100 mm

Weight

409 kg
Per Horsepower: 12.8 kg
Static Distribution: 60% Front, 40% Rear.

Steering

Linear Actuator: 200 lbs, 9A, 20% Duty Cycle. Two Limit Switches.
Turning Radius: 2520 mm

Brakes

Hydraulic Disk Brakes
Front: None
Rear: Disks

Wheels and Tires

Front Wheels, 2WD: 8"x 6.3"
Front Wheels, MFWD: 10"x 6"
Rear Wheels: 12" x 12"
Front Tires, 2WD: 15x6.00-6

Front Tires, MFWD: 18x8.50-10 Titan TRU
Rear Tires: 26x12.00-12 Titan TRU

Electrical System

12V, 60A

Capacities/Lubricants

Engine crankcase: 2.4 L/10w-30 synthetic
Brake Fluid: 0.18 L/DOT 3
Fuel tank: 1.5 L/87-octane gasoline
Transmission: 2.8 L/80w-90

Service and maintenance

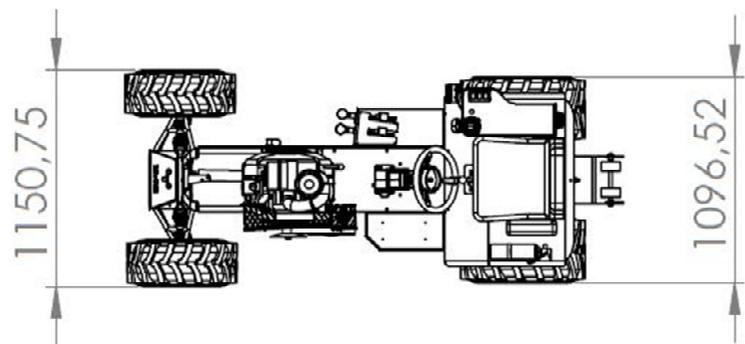
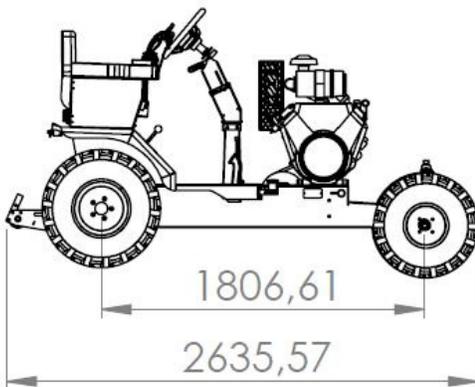
2.4 L engine oil (Change interval: 100 hours or every year)
2.8 L transmissions oil (Change interval 250 hours or every year)
Air and fuel filter (Change interval 400 hours)

Gas consumption

7.1 L/hour at 3060 rpm

Options

Shifter lock
MFWD
Alternator
ECVT
Grease hoses
Adjustable armrest





Customer Assistance

Customer Assistance
scaletractor.bree@gmail.com

Mutrac Distributors
Macdonald Campus of McGill University
21111 Lakeshore Road St Anne de Bellevue Quebec Canada, H9X 3V9

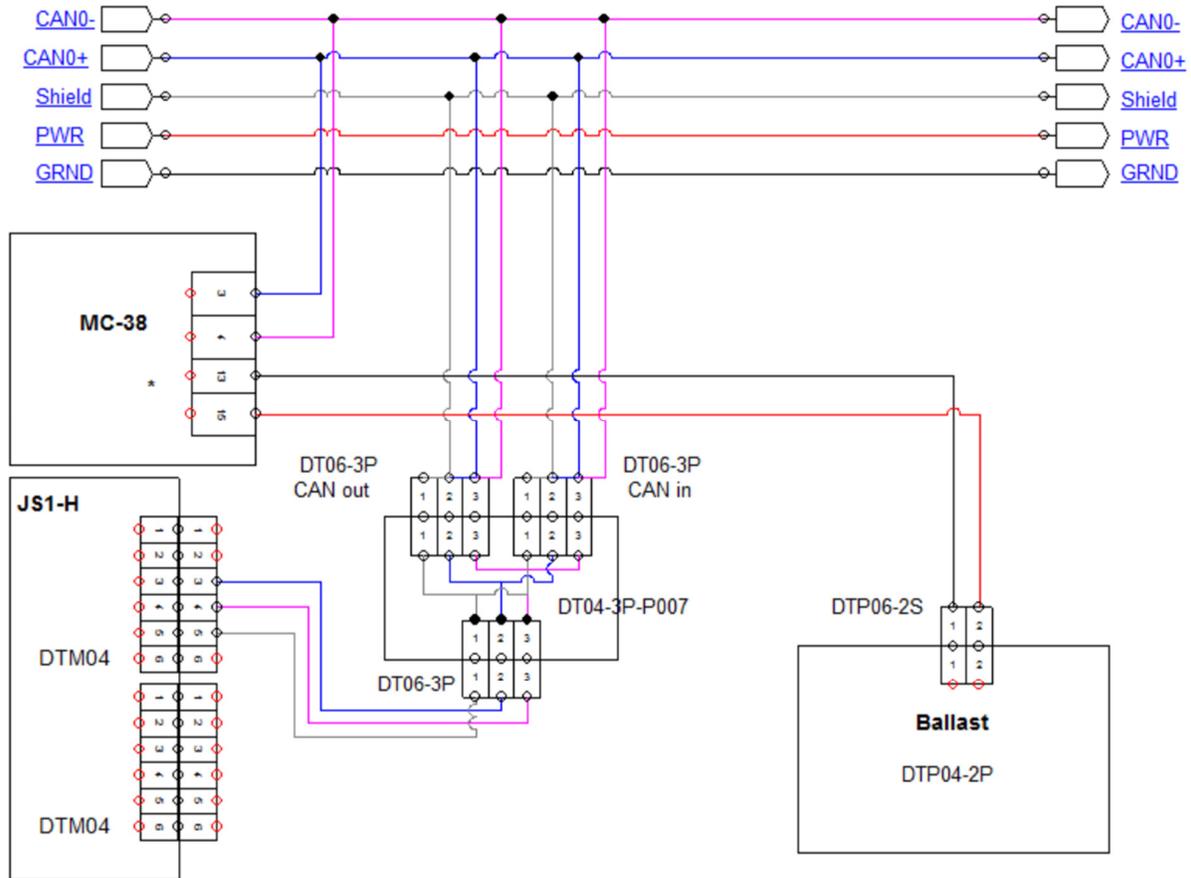
Add-On Non-Genuine Parts and Accessories

We recommend only using genuine parts from authorized distributors as listed under **Maintenance**.



Wiring Diagrams

BIDIRECTIONAL BALLAST CONTROL





STEERING & ECVT

