

# OPERATION MANUAL



**MULTIQUIP®**

**MQ TuffTruk**  
MULTIQUIP

**MODEL**

**TB11G**

**TB11E**

**WALK-BEHIND  
POWER BUGGY**

**(HONDA GX200UT2QX4 GASOLINE ENGINE/  
24VDC, 1300W ELECTRIC MOTOR)**

Revision #1 (09/11/19)



**THIS MANUAL MUST ACCOMPANY THE EQUIPMENT AT ALL TIMES.**

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**PROPOSITION 65 WARNING**

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**TB11G/E TuffTruk  
Walk-Behind Power Buggy**

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# SAFETY INFORMATION

**DO NOT** operate or service the equipment before reading the entire manual. Safety precautions should be followed at all times when operating this equipment. Failure to read and understand the safety messages and operating instructions could result in injury to yourself and others.



## SAFETY MESSAGES

The four safety messages shown below will inform you about potential hazards that could injure you or others. The safety messages specifically address the level of exposure to the operator and are preceded by one of four words: **DANGER**, **WARNING**, **CAUTION** or **NOTICE**.

## SAFETY SYMBOLS

**! DANGER**

Indicates a hazardous situation which, if not avoided, **WILL** result in **DEATH** or **SERIOUS INJURY**.

**! WARNING**

Indicates a hazardous situation which, if not avoided, **COULD** result in **DEATH** or **SERIOUS INJURY**.

**! CAUTION**

Indicates a hazardous situation which, if not avoided, **COULD** result in **MINOR** or **MODERATE INJURY**.

**NOTICE**

Addresses practices not related to personal injury.

Potential hazards associated with the operation of this equipment will be referenced with hazard symbols which may appear throughout this manual in conjunction with safety messages.

Symbol	Safety Hazard
	Lethal exhaust gas hazards
	Explosive fuel hazards
	Burn hazards
	Rotating parts hazards (V-belt)
	Rotating parts hazards (Chain)
	Hydraulic fluid hazards

# SAFETY INFORMATION

## GENERAL SAFETY

### CAUTION

- **NEVER** operate this equipment without proper protective clothing, shatterproof glasses, respiratory protection, hearing protection, steel-toed boots and other protective devices required by the job or city and state regulations.



- Avoid wearing jewelry or loose fitting clothes that may snag on the controls or moving parts as this can cause serious injury.

- **NEVER** operate this equipment when not feeling well due to fatigue, illness or when under medication.



- **NEVER** operate this equipment under the influence of drugs or alcohol.



- **ALWAYS** clear the work area of any debris, tools, etc. that would constitute a hazard while the equipment is in operation.

- No one other than the operator is to be in the working area when the equipment is in operation.

- **DO NOT** use the equipment for any purpose other than its intended purposes or applications.

### NOTICE

- This equipment should only be operated by trained and qualified personnel 18 years of age and older.

- Whenever necessary, replace nameplate, operation and safety decals when they become difficult read.

- Manufacturer does not assume responsibility for any accident due to equipment modifications. Unauthorized equipment modification will void all warranties.

- **NEVER** use accessories or attachments that are not recommended by Multiquip for this equipment. Damage to the equipment and/or injury to user may result.

- **ALWAYS** know the location of the nearest fire extinguisher.



- **ALWAYS** know the location of the nearest first aid kit.



- **ALWAYS** know the location of the nearest phone or **keep a phone on the job site**. Also, know the phone numbers of the nearest **ambulance, doctor and fire department**. This information will be invaluable in the case of an emergency.

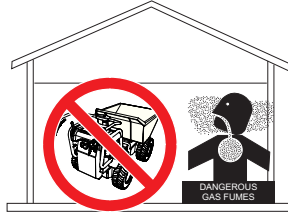


# SAFETY INFORMATION

## TUFFTRUK SAFETY

### DANGER

- Engine fuel exhaust gases contain poisonous carbon monoxide. This gas is colorless and odorless, and can cause death if inhaled.
- The engine of this equipment requires an adequate free flow of cooling air. **NEVER** operate this equipment in any enclosed or narrow area where free flow of the air is restricted. If the air flow is restricted it will cause injury to people and property and serious damage to the equipment or engine.



- **NEVER** operate the equipment in an explosive atmosphere or near combustible materials. An explosion or fire could result causing severe **bodily harm or even death.**



### WARNING

- **NEVER** use your hand to find hydraulic leaks. Use a piece of wood or cardboard. Hydraulic fluid injected into the skin must be treated by a knowledgeable physician immediately or severe injury or death can occur.
- Accidental starting can cause severe injury or death. **ALWAYS** place the ON/OFF switch in the OFF position.
- **NEVER** disconnect any **emergency or safety devices.** These devices are intended for operator safety. Disconnection of these devices can cause severe injury, bodily harm or even death. Disconnection of any of these devices will void all warranties.
- **NEVER** approach power lines with any part of the TuffTruk unless all local, state/provincial and federal (OSHA) required safety precautions have been taken. Use extreme caution when approaching high voltage power lines.



### CAUTION

- **ALWAYS** inspect the surface over which you will travel. Look for holes, drop-offs and obstacles. Look for rough and weak spots on docks, ramps or floor.
- **ALWAYS** Look for oil spills, wet spots and slippery surfaces. Look for soft soil, deep mud and standing water. Watch for anything that might make you lose control or cause the TuffTruk to tip over.
- **ALWAYS** clear away trash and debris. Pick up anything that might puncture the tires.
- **ALWAYS** make sure aisles, ramps, doorways and passages are clear.
- **ALWAYS** plan your work. Make sure you know where you will make your pickups, dumps and turns. Before you take a load, know where you will place it.
- **NEVER** travel down a slope with a **full load.** The possibility exists of tipping.
- **DO NOT** operate the TuffTruk on unsafe haul roads, load areas, and dump areas.
- **DO NOT** operate TuffTruk on excessive slopes with a grade higher than 25° (45%), forward and backward.
- **DO NOT** operate TuffTruk on extremely uneven surfaces.
- **NEVER** allow people to ride inside the tub/bucket.
- **DO NOT** operate the TuffTruk at excessive speeds. Reckless operation may cause accidents and severe injury. Slow down when approaching people, wet areas, and going up and down grades. It is the responsibility of the operator to adjust speed, as necessary, depending on the conditions of the road or path.
- Forward travel speed should not exceed 4 mph (6.44 km/h). Reverse travel speed should not exceed 1.5 mph (2.42 km/h).
- **ALLOW** extra time to stop when operating the TuffTruk on wet surfaces or loosely graded materials.
- **DO NOT** dump materials from bucket/tub while the TuffTruk is moving.



# SAFETY INFORMATION



## NOTICE

- **ALWAYS** ensure TuffTruk is **securely** placed on appropriate blocks or jackstands when performing maintenance.
- When parking on a slope, position the TuffTruk at a right angle to a slope.
- When filling or dumping **DO NOT** exceed payload capacity of TuffTruk.
- **ALWAYS** be aware of traveling conditions. Reduce load if necessary.
- **DO NOT** activate dump mechanism (tub/bucket) if TuffTruk is facing a down hill slope.
- **DO NOT** stand in front or along side the TuffTruk when discharging a load.
- **ALWAYS** block the TuffTruk with appropriate blocks when leaving the TuffTruk parked on a slope.
- To prevent unexpected loss of control, **DO NOT** start engine on a sloping surface.
- Ensure that the speed control levers works freely and returns to the stop position. **DO NOT** start engine unless speed control linkage is working properly.
- Make sure that the tires are inflated to the manufacturer's recommended tire pressure.
- **NEVER** operate the TuffTruk with bad or worn tires. **ALWAYS** replace defective tires with new ones.
- Avoid sudden stops and starts and changes in direction. Operate the controls smoothly. **DO NOT** jerk the steering or any other controls.
- **NEVER** attempt to engage the controls except from the operator's position.
- **NEVER** operate or tow the TuffTruk in traffic or on public roads.
- **ALWAYS** keep the machine in proper running condition.
- Fix damage to machine and replace any broken parts immediately.


- The entire TuffTruk (tub, shroud, wheels, etc.) should be cleaned after every use. Make sure there is no buildup of concrete, grease, oil or debris on the machine.
- **ALWAYS** store equipment properly when it is not being used. Equipment should be stored in a clean, dry location out of the reach of children and unauthorized personnel.
- **ALWAYS** place the fuel valve lever in the **OFF** position when the equipment is not in use.

## ENGINE SAFETY


### ⚠ WARNING

- **DO NOT** place hands or fingers inside engine compartment when engine is running. 
- **NEVER** operate the engine with heat shields or guards removed.
- Keep fingers, hands hair and clothing away from all moving parts to prevent injury. 
- **ALWAYS** shut down the engine before performing service or maintenance.
- **DO NOT** remove the engine oil drain plug while the engine is hot. Hot oil will gush out and severely scald any persons in the general area of the TuffTruk.

### ⚠ CAUTION

- **NEVER** touch the hot exhaust manifold, muffler or cylinder. Allow these parts to cool before servicing equipment. 
- Make certain the operator knows how to and is capable of turning the engine **OFF** in case of an emergency.


## NOTICE

- **NEVER** run engine without an air filter or with a dirty air filter. Severe engine damage may occur. Service air filter frequently to prevent engine malfunction.
- **NEVER** tamper with the factory settings of the engine or engine governor. Damage to the engine or equipment can result if operating in speed ranges above the maximum allowable. 

# SAFETY INFORMATION


## FUEL SAFETY

### DANGER



- **DO NOT** start the engine near spilled fuel or combustible fluids. Fuel is extremely flammable and its vapors can cause an explosion if ignited.
- **ALWAYS** refuel in a well-ventilated area, away from sparks and open flames.
- **ALWAYS** use extreme caution when working with **flammable** liquids.
- **DO NOT** fill the fuel tank while the engine is running or hot.
- **DO NOT** overfill tank and tighten fuel cap until you hear "clicking", since spilled fuel could ignite if it comes into contact with hot engine parts or sparks from the ignition system.
- Store fuel in appropriate containers, in well-ventilated areas and away from sparks and flames.
- **NEVER** use fuel as a cleaning agent.
- **DO NOT** smoke around or near the equipment. Fire or explosion could result from fuel vapors or if fuel is spilled on a hot engine. 
- **DO NOT** leave the TuffTruk in the vicinity of ovens, furnaces or radiant heaters. Heat could raise the pressure of the fuel so that vented gas could ignite.

## BATTERY SAFETY (ELECTRIC START ONLY)

### DANGER

- **DO NOT** drop the battery. There is a possibility that the battery will explode.
- **DO NOT** expose the battery to open flames, sparks, cigarettes, etc. The battery contains combustible gases and liquids. If these gases and liquids come into contact with a flame or spark, an explosion could occur. 

### WARNING

- **ALWAYS** wear safety glasses when handling the battery to avoid eye irritation. The battery contains acids that can cause injury to the eyes and skin. 
- Use well-insulated gloves when picking up the battery.
- **ALWAYS** keep the battery charged. If the battery is not charged, combustible gas will build up.
- **DO NOT** charge battery if frozen. Battery can explode. When frozen, warm the battery to at least 61°F (16°C).
- **ALWAYS** recharge the battery in a well-ventilated environment to avoid the risk of a dangerous concentration of combustible gases.
- If the battery liquid (dilute sulfuric acid) comes into contact with **clothing or skin**, rinse skin or clothing immediately with plenty of water. 
- If the battery liquid (dilute sulfuric acid) comes into contact with **eyes**, rinse eyes immediately with plenty of water and contact the nearest doctor or hospital to seek medical attention.

### CAUTION

- **ALWAYS** disconnect the **NEGATIVE** battery terminal before performing service on the equipment.
- **ALWAYS** keep battery cables in good working condition. Repair or replace all worn cables.
- **ALWAYS** use proper lifting procedures when removing the batteries from the machine. Batteries are quite heavy. Bodily injury may result if proper lifting procedures are not employed.

# SAFETY INFORMATION

## LIFTING SAFETY

### CAUTION

- **NEVER** allow any person or animal to stand underneath the equipment while lifting.

### NOTICE

- When lifting of the TuffTruk is required, attach lifting straps or chains to designated lifting points only.
- Use lifting straps or chains of adequate lifting capacity.
- **NEVER** tip the engine to extreme angles during lifting as it may cause oil to gravitate into the cylinder head, making the engine start difficult.
- **DO NOT** lift machine to unnecessary heights.
- **NEVER** lift the equipment while the engine is running.
- **ALWAYS** use ramps capable of supporting the weight of the TuffTruk and the operator to load and unload the TuffTruk.

## TRANSPORTING SAFETY

### NOTICE

- **ALWAYS** shutdown engine before transporting.
- Tighten fuel tank cap securely and close fuel cock to prevent fuel from spilling.
- When transporting of the TuffTruk is required, place the TuffTruk on a flat bed truck or equivalent and tie down securely.
- **ALWAYS** make sure all tie-downs are in place and the tub/bucket is completely lowered in the flat (horizontal) position and securely latched.
- Place **chock blocks** underneath wheel to prevent rolling.
- **DO NOT** use the TuffTruk to transport people.
- When transporting the TuffTruk on a truck or trailer, know the overall height to avoid contacting overhead obstructions such as bridges and power lines. Check the truck and ramp capacities.
- **ALWAYS** place the fuel valve lever in the **OFF** position before transporting.



# SAFETY INFORMATION

## ENVIRONMENTAL SAFETY/DECOMMISSIONING

### NOTICE

Decommissioning is a controlled process used to safely retire a piece of equipment that is no longer serviceable. If the equipment poses an unacceptable and unrepairable safety risk due to wear or damage or is no longer cost effective to maintain (beyond life-cycle reliability) and is to be decommissioned (demolition and dismantlement), be sure to follow rules below.

- **DO NOT** pour waste or oil directly onto the ground, down a drain or into any water source.
- Contact your country's Department of Public Works or recycling agency in your area and arrange for proper disposal of any electrical components, waste or oil associated with this equipment.
- When the life cycle of this equipment is over, remove battery (if equipped) and bring to appropriate facility for lead reclamation. Use safety precautions when handling batteries that contain sulfuric acid.
- When the life cycle of this equipment is over, it is recommended that the unit frame and all other metal parts be sent to a recycling center.



Metal recycling involves the collection of metal from discarded products and its transformation into raw materials to use in manufacturing a new product.

Recyclers and manufacturers alike promote the process of recycling metal. Using a metal recycling center promotes energy cost savings.

## EMISSIONS INFORMATION

### NOTICE

This equipment conforms with applicable Environmental Protection Agency (EPA) and California Air Resources Board (CARB) emission regulations.

The gasoline engine used in this equipment has been designed to reduce harmful levels of carbon monoxide (CO), hydrocarbons (HC) and nitrogen oxides (NOx) contained in gasoline exhaust emissions.

Mandated Emission Components:

- Engine, EPA certified
- Fuel cap, EPA certified
- Fuel and vapor recovery hoses, EPA certified SAE J30R7 or SAE J30R14T2
- Charcoal canister, EPA certified

Miscellaneous Parts Associated with Emission System:

- Hose clamps and retainer brackets
- Roll over valve vapor recovery valve
- Steel fuel tank

Tampering with or altering the emission control system may increase emissions beyond the legal limit. Do not remove or alter any part of the system.

Additionally, modifying the fuel system may adversely affect evaporative emissions, resulting in fines or other penalties.

The Emission control system is valid only for the United States, its territories and commonwealths to include Canada.

### Emission Control Label

The emission control label is an integral part of the emission system and is strictly controlled by regulation(s).

The label must remain with the engine for its entire life.

If a replacement emission label is needed, please contact your authorized engine distributor.

## SPECIFICATIONS (BUGGY)

**Table 1. Specifications (TuffTruk)**

Model	TB11G	TB11E
Maximum Weight Capacity	374 lbs. (170 kg)	561 lbs. (255 kg)
Maximum Payload Weight	990 lbs. (450 kg.)	990 lbs. (450 kg.)
Bucket/Tub Capacity	10.6 cu. ft. Water Level (.40 cu. yd.)	10.6 cu. ft. Water Level (.40 cu. yd.)
Bucket/Tub Capacity (Option)	7.0 cu. ft. Water Level (.26 cu. yd.)	7.0 cu. ft. Water Level (.26 cu. yd.)
Bucket/Tub Material	Steel	Steel
Drive and Controls	Hydrostatic System	24 VDC Electric Motor Gearbox
Speed Forward	Up to 4.0 mph. (6.4 km/h)	Up to 3.5 mph. (5.63 km/h)
Speed Reverse	Up to 1.5 mph. (2.42 km/h)	Up to 1.5 mph. (2.42 km/h)
Steering Radius Outside Dia.	58 in. (1,473 mm)	58 in. (1,473 mm)
Hydraulic Pump Capacity	77.23 fl. oz. (2.28 liters)	N/A
Hydraulic Oil Tank Capacity	16.90 fl. oz. (.5 liters)	N/A
Hydraulic Oil Type	20W-50 Motor Oil	N/A
Brake System	Hydrostatic/Dead Man Handle	Hydrostatic/Dead Man Handle
Dump Control	Mechanical Dump and Manual Return	Mechanical Dump and Manual Return
Discharge Height	2.0 in. (50.8 mm)	2.0 in. (50.8 mm)
Gradeability Slope (Up/Down)	25°	25°
Gradeability Lateral (Side-Side)	6°	6°
Battery (LxWxH)	N/A	12V BCI Group 27 550 CCA @ 0°F 12.05 x 6.84 x 9.32 in. (306 x 174 x 237 mm)
Battery Weight	N/A	64 lbs (29 kg)
Pneumatic Tires	16 x 6.50 x 8 (406 x 165 x 203 mm)	16 x 6.50 x 8 (406 x 165 x 203 mm)
Pneumatic Tire Pressure	28 PSI (193 kPa)	28 PSI (193 Kpa)



## SPECIFICATIONS (ENGINE)

<b>Table 2. Gasoline Engine Specifications</b>	
<b>Model</b>	<b>HONDA GX200UT2QX4</b>
Type	Air-cooled 4 stroke, Single Cylinder, OHV, Horizontal Shaft Gasoline Engine
Bore X Stroke	2.7 in. X 2.1 in. (68 mm x 54 mm)
Displacement	12.0 cu. in. (196 cc)
Max Output	5.8 H.P./3,600 rpm
Fuel Tank Capacity	0.95 U.S. Gallons (3.6 Liters)
Fuel	Unleaded Automobile Gasoline
Lube Oil Capacity	0.63 qt. (0.6 liter)
Speed Control Method	Centrifugal Fly-Weight Type
Starting Method	Recoil Start
Dimension Approx. (L x W x H)	12.6 X 14.8 X 13.6 in. (321 X 376 X 346 mm)
Dry Net Weight	35.2 lbs. (16.0 Kg)

<b>Table 3. Electric Motor Specifications</b>	
<b>Model</b>	<b>AMER</b>
Type	Permanent Magnet DC Electric Motor
Speed Control Method	Curtis 1228 Controller
Starting Method	Electric
Max RPM (No Load)	2900
Input Voltage	24 VDC
Wattage	1300W
Poles	4
Protection Class	IP: 44
Insulation Class	F
IEC Duty Cycle	S3 15%
Dimension Approx. (L x W x H)	6.4 X 7.81 X 5.7 in. (164 X 200 X 145 mm)
Dry Net Weight Approx.	22 lbs. (10 kg)

# NOISE AND VIBRATION EMISSIONS

**Table 4. Noise and Vibration Emissions**

Model	TB11G	TB11E
Guaranteed ISO 11201:2010 Based Sound Pressure Level at Operator Station in dB(A) <sup>a</sup>	82	56
Guaranteed ISO 3744:2010 Based Sound Power Level in dB(A) <sup>b</sup>	96	69
Hand-Arm Vibration Per ISO 5349-1:2001 in $m/s^2 \Sigma A(8)$	4.6	2.5

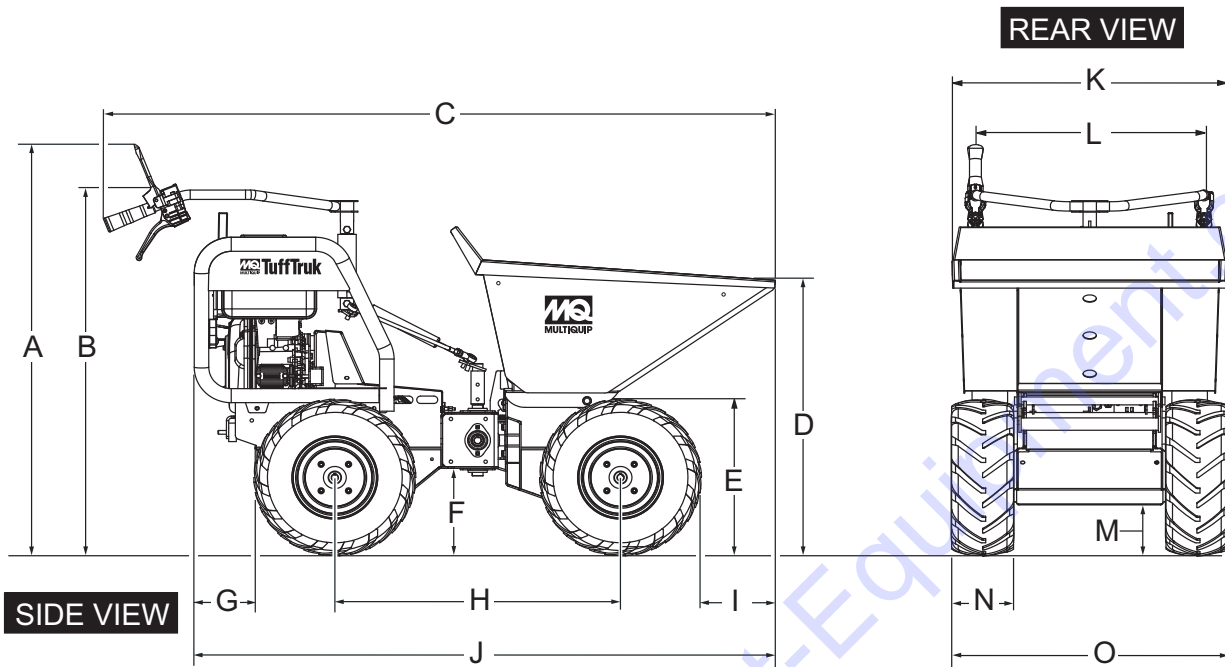
a. With an uncertainty factor K of 2.5 dB (A) included per Note 1 in section 7.2.1 of EN 12649::2008+A1:2011

b. With an uncertainty factor K of 1.5 dB (A) included per Note 1 in section 7.2.1 of EN 12649::2008+A1:2011

## NOTES:

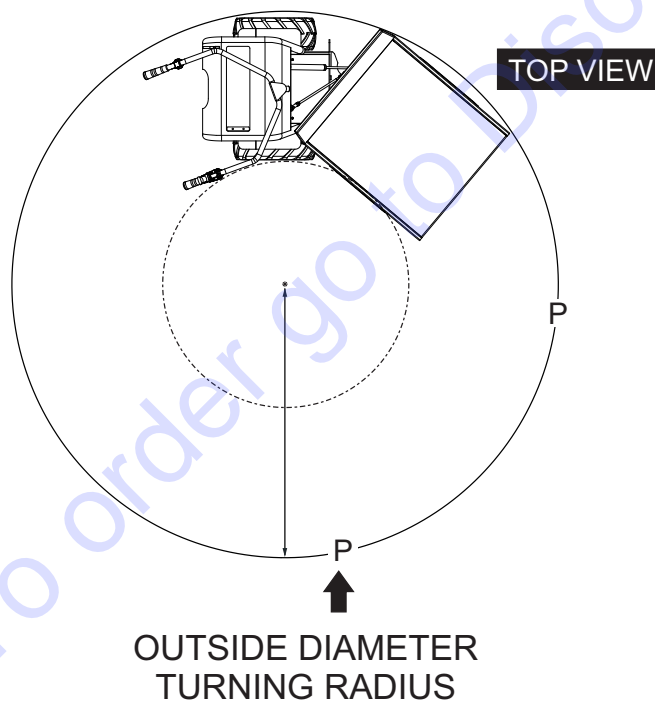
1. *Sound pressure and power levels are “A” weighted measures per ISO 3744:2010. They are measured with the operating condition of the machine which generates the most repeatable but highest values of the sound levels. Under normal circumstances, the sound level will vary depending on the condition of the material being worked upon.*
2. *The vibration level indicated is the vector sum of the RMS (root mean Square) values of amplitudes on each axis, standardized to an 8-hour exposure period, and obtained using the operating condition of the machine that generates the most repeatable but highest values in accordance with the applicable standards for the machine.*
3. *Per EU Directive 2002/44/EC, the daily exposure action value for hand/arm vibration is  $2.5 m/s^2 \Sigma A(8)$ . The daily exposure limit value is  $5 m/s^2 \Sigma A(8)$ .*

# DIMENSIONS



**SIDE VIEW**

**REAR VIEW**



**TOP VIEW**

↑  
OUTSIDE DIAMETER  
TURNING RADIUS

**Table 5. Dimensions**

Reference Letter	Dimension in. (mm)
A	43.34 (1,101)
B	34.68 (881)
C	70.98 (1,803)
D	31.10 (790)
E	16.73 (425)
F	9.37 (238)
G	6.18 (157)
H	29.52 (750)
I	7.71 (196)
J	60.11 (1,527)
K	33.46 (850)
L	23.62 (600)
M	5.55 (141)
N	6.37 (162)
O	33.46 (850)
P	57.67 (1,465)

**Figure 1. TB11G/E Dimensions**

## GENERAL INFORMATION

The Multiquip Walk-Behind Series TuffTruk Power Buggies are available in two versions, gas (Model TB11G) or electric (Model TB11E). Both modes are intended for job site cleanup and material transport.

The buggy is equipped with a 2.0 in. (50.8 mm) dump height which provides clearance and enables the operator to maneuver over any form height.

A low center of gravity has been incorporated into the design which provides added safety when maneuvering the buggy in tight areas.

Maximum **forward** speed for the **gasoline** driven TuffTruk buggy is rated at 4.0 mph. (6.4 km/h). The maximum **forward** speed of the **electric** driven buggy is rated at 3.5 mph. (5.63 km/h). Maximum **reverse** speed for both models is 1.5 mph. (2.42 km/h).

For ease of dumping, a manual hand lever control is provided. Maximum weight capacity (payload) is 990 lbs. (450 kg). Multiple lift points have been provided to allow for easy access of a forklift when lifting is required.

### POWER PLANT (ELECTRIC)

The electric model (TB11E) is powered by a 24 VDC, 1300 watt permanent magnet DC electric motor. The output shaft of the electric motor is connected to a gearbox reduction unit which drives the front and rear wheels. For additional information, reference Table 3.

### POWER PLANT (GASOLINE)

The gas model (TB11G) is powered by a Honda 5.8 HP, GX200 air cooled, 4-cycle gasoline engine. Power is transferred from the output shaft of the engine to the V-belt pulley drive system which drives the front and rear wheels.

Reference Table 2 for complete engine specifications. In addition, refer to the engine owner's manual for instructions regarding the operation and maintenance of your engine. If the original manual is lost or damaged, please contact your nearest Multiquip dealer for a replacement.

### MOTOR CONTROLLER (TB11E MODEL ONLY)

The TB11E is equipped with a sealed heavy-duty permanent motor controller, Curtis Model 1229 Speed Controller (ECU). This controller provides functional and directional control of the TuffTruk buggy. It allows the buggy to start and stop or move in a forward or reverse direction.

This controller can detect a wide variety of faults or error conditions. Diagnostic information can be obtained by interfacing with the Curtis Model 3100R Gauge Display. This gauge will display error codes as referenced in the maintenance section of this manual.

In addition, this controller has the capability of interfacing with Controller Area Network (CAN bus) applications.

### DIAGNOSTIC GAUGE (TB11E MODEL ONLY)

TB11E is equipped with a diagnostic gauge. This gauge will display system error codes. Reference maintenance section in this manual for further details.

#### WARNING

All operators must have training before operating the TuffTruk buggy. For your safety, warnings are on the machine and in this manual. Failure to obey these warnings can cause severe injury or even death.

#### CAUTION



**DO NOT** attempt to operate the TuffTruk buggy until the Safety Information, General Information, and Inspection sections of this manual have been **read and thoroughly understood**.

# COMPONENTS

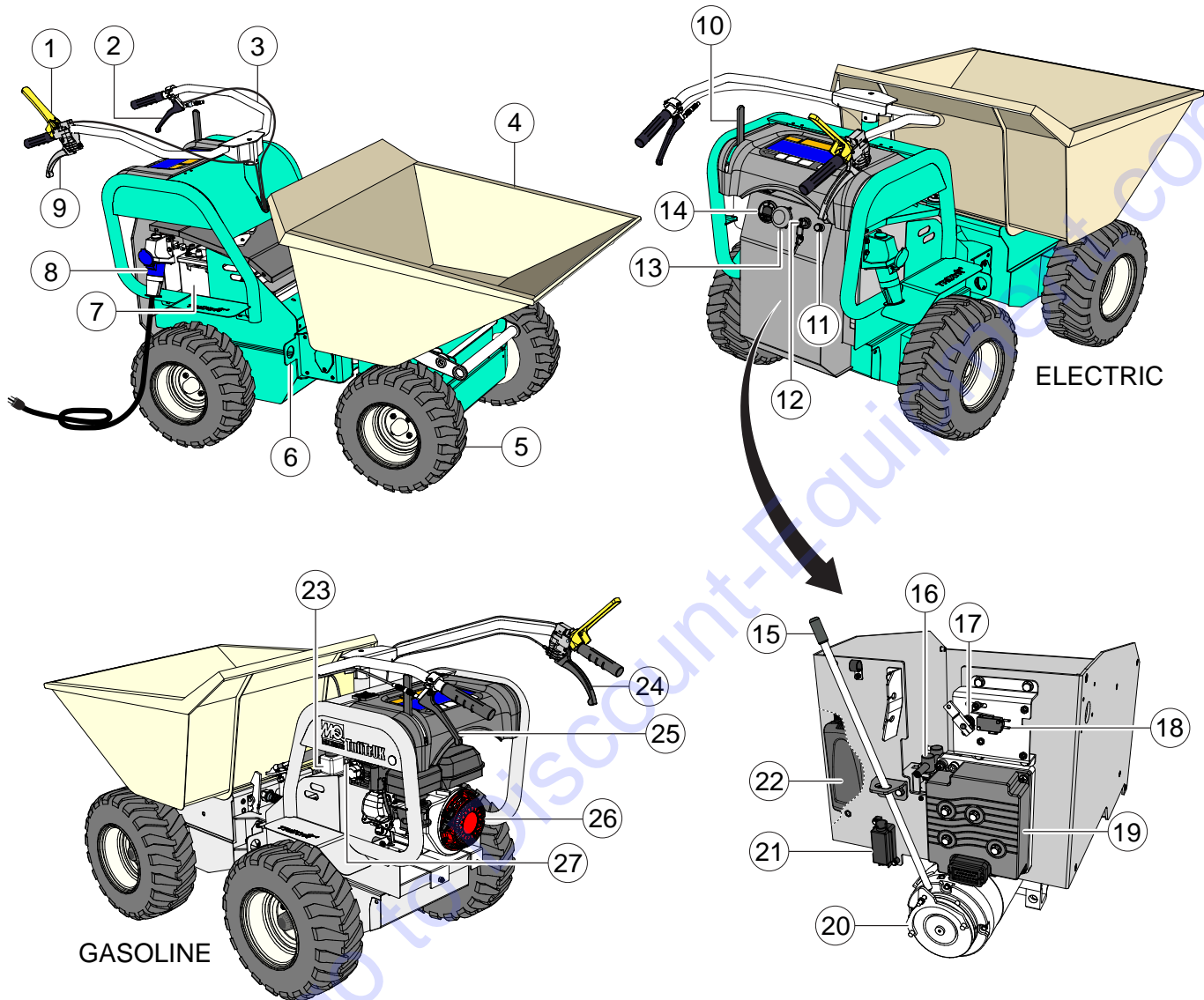


Figure 2. TuffTruk Walk-Behind Power Buggy Components

## COMPONENTS

1. **Deadman Control Lever** — **Yellow** handle lever, when engaged (closed) allows the buggy to travel in either a forward or reverse direction. Works in conjunction with forward and reverse control levers. In addition, this lever when engaged releases the brake.
2. **Reverse Control Lever Signal Cable (TB11E)** — This lever/cable is a 2-wire cable (switch) that when activated sends a +12 VDC signal (J1-10) to the motor controller indicating that the reverse travel function has been selected.
3. **Handle Bar (Steering)** — This handle bar is used to steer the buggy. When steering the buggy, use both hands and hold onto both handle bar grips.
4. **Tub or Bucket** — Used for the transportation of material. Tub holds approximately 10.6 cubic feet (0.40 cubic yards) of water.
5. **Tires** — Unit uses pneumatic tires. Reference Table 1 for tire size.
6. **Lifting Point** — Attach a suitable lifting strap to these points when lifting of the buggy is required.
7. **Battery (TB11E)** — Uses two 12 volt batteries connected in series (24 volts). Always use gloves and eye protection when handling the batteries.
8. **Battery Charger Receptacle (TB11E)** — Plug the battery charger cable into this receptacle, then connect the free-end of the cable to a 120 VAC power source.
9. **Forward/Reverse Speed Control Lever** — When fully engaged, the buggy will travel at **FULL** speed in either the forward or reverse direction. When released, the buggy will **STOP**. This feature is only on the **TB11E** model.
10. **Dump Control Lever** — Push the lever forward to place the tub in the dump position (vertical).
11. **Component Fuse (TB11E)** — 10 amp fuse that provides protection for the Curtis Model 3100R Diagnostic Display and other electronic components.
12. **Ignition/Key (TB11E)** — When activated allows the unit to be started.
13. **Emergency Stop Switch (TB11E)** — In the event of an emergency, **push** this button to shutdown the electric motor.
14. **Battery/Diagnostic Gauge (TB11E)** — Uses a Curtis Model 3100R Gauge Display. Displays battery voltage and fault codes. CAN bus compatible.
15. **Free-Wheel Brake Lever (TB11E)** — Two position lever. When placed in the up position (OFF) and held allows the buggy to be moved with the electric motor disengaged (**OFF**).
16. **Contactactor Solenoid (TB11E)** — When energized provides +12 VDC power to motor controller.
17. **5K OHM Potentiometer (TB11E)** — Provides signal for speed sensor.
18. **Deadman Microswitch (TB11E)** — When activated sends a +12 VDC signal (J1-3) to the motor controller to release the brake.
19. **Motor Speed Controller (TB11E)** — Unit uses a Curtis Model 1229 Controller. Requires a 24 VDC input. Interfaces with CAN bus applications.
20. **Electric Motor (TB11E)** — Uses a 24 VDC, 1300 watt electric motor.
21. **Contactactor Fuse (TB11E)** — 125 amp fuse that provides protection for the electric motor.
22. **Battery Charger (TB11E)** — When activated, charges both 12-volt batteries. This feature is only on the **TB11E** model.
23. **Hydraulic Tank/Cap (TB11G)** — Remove this cap to add hydraulic oil. Tank holds approximately 16.90 fl. oz. (.5 liters). **DO NOT** over fill. Reference Table 1 for hydraulic pump oil capacity.
24. **Forward Speed Control Lever (TB11G)** — When fully engaged, the buggy will travel at **FULL** speed in the forward direction. When released, the buggy will **STOP**.
25. **Reverse Speed Control Lever (TB11G)** — When fully engaged, the buggy will travel at **FULL** speed in the reverse direction. When released, the buggy will **STOP**.
26. **Engine (TB11G Model Only)** — Uses a recoil start Honda 5.8 HP, GX200 air cooled, 4-cycle gasoline engine.
27. **Free-Wheel Brake Lever (TB11G)** — Two position lever. When placed in the up position (OFF) and held allows the buggy to be moved with the gasoline engine disengaged.



# ENGINE COMPONENTS

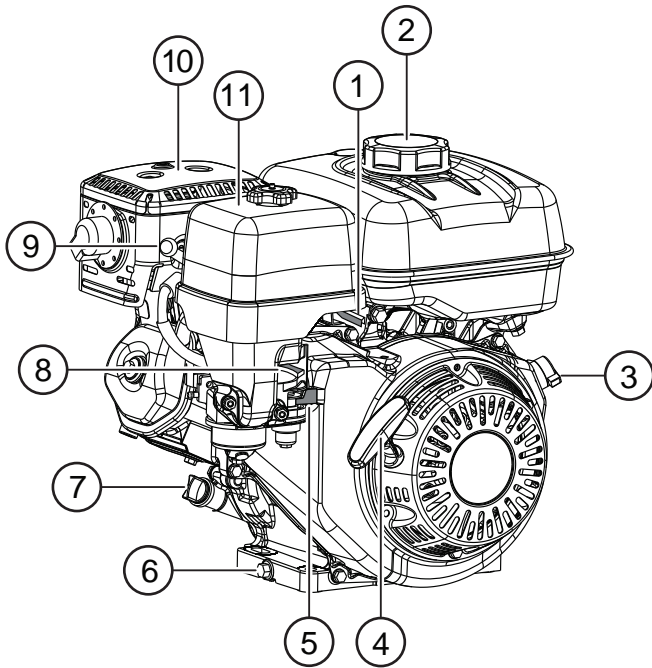


Figure 3. Engine Components

## INITIAL SERVICING

The engine (Figure 3) must be checked for proper lubrication and filled with fuel prior to operation. Refer to the manufacturer's engine manual for instructions and details of operation and servicing.

1. **Throttle Lever** – Used to adjust engine RPM speed.
2. **Fuel Filler Cap/Fuel Tank** – Remove this cap to add unleaded gasoline to the fuel tank. Fill with unleaded gasoline. Refer to Table 2 for fuel tank capacity. Make sure cap is tightened securely. **DO NOT** over fill. For additional information, refer to Honda engine owner's manual.

### DANGER



Add fuel to the tank only when the engine is stopped and has had an opportunity to cool down. In the event of a fuel spill, **DO NOT** attempt to start the engine until the fuel residue has been completely wiped up and the area surrounding the engine is dry.

3. **Engine On/Off Switch** – **ON** position permits engine starting, **OFF** position stops engine operation.
4. **Recoil Starter (pull rope)** – Manual-starting method. Pull the starter grip until resistance is felt, then pull briskly and smoothly.
5. **Fuel Valve Lever** – **OPEN** to let fuel flow, **CLOSE** to stop the flow of fuel.
6. **Oil Drain Plug** – Remove this plug to remove oil from the engine's crankcase.
7. **Dipstick/Oil Filler Cap** – Remove this cap to determine if the engine oil is low. Add oil through this filler port as recommended in Table 6.
8. **Choke Lever** – Used in the starting of a cold engine, or in cold weather conditions. The choke enriches the fuel mixture.
9. **Spark Plug** – Provides spark to the ignition system. Set spark plug gap according to engine manufacturer's instructions. Clean spark plug once a week.
10. **Muffler** – Used to reduce noise and emissions. **NEVER** touch when *hot!*

### CAUTION



Engine components can generate extreme heat. To prevent burns, **DO NOT** touch these areas while the engine is running or immediately after operating. **NEVER** operate the engine with the muffler removed.

11. **Air Cleaner** – Prevents dirt and other debris from entering the fuel system. Remove wing-nut on top of air filter canister to gain access to filter element.

### NOTICE

Operating the engine without an air filter, with a damaged air filter or a filter in need of replacement, will allow dirt to enter the engine, causing rapid engine wear.

## BEFORE STARTING

### CAUTION

**NEVER** disable or disconnect the **start/stop switch**. It is provided for operator safety. Injury may result if it is disabled, disconnected or improperly maintained.

1. Read all safety instructions at the beginning of manual.
2. Clean the unit, removing dirt and dust, particularly the engine cooling air inlet, carburetor and air cleaner.
3. Check the air filter for dirt and dust. If air filter is dirty, replace air filter with a new one as required.
4. Check carburetor for external dirt and dust. Clean with dry compressed air.
5. Check fastening nuts and bolts for tightness.

### CAUTION



**ALWAYS** wear approved eye and hearing protection while operating the buggy.

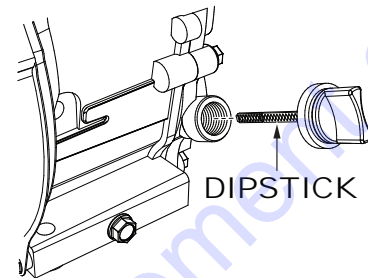
### CAUTION



**NEVER** place hands or feet inside the engine guard cover while the engine is running. **ALWAYS** shut the engine down before performing any kind of maintenance service on the buggy.

## ENGINE OIL CHECK

1. To check the engine oil level, place the unit on secure level ground with the engine stopped.
2. Remove the filler dipstick from the engine oil filler hole (Figure 4) and wipe it clean.

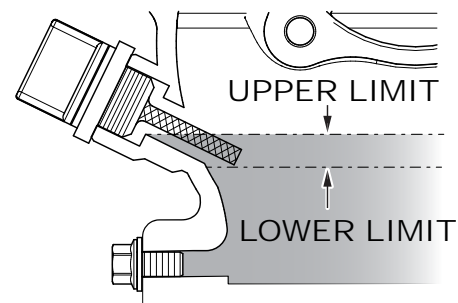


**Figure 4. Engine Oil Dipstick (Removal)**

3. Insert and remove the dipstick without screwing it into the filler neck. Check the oil level shown on the dipstick.
4. If the oil level is low (Figure 5), fill to the edge of the oil filler hole with the recommended oil type (Table 6). Maximum oil capacity is 0.63 quarts (0.6 liters).

### NOTICE

Reference engine manufacturer's manual for specific servicing instructions.



**Figure 5. Engine Oil Dipstick (Oil Level)**

**Table 6. Engine Oil Type**

Season	Temperature	Oil Type
Summer	25°C or Higher	SAE 10W-30
Spring/Fall	25°C ~ 10°C	SAE 10W-30/20
Winter	0°C or Lower	SAE 10W-10



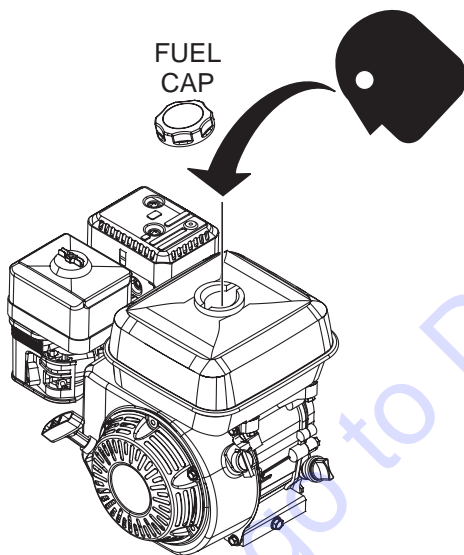
## FUEL CHECK

### **! DANGER**



If your TuffTruk buggy has a gasoline engine, determine if the engine fuel is low. If fuel is low, remove the fuel filler cap and fill it with **unleaded** gasoline. Motor fuels are **highly flammable** and can be dangerous if mishandled. **DO NOT** smoke while refueling. **DO NOT** attempt to refuel the mixer if the engine is **hot** or **running**.

1. Remove the fuel cap (Figure 6) located on top of fuel tank.
2. Visually inspect to see if fuel level is low. If fuel is low, replenish with unleaded fuel.

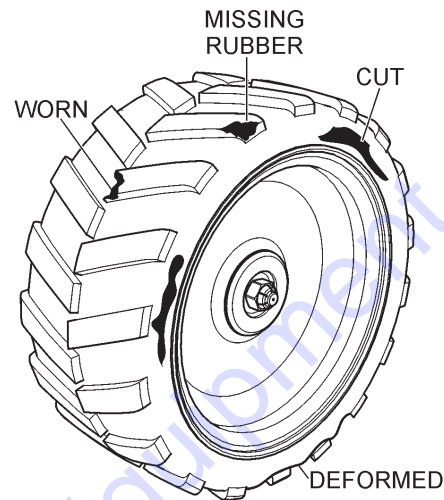


**Figure 6. Fuel Check**

3. When refueling, be sure to use a strainer for filtration. **DO NOT** top-off fuel. Wipe up any spilled fuel immediately.

## TIRES

Check for **worn** or **defective** tires (Figure 7). Replace any defective or worn tires immediately.



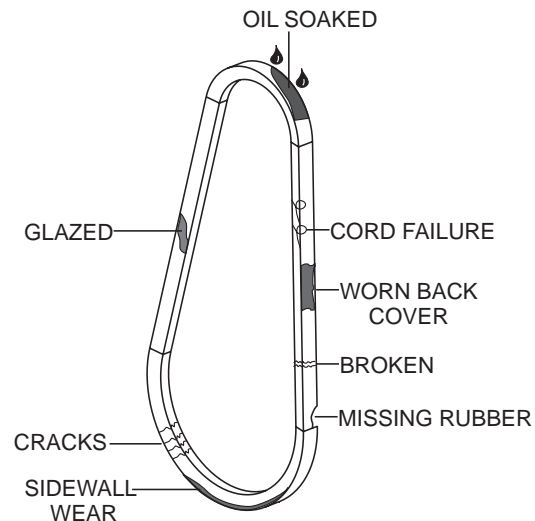
**Figure 7. Tire Wear**

## V-BELT CHECK

Visually examine the V-belt (Figure 8) and determine if it is full of tiny cracks, frayed, has pieces of rubber missing, is peeling or otherwise damaged.

Also, examine the belt and determine if it is **oil soaked** or **"glazed"** (hard shiny appearance on the sides of the belt). Either of these two conditions can cause the belt to run hot, which can weaken it and increase the danger of it breaking.

If the V-belt exhibits any of the above wear conditions replace the V-belt immediately.



**Figure 8. V-Belt Inspection**

## BATTERY (ELECTRIC MODEL ONLY)

This unit is of negative ground **DO NOT** connect in reverse. **ALWAYS** maintain battery fluid level between the specified marks. Battery life will be shortened, if the fluid levels are not properly maintained. Add only distilled water when replenishment is necessary.

**DO NOT** over fill. Check to see whether the battery cables are loose. Poor contact may result in poor starting or malfunctions.

**ALWAYS** keep the terminals firmly tightened and coat the terminals with an approved battery terminal treatment compound. Replace battery with only recommended type battery. The battery type used in this power buggy is BCI Group 27.

The battery is sufficiently charged if the specific gravity of the battery fluid is 1.28 (at 68° F). If the specific gravity should fall to 1.245 or lower, it indicates that the battery is dead and needs to be recharged or replaced.

Before charging the battery with an external electric source, be sure to disconnect the battery cables.

### **CAUTION**

**ALWAYS** disconnect the negative terminal **FIRST** and reconnect the negative terminal **LAST**.

## Battery Cable Installation

**ALWAYS** be sure the battery cables (Figure 9) are properly connected to the battery terminals as shown below. The batteries are connected in series.

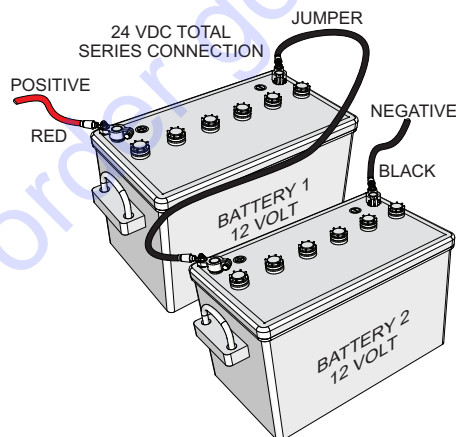


Figure 9. Battery Series Connections

When connecting battery do the following:

1. **NEVER** connect the battery cables to the battery terminals when the ignition is in the **ON** position (start).
2. Place a small amount of battery terminal treatment compound around both battery terminals. This will ensure a good connection and will help prevent corrosion around the battery terminals.

### **NOTICE**

If the battery cable is connected incorrectly, electrical damage to the power buggy will occur. Pay close attention to the polarity of the battery when connecting the battery.

### **CAUTION**

Inadequate battery connections may cause poor starting of the TuffTruk buggy, and create other malfunctions.

## TIRE PRESSURE CHECK

The wheels and tires of the power buggy are very important in its effective operation.

1. Check the tires regularly to make certain the lug nuts are tight.
2. Make sure tires are inflated to manufacturer's suggested tire pressure. **DO NOT** operate the buggy with bad or worn tires.

## LINKAGE CHECK

Check and make sure that **all** linkages within the TuffTruk buggy are functioning correctly.

## STEERING CHECK

1. Check and make sure that the power buggy's steering turns freely and that there is no binding.

# OPERATION (GASOLINE)

This section is intended to assist the operator with the initial start-up of the unit. It is extremely important that this section be read carefully before attempting to use the TuffTruk walk-behind power buggy in the field. **DO NOT** use your buggy until the General Information, and Inspection sections of this manual have been **read and thoroughly understood**.



## WARNING

Failure to understand the operation of the buggy could result in severe damage to the buggy or personal injury. Reference Figure 2 and Figure 3 for the location of any components referenced in this manual.

## CAUTION



**NEVER** operate the TuffTruk walk-behind power buggy in a confined area or enclosed area structure that does not provide ample free flow of air. Gasoline models only.

## STARTING THE BUGGY (GASOLINE MODEL)

The following steps outline the procedure for starting the gasoline TuffTruk buggy.

1. Place the fuel shut-off lever (Figure 10) in the **ON** position.

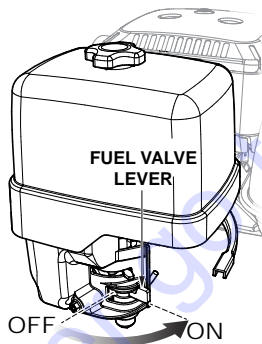


Figure 10. Fuel Shut-Off Lever (ON)

2. To start a cold engine, move the choke lever (Figure 11) to the **CLOSED** position.

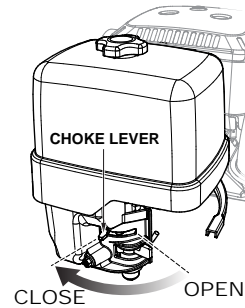


Figure 11. Choke Lever (Closed)

## NOTICE

The **CLOSED** position of the choke lever enriches the fuel mixture for starting a cold engine. The **OPEN** position provides the correct fuel mixture for normal operation after starting, and for restarting a warm engine.

3. If starting a warm engine or the temperature is warm, move the choke lever (Figure 12) to the **OPEN** position.

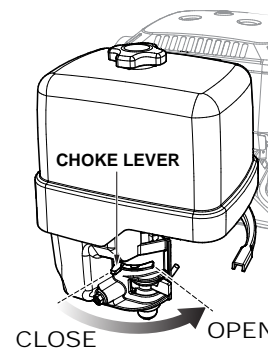


Figure 12. Choke Lever (Open)

4. Move the throttle lever (Figure 13) away from the slow position, about 1/3 of the way toward the fast position.

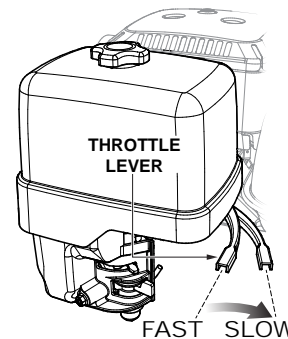


Figure 13. Throttle Lever

## OPERATION (GASOLINE)

- Place the engine ON/OFF switch (Figure 14) in the **ON** position.

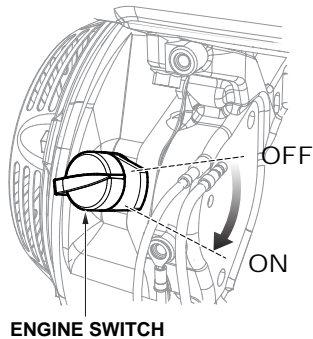


Figure 14. Engine On/Off Switch (ON)

- Pull the **starter grip** (Figure 15) lightly until you feel resistance, then pull briskly. Return the starter grip gently.

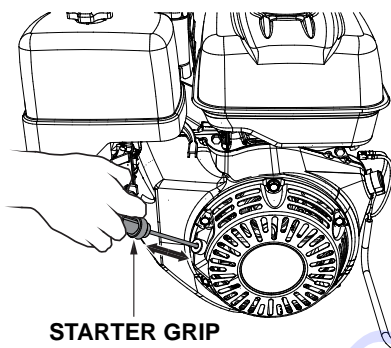


Figure 15. Starter Grip

### NOTICE

**DO NOT** pull the starter rope all the way to the end.  
**DO NOT** release the starter rope after pulling. Allow it to rewind as soon as possible.

### TRAVELING

- Make sure the transmission bypass lever (Figure 16) is engaged (down position). To engage, push lever downward and move to the left.

### NOTICE

If the transmission bypass lever is placed in the **UP** position (free-wheel) the buggy will not move when the forward or reverse speed control levers are activated.

For normal operation this lever should always be placed in the down position.

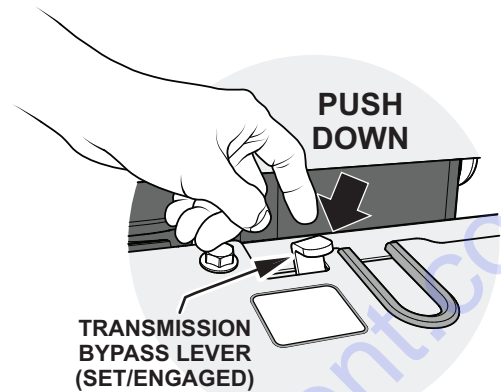


Figure 16. Transmission Bypass Lever (Engaged)

### NOTICE

**NEVER** activate (pull upwards) the transmission bypass lever with the engine running. Serious damage to the unit could occur.

- With the engine running, fully squeeze the **YELLOW** deadman lever (Figure 16) and hold down. Transmission is now active (unlocked).

### NOTICE

The transmission bypass lever when **pushed down** works in conjunction with the deadman lever. With the deadman lever in the upright position, the transmission is **locked**. When the **YELLOW** deadman lever is engaged (fully squeezed), the transmission will automatically be unlocked.

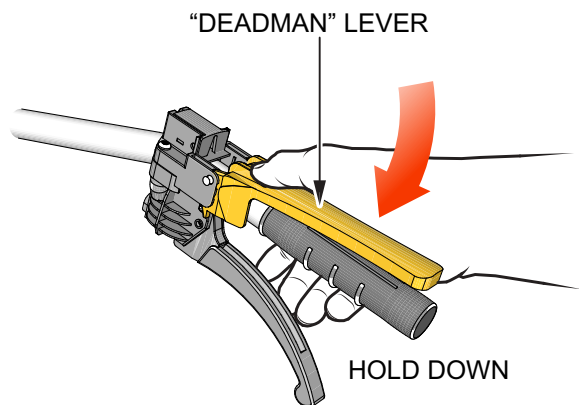
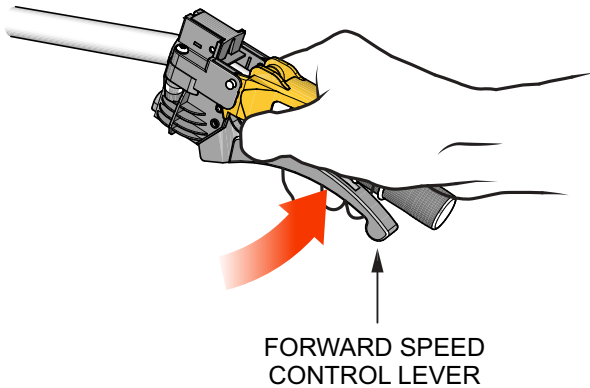


Figure 17. Deadman Lever (Gas)

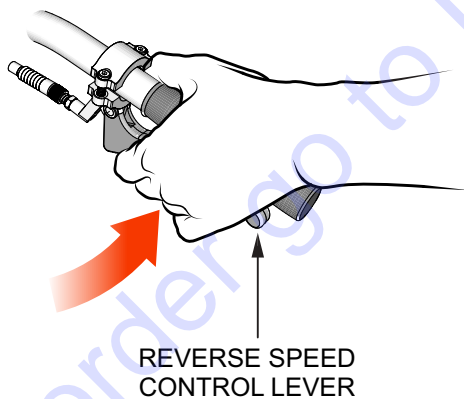
## OPERATION (ELECTRIC)

3. Located underneath the **YELLOW** deadman lever is the forward speed control lever.
4. Slightly squeeze the **forward** speed control lever (Figure 18) until the buggy begins to move in a forward direction.



**Figure 18. Forward Speed Control Lever (Gas)**

5. Walk slowly behind the buggy to get a feel for the buggy. For maximum speed, **fully squeeze** the forward speed control lever.
6. To stop, release the forward speed control lever.
7. On the opposite side of the handle bar is the **reverse** speed control lever (Figure 19). Repeat the above steps for traveling in the reverse direction.



**Figure 19. Reverse Speed Control Lever (Gas)**

### NOTICE

**NEVER** squeeze both speed control levers at the same time, as this will cause damage to the unit.

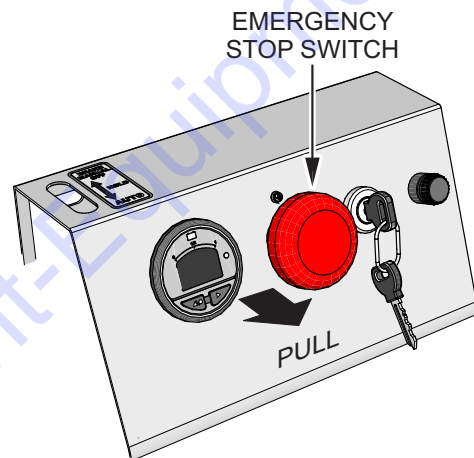
## STARTING THE BUGGY (ELECTRIC MODEL)

### NOTICE

The travel function (forward/reverse) for the electric model is different from the gasoline version.

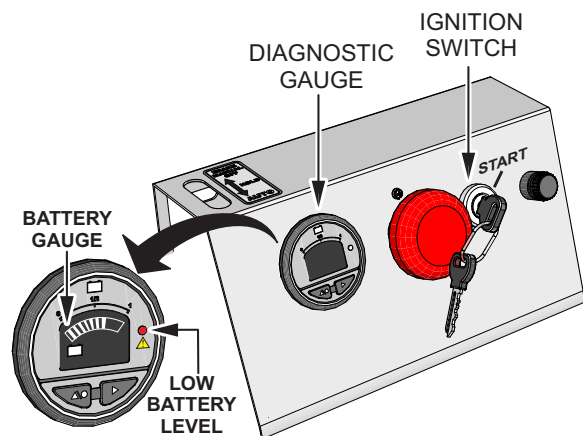
The following steps outline the procedure for starting the electric model power buggy.

1. Located on the control panel of the buggy, is the **start/stop** button (Figure 20). Pull this button outward to start the electric motor.



**Figure 20. Emergency Stop Switch (Closed)**

2. Place the ignition key (Figure 21) in the **START** position. Verify that all segments of the diagnostic gauge illuminate for 1 second and then turn off. In addition, check battery voltage level. If low, recharge batteries.



**Figure 21. Ignition Key (Start)**



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# OPERATION (ELECTRIC)

## TRAVELING

1. Place the brake bypass lever (Figure 22) in the **AUTO** position. If the lever is left in the **ON** (free-wheel) position, the buggy will not move when the forward/reverse speed control lever is activated.

### NOTICE

The brake bypass lever when placed in the **AUTO** position works in conjunction with the deadman lever. With the deadman lever in the upright position, the brake is set (engaged). When the **YELLOW** deadman lever is engaged (fully squeezed), the brake will automatically be released (disengaged).

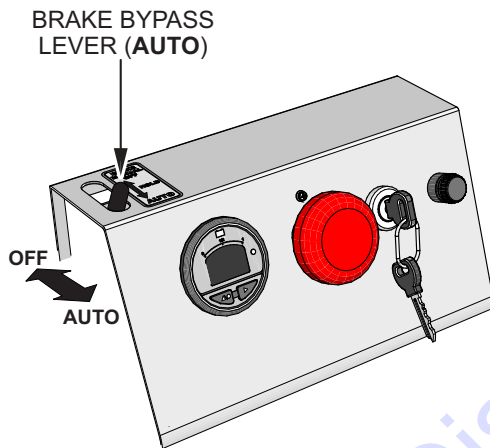


Figure 22. Brake Bypass Lever (Auto)

2. With the electric motor running, fully squeeze the **YELLOW** deadman lever (Figure 23) and hold down. When the lever is held down, a signal is sent via a microswitch to the motor controller (J1-3) to release the brake.

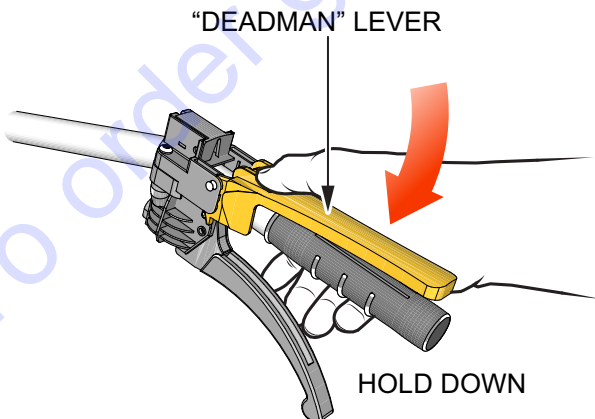


Figure 23. Deadman Lever (Electric)

3. Slightly squeeze the **forward/reverse** speed control lever (Figure 24) until the buggy begins to move in a **forward** direction.

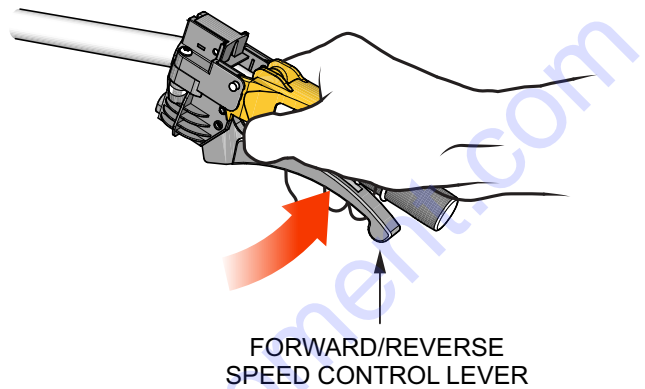


Figure 24. Forward/Reverse Speed Control Lever (Electric)

4. On the opposite side of the handle bar is the **reverse** control lever **signal cable**. This cable is a 2-wire cable that sends a signal via a switch to the motor controller (J1-10) indicating that the **reverse** travel function has been selected.
5. Squeeze the **reverse** control lever signal cable (Figure 25) and hold down.

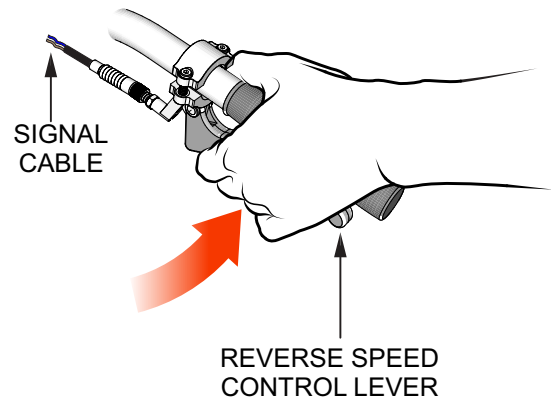


Figure 25. Reverse Control Lever Signal Cable

6. Slightly squeeze the **forward/reverse** speed control lever (Figure 24) until the buggy begins to move in a **reverse** direction.

### CAUTION

Avoid sudden and quick turns. When steering, turn the handle bar slowly. **ALWAYS** face the controls when traveling.

# OPERATION (GAS/ELECTRIC)

## STEERING (GAS/ELECTRIC)

To steer the buggy, use the handle bar in front of the unit.

1. To turn left (Figure 26) when traveling in the forward direction, turn the handle bar clockwise.

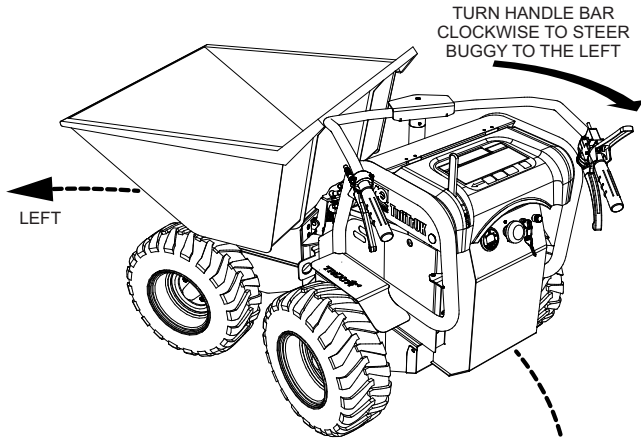


Figure 26. Steering the Buggy (CW-Left)

2. To turn right (Figure 27) when traveling in the forward direction, turn the handle bar in the counterclockwise direction.

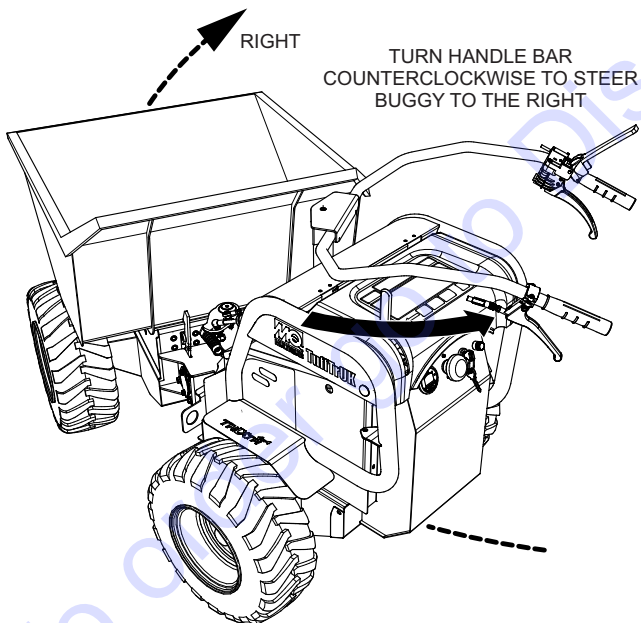


Figure 27. Steering the Buggy (CCW-Right)

### CAUTION

**DO NOT** steer the buggy left or right when traveling up or down on a grade. Travel in a straight path.

## TRAVELING ON A SLOPE

1. When traveling on a slope, it is necessary to determine the grade of the path. The TB11G/E buggies can travel up or down slopes not exceeding 25° (Figure 28). **DO NOT** travel on steeper slopes.

To determine the % grade of your path of travel, use the formula and graph in Figure 28.

2. Lateral side to side travel cannot exceed 6°.

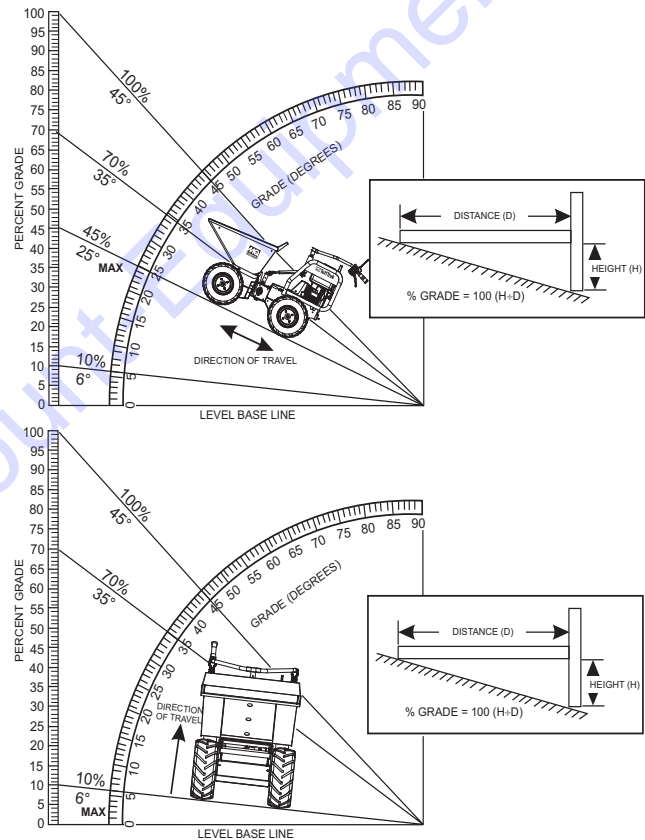


Figure 28. Determining Grade of Slope



# OPERATION (GAS/ELECTRIC)

## NOTICE

The possibility of **tipping** (Figure 29A) exist when transporting heavy loads. **ALWAYS** transport heavy loads as shown in Figure 29B.

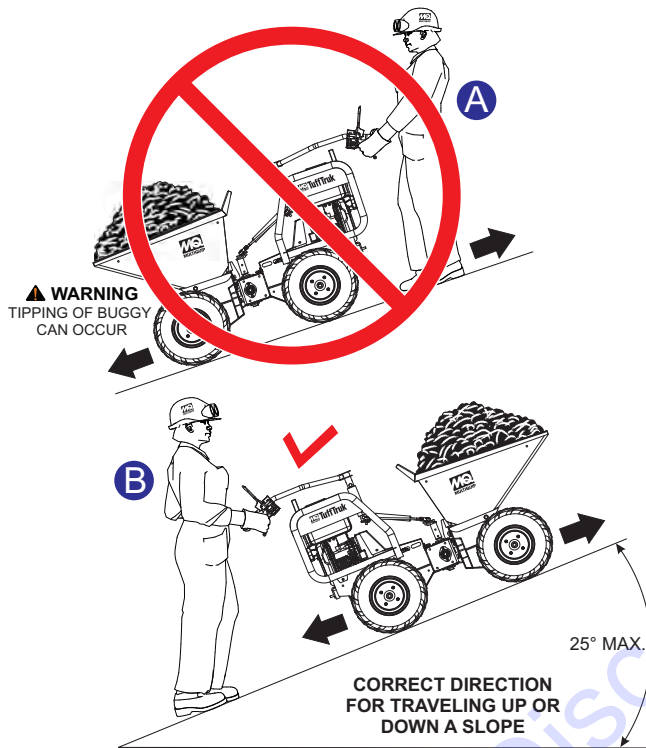


Figure 29. Slope Travel Direction

## TUB (BUCKET) DUMPING

1. To place the tub in the dump position (Figure 30) pull back on the dump lever and release. The tub will automatically rotate to the vertical position and dump its contents.

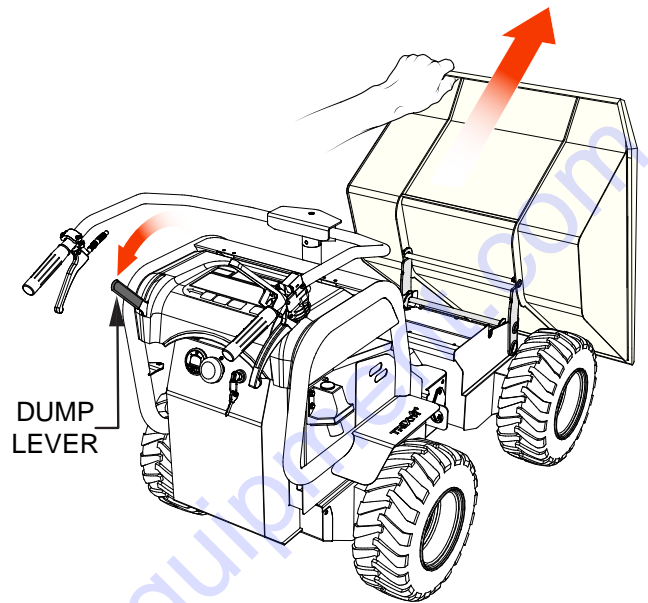


Figure 30. Tub Vertical Position

## NOTICE

If the buggy is on a incline, it might be necessary to slightly push the tub upward in a forward direction so the tub can be placed in the dump position.

2. To return the tub back to the horizontal position, grab hold of the tub (Figure 31) and push down.

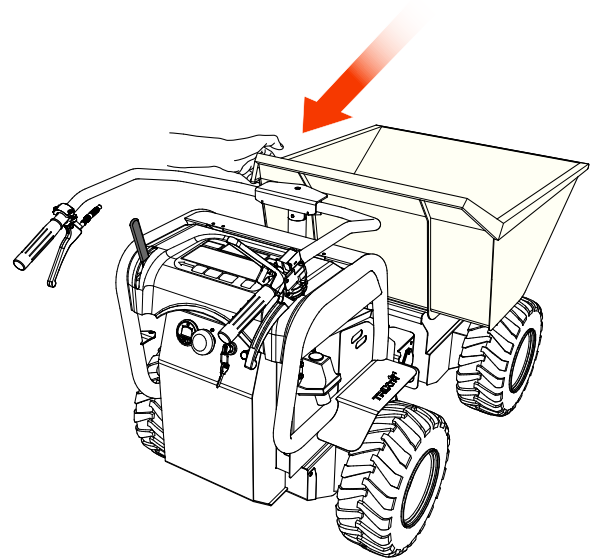


Figure 31. Tub Horizontal Position

## OPERATION (GAS/ELECTRIC)

### NORMAL SHUTDOWN (GASOLINE)

Correct shutdown is important for safe operation. Follow these general steps:

1. Release the **YELLOW** deadman lever and come to a complete stop. Brake is now set.
2. Let the engine idle for 3-5 minutes for gradual cooling.
3. Place the engine ON/OFF switch in the **OFF** position.
4. Place the fuel valve lever in the **OFF** position.
5. Block wheels if on a slope or incline.

### EMERGENCY SHUTDOWN (GASOLINE)

1. Place the engine ON/OFF switch (Figure 32) in the **OFF** position.

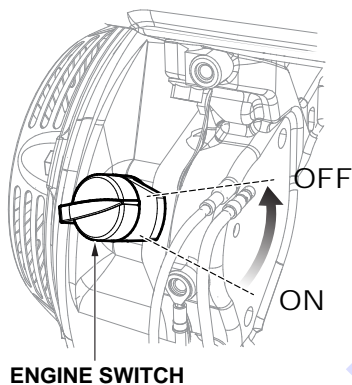


Figure 32. Engine ON/OFF Switch (OFF)

### NORMAL SHUTDOWN (ELECTRIC)

1. Release the **YELLOW** deadman lever and come to a complete stop. Brake is now set.
2. Place the ignition switch in the **OFF** position.
3. Block wheels if on a slope or incline.

### EMERGENCY SHUTDOWN (ELECTRIC)

1. Push the **EMERGENCY STOP** switch (Figure 33).

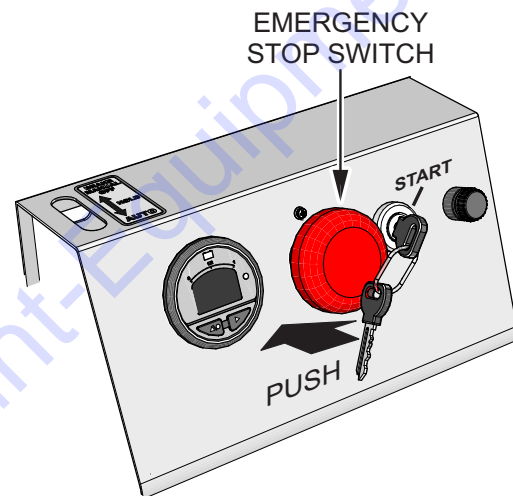


Figure 33. Emergency Stop Switch (Push)

Table 7. Engine Maintenance Schedule						
DESCRIPTION (3)	OPERATION	BEFORE EACH USE	FIRST MONTH OR 25 HRS.	EVERY 6 MONTHS OR 100 HRS.	EVERY YEAR OR 300 HRS.	EVERY 2 YEARS OR 500 HRS.
Engine Oil	Check	X				
	Change		X	X		
Engine Oil Filter	Replace	Every 100 Hrs.				
Air Cleaner	Check	X				
	Clean		X (1)			
	Change			X		X (*)
Spark Plugs	Check/Adjust			X		
	Replace				X	
Cooling Fins	Clean			X		
Fuel Filter	Replace				X (2)	
Fuel Tube	Check	Every 2 years (replace if necessary) (2)				

\* - Replace the paper filter element only.

(1) Service more frequently when used in **DUSTY** areas.

(2) These items should be serviced by your service dealer, unless you have the proper tools and are mechanically proficient. Refer to the Briggs & Stratton, Vanguard Shop Manual for service procedures.

(3) For commercial use, log hours of operation to determine proper maintenance intervals.


Table 8. Power Buggy Maintenance Schedule						
Check Item	OPERATION	DAILY	Periodic Maintenance Interval			
			Every 25 Hrs	Every 50 Hrs	Every 100-125 Hrs	Every 200 Hrs
Tub	Clean	X			X	
Tub For Cracks/Deformations	Check			X		
Tires For Severe Cuts/Wear	Check	X				
Hydraulic Oil Level (TB11G)	Check	X				X
Hydraulic Oil (TB11G)	Replace					X
Hydraulic Oil System (TB11G)	Check	X			1st time	X
Drive Chains	Clean/Lube					Once a Year
V-Belt (TB11G)	Check	X				
Bearing (TB11E)	Lube			X		
Fastners	Check	X				


# MAINTENANCE (GASOLINE)


## MAINTENANCE

When performing any maintenance on the power buggy engine or electric motor, follow all safety messages and rules for safe operation stated at the beginning of this manual.


**WARNING**

 Accidental starts can cause severe injury or death.


 **ALWAYS** place the ON/OFF switch in the OFF position.

 Disconnect and ground spark plug leads and disconnect negative battery cable from battery before servicing.

**WARNING**

 Some maintenance operations may require the engine to be run. Ensure that the maintenance area is well ventilated. Exhaust contains poisonous carbon monoxide gas that can cause unconsciousness and may result in **DEATH**

**CAUTION**

 **ALWAYS** allow the engine to cool before servicing. **NEVER** attempt any maintenance work on a hot engine.

**DANGER**

**DO NOT** use gasoline as a cleaning solvent to avoid creating the risk of fire or an explosion.

**NOTICE**

Operating the engine with loose or damaged air cleaner components could allow unfiltered air into the engine causing premature wear and failure to the engine. In addition, plugged cooling fins, and/or cooling shrouds removed will cause engine damage due to overheating.

## NOTICE

See the engine manual supplied with your machine for appropriate engine maintenance schedule and troubleshooting guide for problems.

Perform the scheduled maintenance procedures as defined by Table 7 and below:

## DAILY

- Thoroughly remove dirt and oil from the engine and control area. Clean or replace the air cleaner elements as necessary. Check and retighten all fasteners as necessary.

## WIRING

Inspect the entire buggy for bad or worn electrical wiring or connections. If any wiring or connections are exposed (insulation missing) replace wiring immediately.

## PIPING AND HOSE CONNECTION

Inspect all piping, oil hose, hydraulic hose and fuel hose connections for wear and tightness. Tighten all hose clamps and check for leaks. If any hose lines are defective replace them immediately.

## FUEL STRAINER (IF EQUIPPED)

- Thoroughly clean the area around the fuel cap.
- Remove the fuel cap from the fuel tank.
- Next, remove, inspect and clean the fuel filter (Figure 34) with solvent.

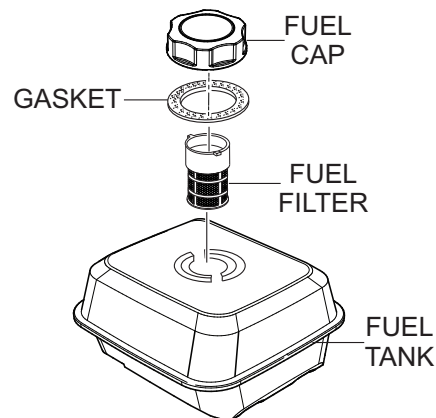


Figure 34. Fuel Strainer

# MAINTENANCE (GASOLINE)

## SPARK PLUG

1. Remove and clean the spark plug (Figure 35), then adjust the spark gap to 0.024~0.028 inch (0.6~0.7 mm). This unit has electronic ignition, which requires no adjustments.

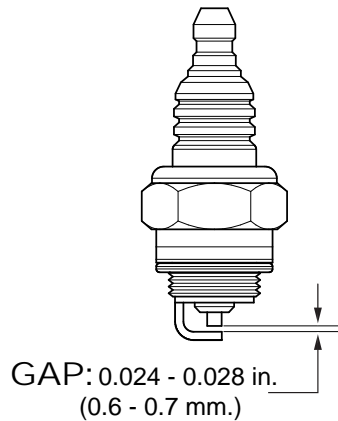


Figure 35. Spark Plug Gap

## ENGINE OIL

1. Drain the engine oil when the oil is warm as shown in (Figure 36).
2. Unscrew the oil filler dipstick from its holder.
3. Next, remove oil drain bolt and sealing washer and allow the oil to drain into a suitable container.
4. Replace engine oil with recommended type oil as listed in Table 6. For engine oil capacity, see Table 2 (Engine Specifications). **DO NOT** overfill.
5. Install drain bolt with sealing washer and tighten securely.

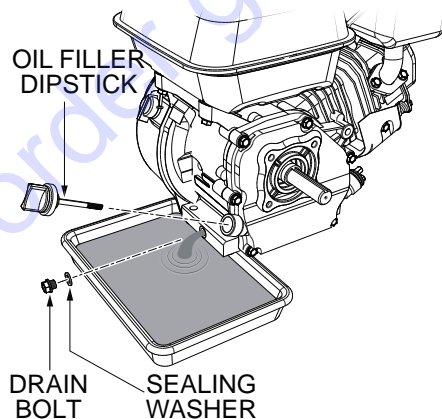


Figure 36. Draining Engine Oil

## ENGINE AIR CLEANER

1. Remove the air cleaner cover and foam filter element as shown in (Figure 37).
2. Tap the paper filter element (Figure 37) several times on a hard surface to remove dirt, or blow compressed air [not exceeding 30 psi (207 kPa, 2.1 kgf/cm<sup>2</sup>)] through the filter element from the air cleaner case side. **NEVER** brush off dirt. Brushing will force dirt into the fibers. Replace the paper filter element if it is excessively dirty.
3. Clean foam element in warm, soapy water or nonflammable solvent. Rinse and dry thoroughly. Dip the element in clean engine oil and completely squeeze out the excess oil from the element before installing.

**! DANGER**

**DO NOT** use gasoline as a cleaning solvent to avoid creating the risk of fire or an explosion.

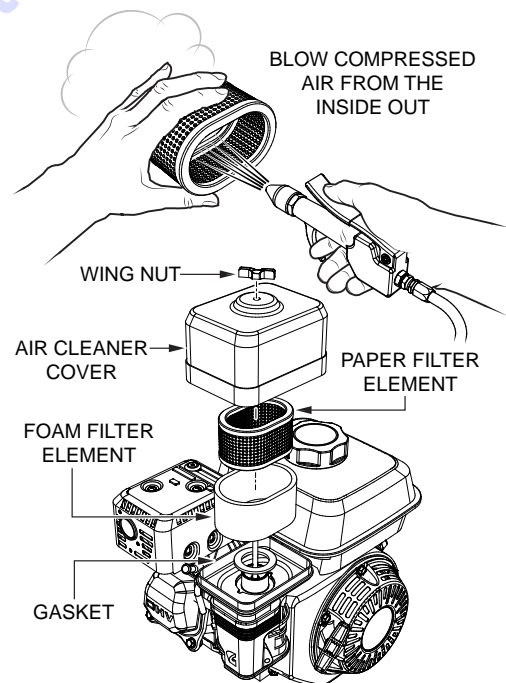


Figure 37. Engine Air Cleaner

## MAINTENANCE (GASOLINE)

### SPARK ARRESTER CLEANING (OPTIONAL)

Clean the spark arrester (Figure 38) every 6 months or 100 hours.

1. Remove the 4 mm screw (3) from the exhaust deflector (Figure 38), then remove the deflector.

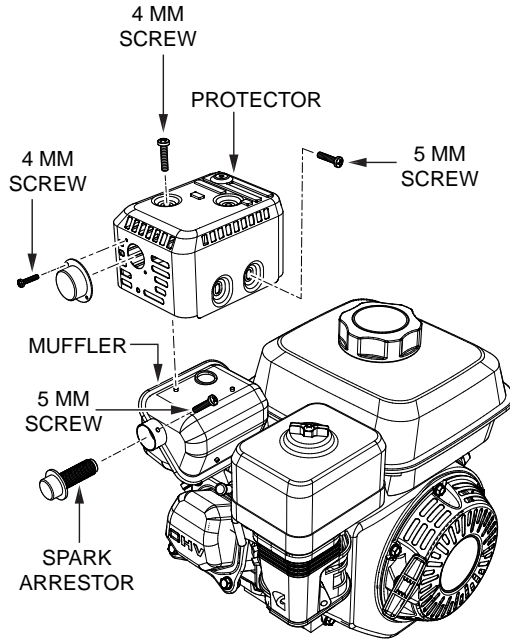


Figure 38. Spark Arrester

2. Remove the 5 mm screw (4) from the muffler protector, then remove the muffler protector.
3. Carefully remove carbon deposits from the spark arrester screen (Figure 39) with a wire brush

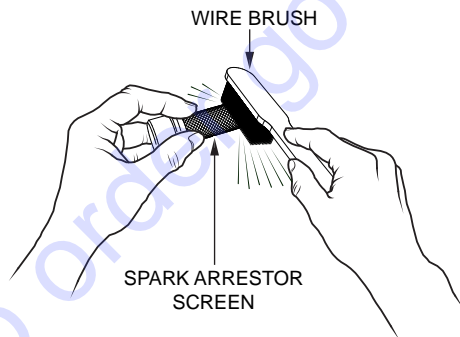


Figure 39. Cleaning The Spark Arrester

4. If the spark arrester is damaged and has breaks or holes, replace with a new one.
5. Reinstall the spark arrester and muffler protector in reverse order of disassembly.

### ADDING HYDRAULIC OIL

1. Replace hydraulic oil after every 200 hours of operation. The reservoir tank capacity is 16.90 fl. oz. (.5 liters).
2. Visually inspect the hydraulic oil level by reading the hydraulic oil level (Figure 40) indicated on the hydraulic oil tank.



Figure 40. Hydraulic Oil Reservoir Tank

3. If the hydraulic oil level is low, fill to the proper level with 20W-50 motor oil or equivalent as indicated on the tank.
4. Start the engine and read the oil level on the tank again. If oil level is still low, add motor oil as required.

#### NOTICE

If adding oil to an **empty** hydraulic drive pump, oil capacity is 77.23 fl. oz. (2.28 liters)



## MAINTENANCE (GASOLINE)

### DEADMAN CONTROL CABLE ADJUSTMENT

The **deadman** cable may require adjustment at some point in time. This cable is responsible for the dis-engagement of the safety pin, the setting and releasing of the brake. To gain access to the safety pin, the access panel **must** be removed.

1. Remove the four screws (Figure 41) that secure the rear access panel to the frame.

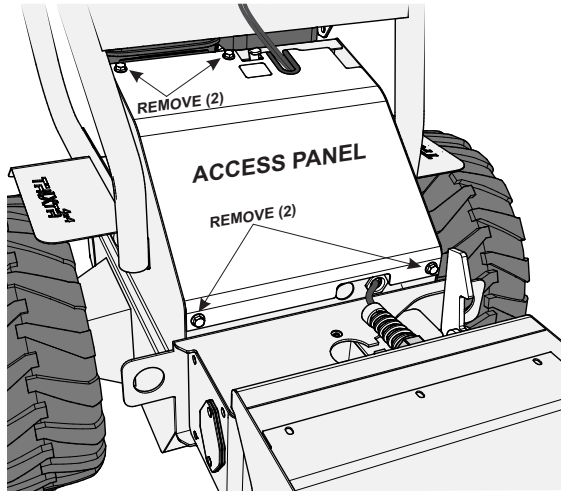


Figure 41. Rear Access Panel Removal

2. With the engine **OFF**, push down on the **YELLOW** deadman lever (Figure 42) about 10°~20°.

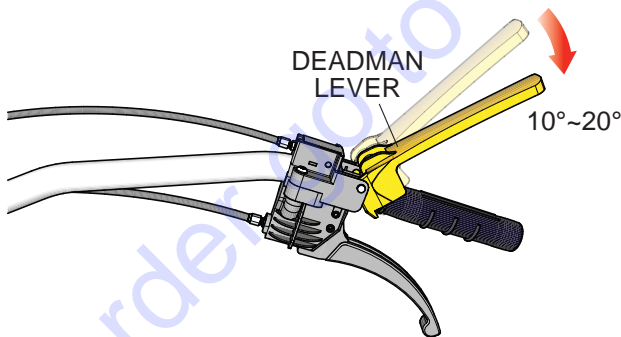


Figure 42. Deadman Lever Engaged (10°~20°)

3. Verify that the safety pin (Figure 43) has been released from the **pump direction bracket slot**.

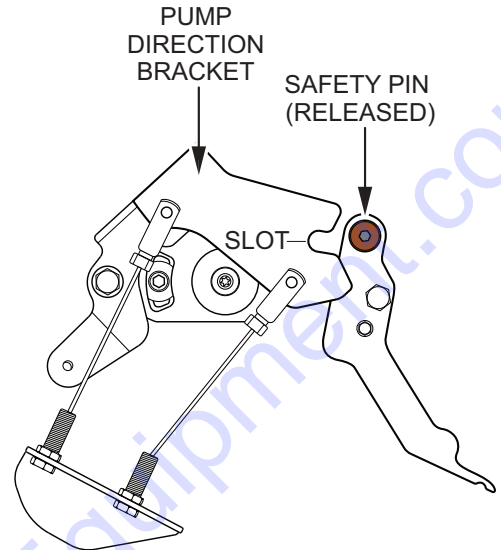


Figure 43. Safety Pin Released

4. If the safety pin has not been released from the pump direction bracket slot, adjust the nut (Figure 44) on the deadman lever until the safety pin clears the pump direction bracket slot.

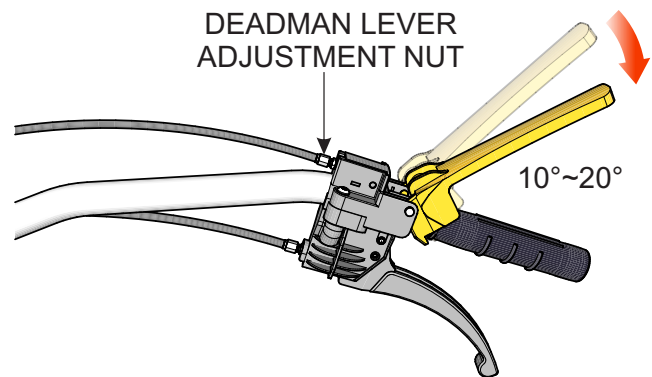


Figure 44. Deadman Lever Adjustment Nut

## MAINTENANCE (GASOLINE)

5. Release the deadman lever (Figure 45).

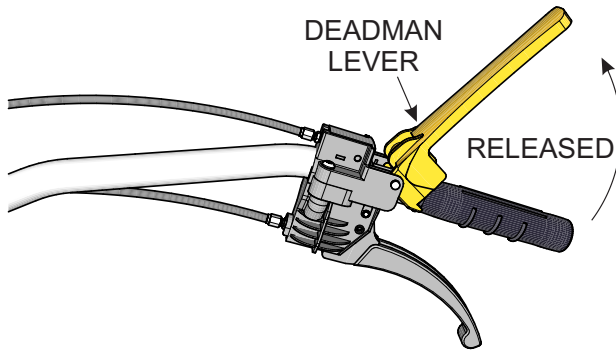


Figure 45. Deadman Lever Released (Disengaged)

6. Verify that the safety pin (Figure 46) has been properly seated back into the pump direction bracket slot.

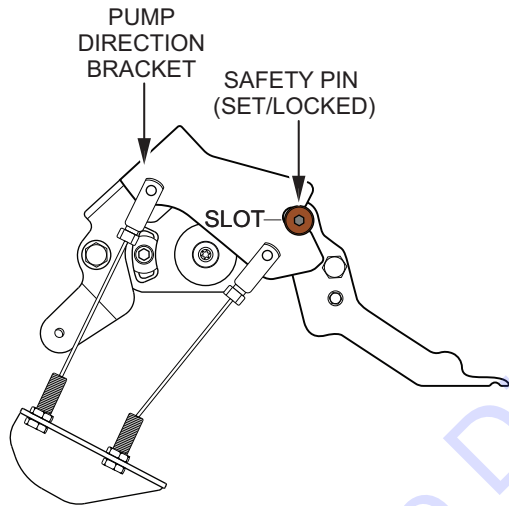


Figure 46. Safety Pin Engaged (Locked)

### DIRECTION CONTROL CABLE ADJUSTMENTS

After some use, it may become necessary to adjust the tension on the forward and reverse control cables. Please use the following procedure to make the adjustments.

#### Forward/Reverse Control Cables Adjustment

1. Fully engage the deadman control lever (Figure 47). Secure lever with a cable-tie in the closed position.

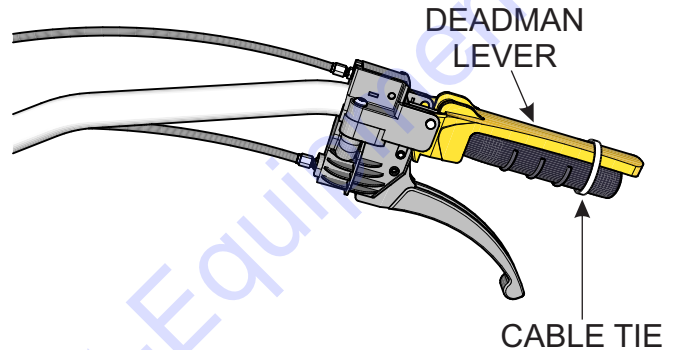


Figure 47. Securing Deadman Lever

2. Verify that the safety pin (Figure 43) has cleared the pump direction bracket slot.
3. Fully squeeze the **forward** control lever and verify that a 0.12~0.20 inch (3~5 mm) gap (Figure 48) exists between the control lever and the handle bar/hand grip.

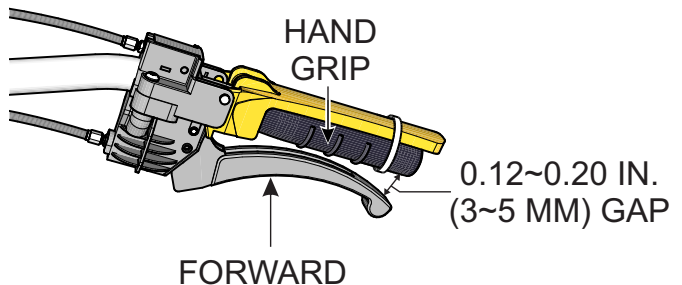
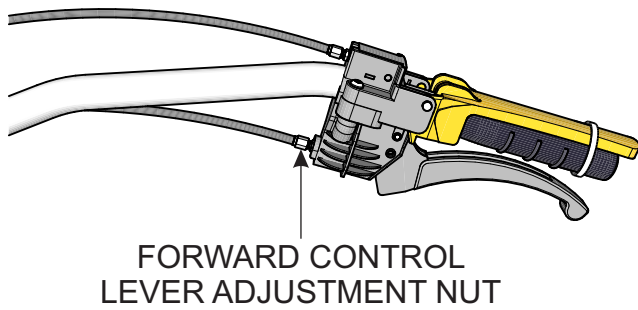


Figure 48. Forward Control Lever Gap

4. If the correct gap has not been achieved, adjust the nut (Figure 49) on the cable of the **forward lever** until the correct gap has been achieved.

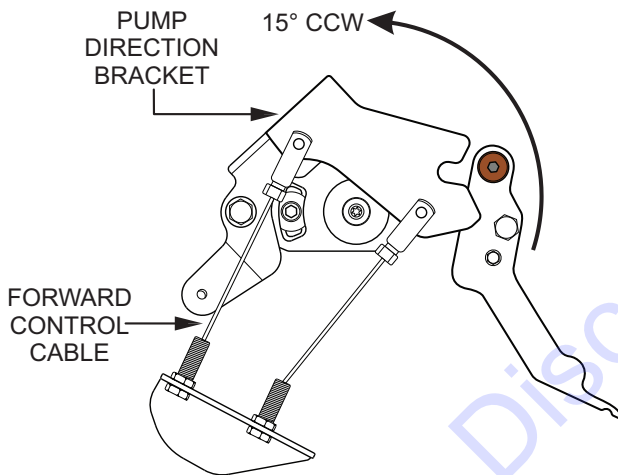


## MAINTENANCE (GASOLINE)



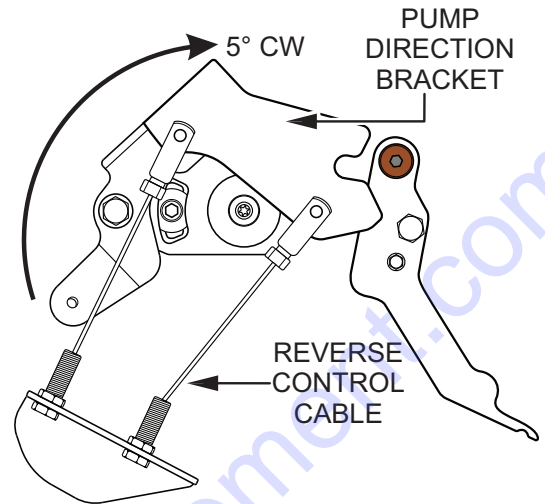
**Figure 49. Forward Control Lever Adj. Nut**

- Once the correct gap has been established and the forward control lever is fully engaged, verify that the **pump direction bracket** (Figure 50) rotates about 15° CCW.



**Figure 50. Pump Direction Bracket (CCW 15°)**

- If the correct bracket rotation (15°) has not been achieved, adjust the nut (Figure 49) on the cable of the **forward control lever** until the correct rotation has been achieved.
- Recheck forward lever control lever gap (0.12~0.20 inch/3~5 mm).
- Repeat the same procedure for the **reverse control lever** using 5° rotation for the pump direction bracket (Figure 51).



**Figure 51. Pump Direction Bracket (CW 5°)**

### PUMP NEUTRAL SETTING

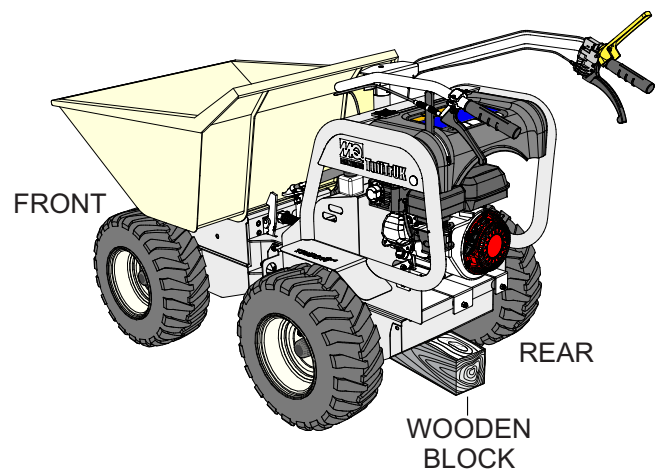
#### NOTICE

Lifting of the buggy will be required when making the pump neutral setting adjustments. Use two people to lift the TuffTruk buggy.

If the unit tends to creep while in the **neutral** position, adjustment of the pump neutral setting will be required.

The pump neutral setting requires that the buggy be placed on wooden blocks.

- Lift the buggy and place wooden blocks (Figure 52) at the front and rear of the buggy. Place blocks so that the front and rear wheels can rotate freely just above the ground.



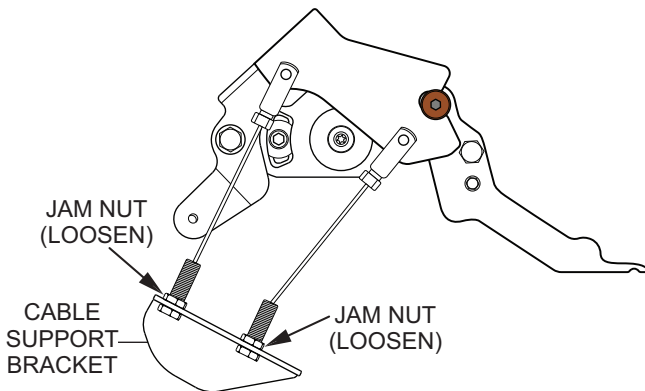
**Figure 52. Wood Block Placement**

## MAINTENANCE (GASOLINE)

### NOTICE

Disconnection of the forward and reverse control cables from the cable support bracket may not be required. If the cables have **sufficient slack**, then disconnection will not be required. Disconnect these cables only if necessary.

2. If necessary, disconnect both the forward and reverse control cables from the cable support bracket as shown in Figure 53.



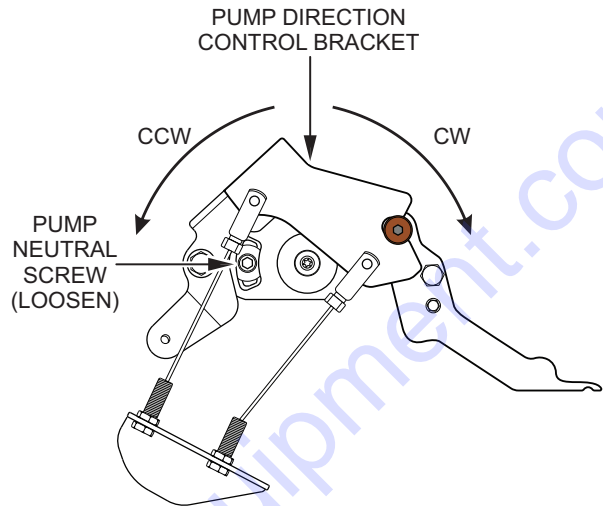
**Figure 53. FWD/REV Cable Support Bracket**

3. Start the engine and let idle.
4. Next, fully engage the **YELLOW** deadman control lever (Figure 47). Secure lever with tape or rubber band in the **closed** position.

### CAUTION

When loosening the pump neutral screw or rotating the pump direction control bracket, be sure to keep **hands clear** of the V-belt and pulley. Possibility exists of entanglement.

5. Using a 3/16-inch allen wrench, loosen the pump neutral setting screw (Figure 54).



**Figure 54. Pump Neutral Setting Screw**

6. Slightly move the **pump direction control bracket** (Figure 54) either CW or CCW. Tighten pump neutral setting screw.
7. Verify if the front or rear wheels are rotating (creeping). If buggy still creeps, repeat steps 5 and 6.
8. If the forward and reverse control cables were disconnected, reconnect to the cables to the support bracket.
9. Fully engage the forward control lever and verify that the wheels rotate between 74~78 rpm's in the forward direction.
10. Fully engage the reverse control lever and verify that the wheels rotate between 28~32 rpm's in the reverse direction.
11. Turn off engine.

# MAINTENANCE (ELECTRIC)

## FREE-WHEEL

In the event the buggy loses power a free-wheel feature has been built into the buggy so that the unit can be moved due to loss of power.

### Gas Version

1. **Pull up** on the transmission bypass lever (Figure 55).

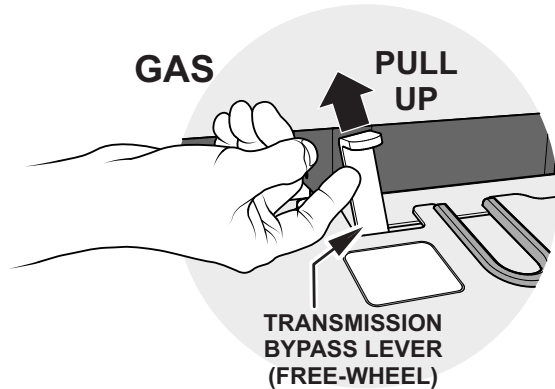


Figure 55. Transmission Bypass Lever (Free-Wheel)

2. Next, fully squeeze the **YELLOW** deadman lever.
3. The buggy can now be moved.

### Electric Version

1. **Push** and **hold** the brake bypass lever (Figure 56).

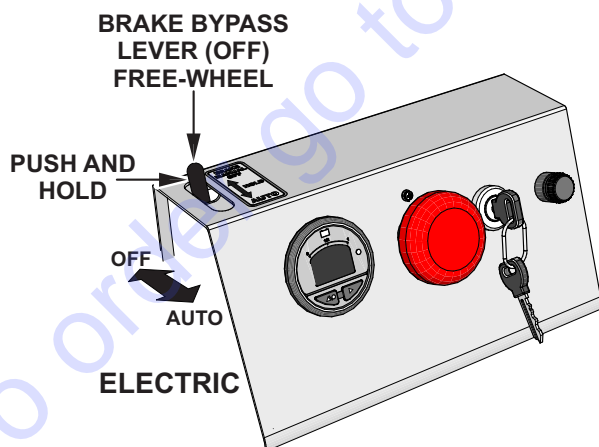


Figure 56. Brake Bypass Lever

2. The buggy can now be moved.

## BATTERY CHARGER

The TB11E buggy has a built-in 24 VDC battery charger. When charging of the battery is required, perform the following:

### NOTICE

The battery charger installed on the TB11E is a Smart Charger, it can be left connected to the batteries after full charge (green light on) without harming batteries.

The charger uses minimum power in this stand-by mode (battery fully charged) and maintains the batteries at full charge and extends battery life.

1. Place the ignition switch key (Figure 57) on the **OFF** position.

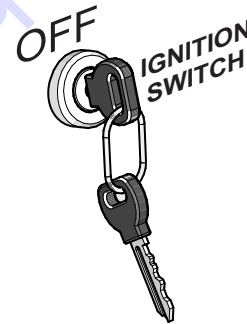


Figure 57. Ignition Switch (OFF)

2. Push the **EMERGENCY STOP** switch (Figure 58).

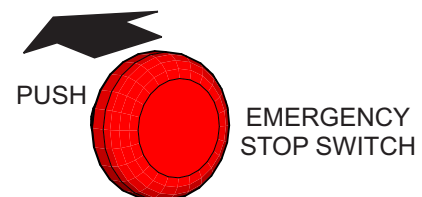
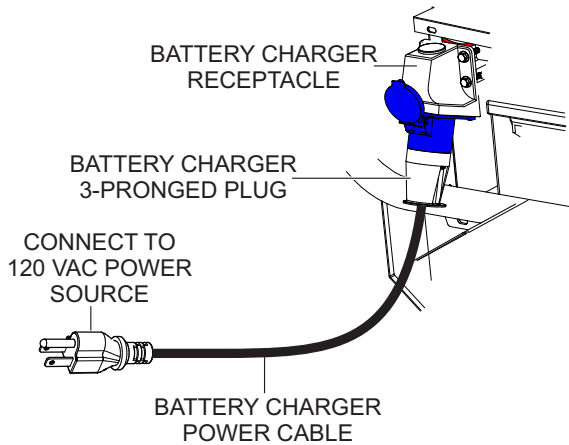


Figure 58. Emergency Stop Switch (Push)

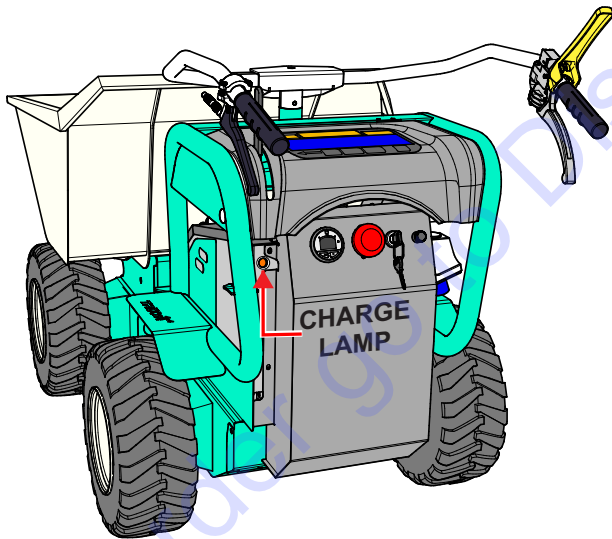
## MAINTENANCE (ELECTRIC)

3. Insert the 3-pronged blue and white battery charger power cable plug into the battery charger receptacle as shown in Figure 59.



**Figure 59. Battery Charger Power Cable**

4. Next, connect the other end of the battery charger power cable to a 120 VAC voltage source.
5. Charging of the batteries can be observed by viewing the small window (Figure 60) on the left-hand side of the battery box.



**Figure 60. Charging Light**

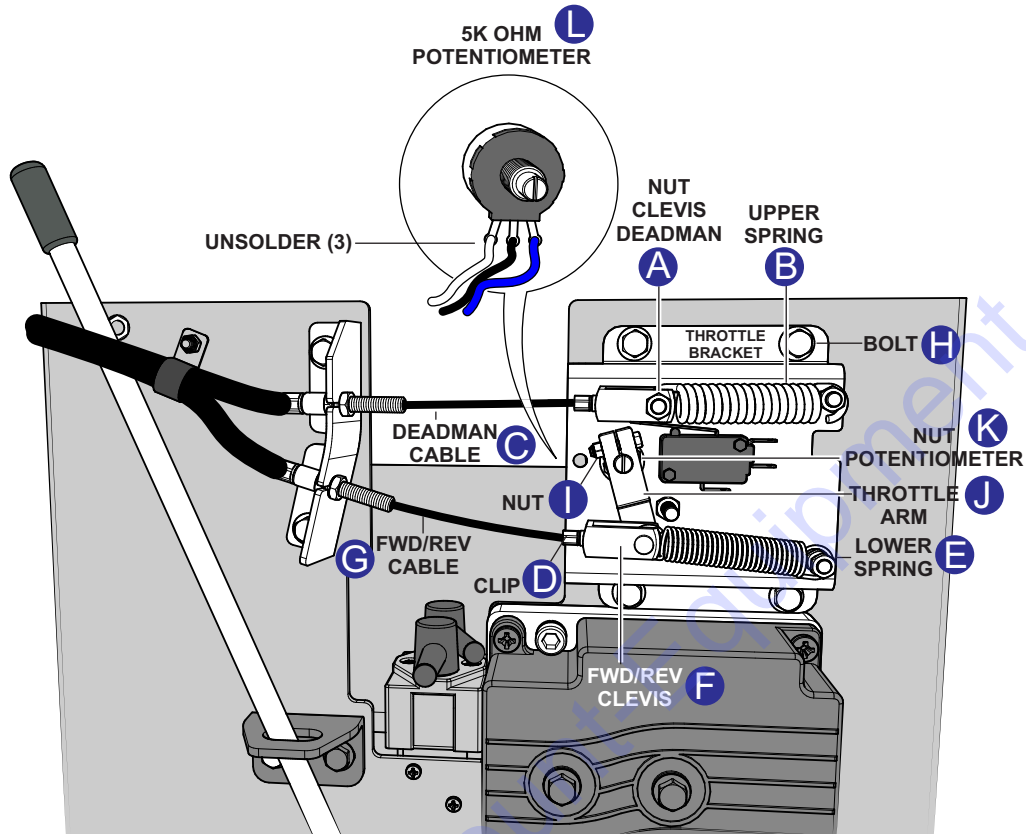
6. The charging light is normally **orange** which changes to **green** when the battery is fully charged.

### 5K OHM POTENTIOMETER REPLACEMENT

The speed on the the electric buggy is controlled by a 5K ohm potentiometer. This potentiometer provides a 0~5 VDC input signal to the motor controller via pin-13. Reference wiring diagram.

Use the following procedure when installing a replacement potentiometer. Reference Figure 61.

1. Lift the buggy and place wooden blocks at the front and rear of the buggy. Place blocks so that the front and rear wheels can rotate freely just above the ground.
2. Remove the four screws that secure the control panel to the frame.
3. Carefully set control panel down.
4. Loosen the nut on the **deadman clevis** (Figure 61A) that secures the deadman cable to the throttle bracket upper spring.
5. Remove bolt, black rubber spacer and **upper** spring (Figure 61B) from the deadman clevis.
6. Position deadman cable (Figure 61C) away from throttle bracket.
7. Unhook the clip attached to the FWD/REV clevis (Figure 61D). Position the clip downward.
8. Next, remove the **lower** spring (Figure 61E) from the FWD/REV clevis.
9. Remove the FWD/REV clevis (Figure 61F) from the throttle arm.
10. Position the FWD/REV cable (Figure 61G) away from throttle bracket.
11. Remove the four bolts (Figure 61H) that secure the throttle bracket to the frame.
12. Loosen the nut (Figure 61I) that secures the potentiometer to the throttle arm.
13. Slide the throttle arm (Figure 61J) off the output shaft of the potentiometer.
14. Remove the nut that secures the potentiometer to the throttle bracket (Figure 61K).
15. Next, unsolder the **WHITE**, **BLACK** and **BLUE** wires connected to the potentiometer (Figure 61L). Mark orientation.
16. Solder the **WHITE**, **BLACK** and **BLUE** wires removed in step 15 back onto the 5K ohm replacement potentiometer in the same orientation.



**Figure 61. 5K Ohm Potentiometer Replacement**

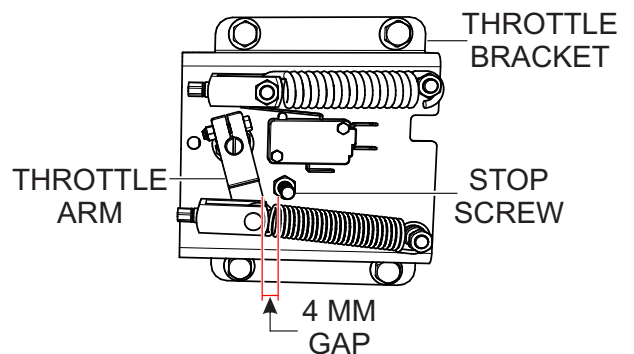
17. Install new 5K ohm potentiometer back onto throttle bracket and secure with retaining nut.
18. Reinstall throttle arm back onto output shaft of potentiometer. Do not tighten retaining nut at this time.
19. Reconnect deadman and FWD/REV cables and associated hardware back onto throttle bracket.
5. Tighten the nut (Figure 61I) that secures the output shaft of the potentiometer to the throttle arm.
6. Remove support blocks, and reinstall control panel.

## THROTTLE ADJUSTMENT

1. Using a small flat blade screw driver, rotate the shaft on the potentiometer **fully** counterclockwise.
2. Fully engage the deadman control lever, then fully squeeze the forward speed control lever.
3. Verify that a 4mm gap ( ) exist between the throttle arm and the stop screw. Adjust if necessary.
4. With the deadman lever held down and the forward speed lever still fully engaged, turn the potentiometer adjustment screw slowly clockwise until the motor **clicks**. Verify that the wheels rotate forward. slowly

### NOTICE

Ensure when the forward speed lever is released the motor dis-engages the drive before the potentiometer arm makes contact with the stop screw.



**Figure 62. Throttle Arm Gap (4 MM)**



# MAINTENANCE (GAS/ELECTRIC)

## DRIVE CHAIN LUBRICATION

There are **three** drive chains that require lubrication at least once a year. Follow the procedure below when lubrication of the drive chains are required.

### Drive Chains Lubrication

#### NOTICE

Lifting of the buggy will be required when lubrication of the three drive chains is required. Use two people to lift the TuffTruk buggy.

1. Pull back on the dump lever and place the tub in the dump position.
2. Next, remove the **six** bolts that secure the front drive chain access panel (Figure 63) to the frame. Set the bolts aside and remove access panel.

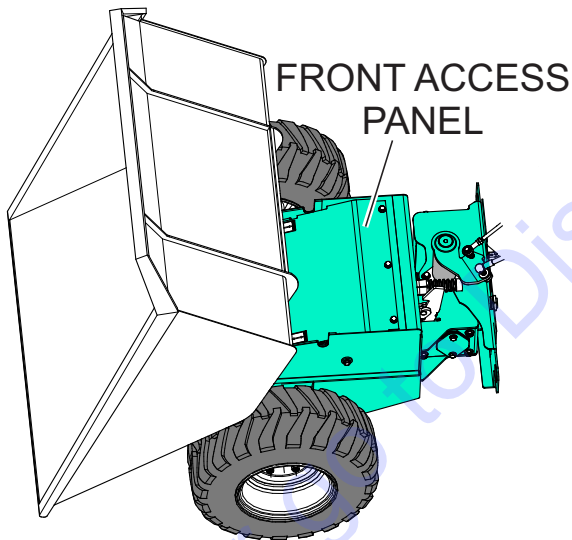


Figure 63. Front Access Panel Removal

3. Next, remove the **four** bolts that secure the rear drive chains access panel to the frame. Set the bolts aside and remove access panel.

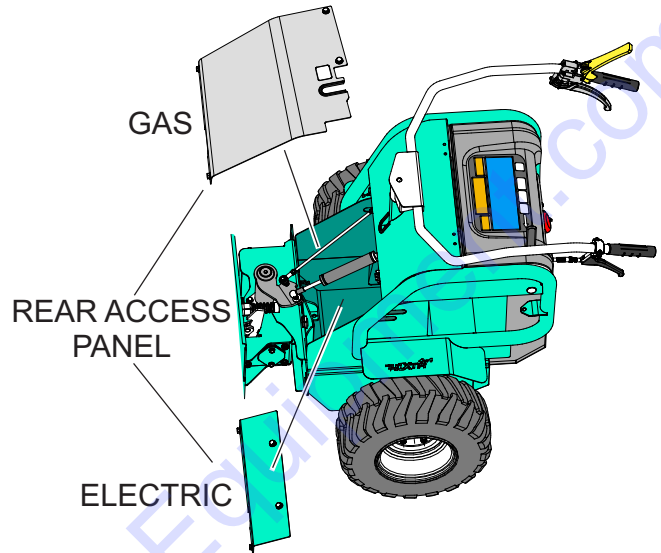


Figure 64. Rear Access Panel Removal

4. Lift the buggy and place wooden blocks at the front and rear of the buggy as shown in Figure 52. Place blocks so that the front and rear wheels can rotate freely just above the ground.
5. Start the engine and let idle.
6. Fully squeeze the **YELLOW** deadman lever and hold down.
7. Next, slightly squeeze the **forward** speed control lever and verify that all three chains are rotating.
8. Using chain lube lubricant (Figure 65), lubricate each rotating chain.



# MAINTENANCE (GAS/ELECTRIC)

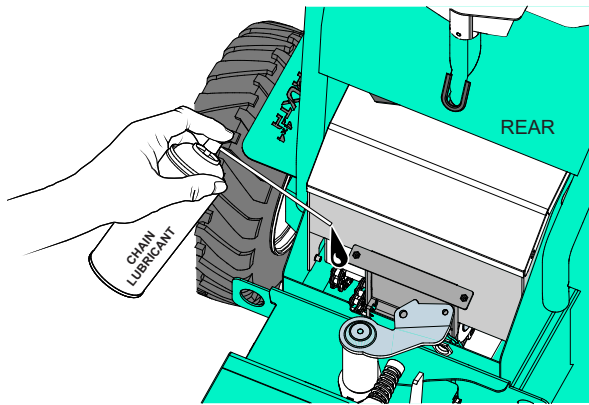
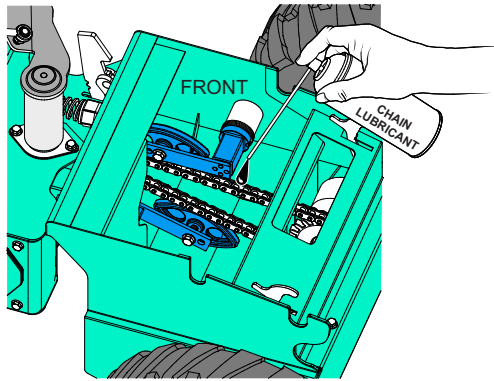


Figure 65. Lubricating Drive Chains

9. Reinstall all access panels. Tighten bolts securely.

## Zerk Fitting Lubrication

1. Lubricate the zerk fitting as shown in Figure 66 using lithium base grease, grade NO.1 once a year. Apply two shots of grease

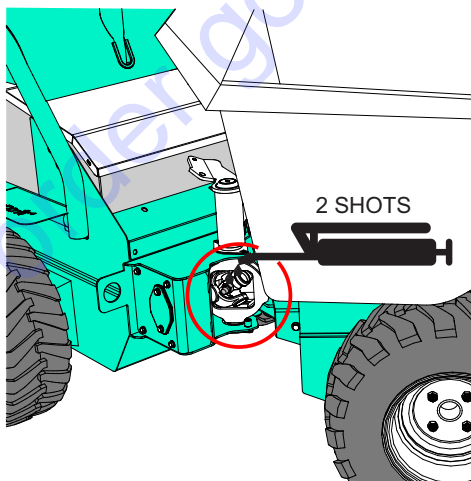


Figure 66. Zerk Fitting Lubrication

## TIRES/WHEELS/LUG NUTS

Tires and wheels are very important and critical components of the buggy. When specifying or replacing the wheels, it is important that the wheels, tires, and axle are properly matched.

### CAUTION

**DO NOT** attempt to repair or modify a wheel. If the rim is cracked, replace the rim immediately and inspect the tire for cuts, wear, and deformations.

## TIRE WEAR

The tires (Figure 67) used on the power buggy are pneumatic. Proper inflation is 28 PSI (193 kPa). In addition, inspect the tires for cuts, wear and deformity.

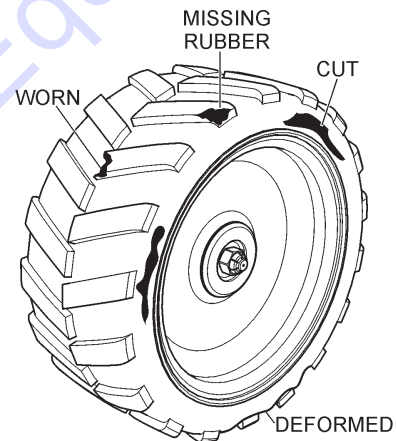


Figure 67. Tire Inspection

# MAINTENANCE (GAS/ELECTRIC)

## LUG NUT TORQUE REQUIREMENTS

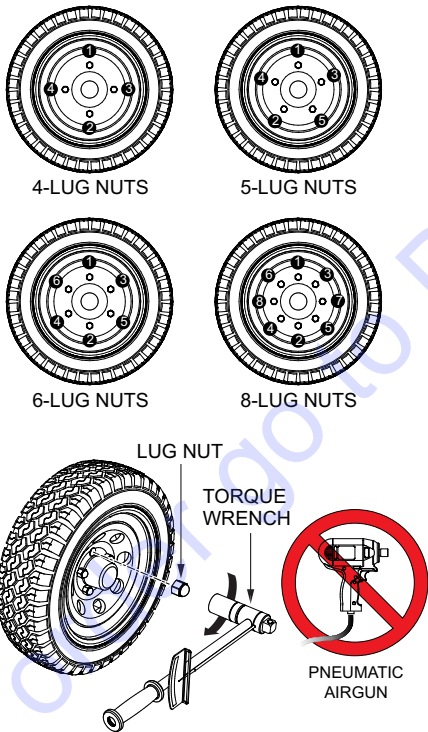
It is extremely important to apply and maintain proper wheel mounting torque on the TuffTruk. Be sure to use only the fasteners matched to the cone angle of the wheel. Proper procedure for attachment of the wheels is as follows:

1. Start all wheel lug nuts by hand.
2. Torque all lug nuts (Figure 68) in sequence. **DO NOT** torque the wheel lug nuts all the way down. Tighten each lug nut in 3 separate passes as defined by Table 9.

**Table 9. Tire Torque Requirements**

Wheel Size	First Pass FT-LBS	Second Pass FT-LBS	Third Pass FT-LBS
480 x 8 in.	20-25	35-40	50-65

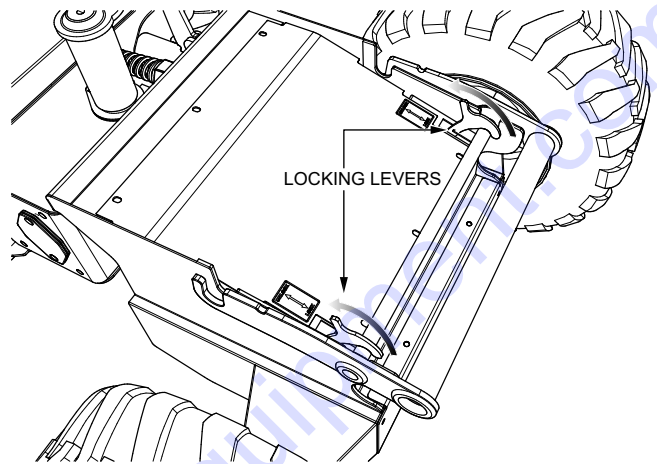
3. After first road use, retorque all lug nuts in sequence. Check all wheel lug nuts periodically.



**Figure 68. Lug Nut Torque Sequence**

## TUB REMOVAL/PLACEMENT

1. Place both locking levers in the **unlock** position (Figure 69).



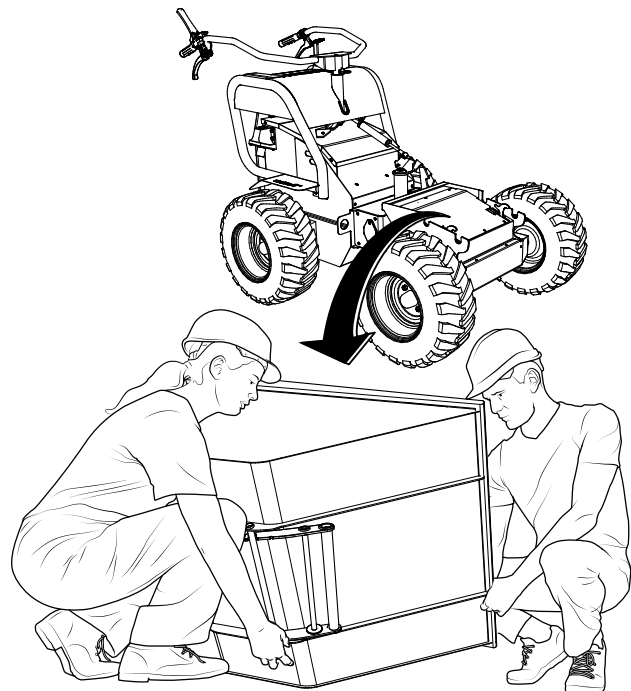
**Figure 69. Locking Levers (Unlock)**

2. With **two people**, lift and remove the tub (Figure 70). Place the tub onto its side away from the unit.



### CAUTION

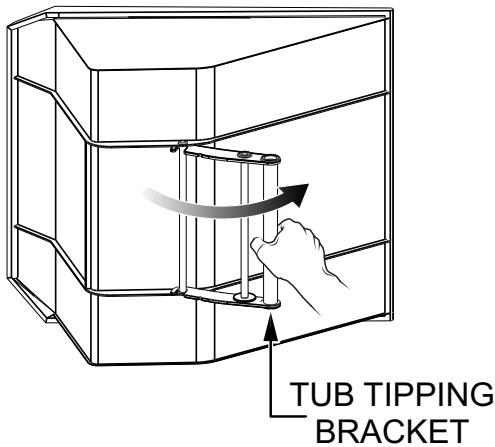
**DO NOT** attempt to lift or move the tub by yourself.



**Figure 70. Tub Removal**

## MAINTENANCE (GAS/ELECTRIC)

3. Orient the tub tipping bracket to the base of the tub as shown in Figure 71.
5. Tilt the tub into its discharge position and place both locking levers in the **lock** position (Figure 73).

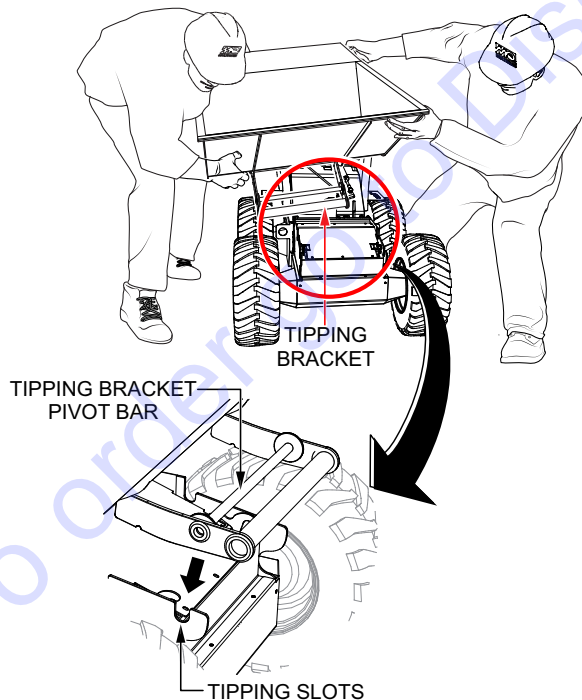


**Figure 71. Tipping Bracket Orientation**

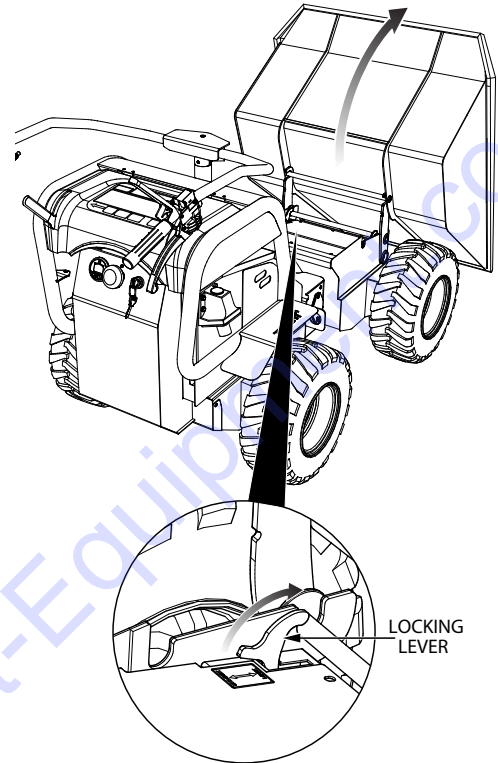
4. With **two people**, lift the tub and tipping bracket onto the chassis (Figure 72). Make sure the tipping bracket pivot bar rests within the tipping slots.

**CAUTION**

**DO NOT** attempt to lift or move the tub by yourself.

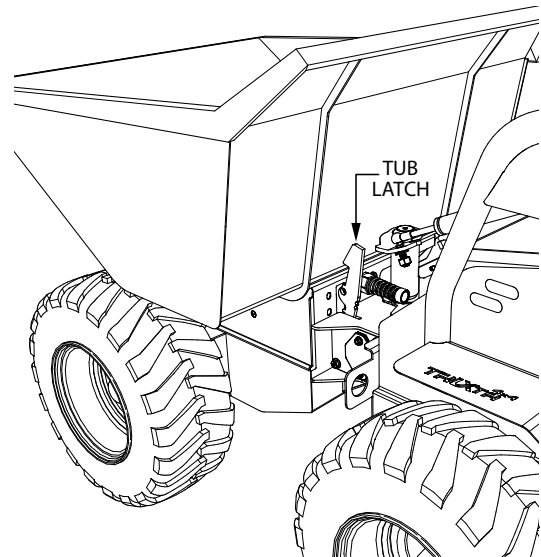


**Figure 72. Tub Placement**



**Figure 73. Locking Levers (Lock)**

6. Place the tub in the forward position and make sure it is secured firmly under the tub catch (Figure 74). Adjust the tub catch if necessary.



**Figure 74. Tub Latch**

### TUFFTRUK BUGGY STORAGE

**! CAUTION**

**NEVER** store the power buggy with fuel in the tank for any extended period of time. **ALWAYS** clean up spilled fuel immediately.

For storage of the buggy for over 30 days, the following is recommended:

- Run the engine until the gasoline in the carburetor is completely consumed.
- Drain the fuel tank completely, or add STA-BIL to the fuel.
- Completely drain the oil from the crankcase and refill with fresh oil.
- Remove the spark plug, pour 2 or 3 cc of SAE 30 oil into the cylinder and crank slowly to distribute the oil.
- Slowly rotate the engine a few times with the starter rope and install a new plug.
- Pull out the starter rope slowly and stop at the compression point.
- Clean the entire buggy and engine compartment.
- Clean drum of all debris and foreign matter.
- Cover the buggy with a plastic sheet in a moisture and dust-free location out of direct sunlight.

# TROUBLESHOOTING (ENGINE)

Troubleshooting (Engine)		
Symptom	Possible Problem	Solution
Difficult to start, fuel is available, but no spark at spark plug.	Spark plug bridging?	Check gap, insulation or replace spark plug.
	Carbon deposit on spark plug?	Clean or replace spark plug.
	Short circuit due to deficient spark plug insulation?	Check spark plug insulation, replace if worn.
	Improper spark plug gap?	Set to proper gap.
	Spark plug is red?	Check transistor ignition unit.
	Spark plug is bluish white?	If insufficient compression, repair or replace engine. If injected air leaking, correct leak. If carburetor jets clogged, clean carburetor.
	No spark present at tip of spark plug?	Check if transistor ignition unit is broken, and replace defective unit. Check if voltage cord cracked or broken and replace. Check if spark plug if fouled and replace.
	No oil?	Add oil as required.
	Oil pressure alarm lamp blinks upon starting? (if applicable)	Check automatic shutdown circuit, "oil sensor". (if applicable)
Difficult to start, fuel is available, and spark is present at the spark plug.	ON/OFF switch is shorted?	Check switch wiring, replace switch.
	Ignition coil defective?	Replace ignition coil.
	Improper spark gap, points dirty?	Set correct spark gap and clean points.
	Condenser insulation worn or short circuiting?	Replace condenser.
	Spark plug wire broken or short circuiting?	Replace defective spark plug wiring.
Difficult to start, fuel is available, spark is present and compression is normal.	Wrong fuel type?	Flush fuel system, replace with correct type of fuel.
	Water or dust in fuel system?	Flush fuel system.
	Air cleaner dirty?	Clean or replace air cleaner.
	Choke open?	Close choke.
Difficult to start, fuel is available, spark is present and compression is low.	Suction/exhaust valve stuck or protruded?	Reseat valves.
	Piston ring and/or cylinder worn?	Replace piston rings and/or piston.
	Cylinder head and/or spark plug not tightened properly?	Torque cylinder head bolts and spark plug.
No fuel present at carburetor.	Head gasket and/or spark plug gasket damaged?	Replace head and spark plug gaskets.
	No fuel in fuel tank?	Fill with correct type of fuel.
	Fuel cock does not open properly?	Apply lubricant to loosen fuel cock lever, replace if necessary.
	Fuel filter/lines clogged?	Replace fuel filter.
	Fuel tank cap breather hole clogged?	Clean or replace fuel tank cap.
Air in fuel line?	Bleed fuel line.	

## TROUBLESHOOTING (ENGINE)

Troubleshooting (Engine) - continued		
Symptom	Possible Problem	Solution
Weak in power, compression is proper and does not misfire.	Air cleaner dirty?	Clean or replace air cleaner.
	Improper level in carburetor?	Check float adjustment, rebuild carburetor.
	Defective spark plug?	Clean or replace spark plug.
	Improper spark plug?	Set to proper gap.
Weak in power, compression is proper but misfires.	Water in fuel system?	Flush fuel system and replace with correct type of fuel.
	Dirty spark plug?	Clean or replace spark plug.
	Ignition coil defective?	Replace ignition coil.
Engine overheats	Wrong type of fuel?	Replace with correct type of fuel.
	Cooling fins dirty?	Clean cooling fins.
	Intake air restricted?	Clear intake of dirt and debris. Replace air cleaner elements as necessary.
	Oil level too low or too high?	Adjust oil to proper level.
Rotational speed fluctuates.	Governor adjusted incorrectly?	Adjust governor.
	Governor spring defective?	Replace governor spring.
	Fuel flow restricted?	Check entire fuel system for leaks or clogs.
Recoil starter malfunctions. (if applicable)	Recoil mechanism clogged with dust and dirt?	Clean recoil assembly with soap and water.
	Spiral spring loose?	Replace spiral spring.
Starter malfunctions.	Loose, damaged wiring?	Ensure tight, clean connections on battery and starter.
	Battery insufficiently charged?	Recharge or replace battery.
	Starter damaged or internally shorted?	Replace starter.
Burns too much fuel.	Over-accumulation of exhaust products?	Check and clean valves. Check muffler and replace if necessary.
	Wrong spark plug?	Replace spark plug with manufacturer's suggested type.
Exhaust color is continuously "white".	Lubricating oil is wrong viscosity?	Replace lubricating oil with correct viscosity.
	Worn rings?	Replace rings.
Exhaust color is continuously "black".	Air cleaner clogged?	Clean or replace air cleaner.
	Choke valve set to incorrect position?	Adjust choke valve to correct position.
	Carburetor defective, seal on carburetor broken?	Replace carburetor or seal.
	Poor carburetor adjustment, engine runs too rich?	Adjust carburetor.
Will not start, no power with key "ON". (if applicable)	ON/OFF device not activated ON?	Turn on ON/OFF device.
	Battery disconnected or discharged?	Check cable connections. Charge or replace battery
	Ignition switch/wiring defective?	Replace ignition switch. Check wiring.



## TROUBLESHOOTING (GAS)

Troubleshooting (Power Buggy Gas)		
Symptom	Possible Problem	Solution
Loss of Power.	FWD/REV speed cables out of adjustment?	Adjust FWD/REV speed control cables. Replace cables if necessary.
	Hydraulic drive pump defective?	Check or replace hydraulic drive pump.
	Hydraulic oil level low?	Check hydraulic oil level. Add oil if necessary.
	Low engine RPM?	Check engine speed.
	Defective V-belt?	Check or replace V-belt.
Loss of Travel Speed.	FWD/REV speed cables out of adjustment?	Adjust FWD/REV speed control cables.
	Parking brake in free-wheel position?	Place parking brake lever in set (down) position.
	Hydraulic drive pump defective?	Check or replace hydraulic drive pump.
System Operating Hot.	Hydraulic oil level low?	Check hydraulic oil level add hydraulic oil if necessary.
	Defective cooling fan?	Inspect cooling fan, replace if necessary.
System jerky when started.	FWD/REV speed cables out of adjustment?	Adjust FWD/REV speed control cables.
	Defective hydraulic drive pump?	Check drive pump, replace if necessary.
Difficult to steer.	Low tire pressure?	Check tire pressure.
Parking brake will not hold.	Pump neutral setting incorrect?	Adjust pump neutral setting.
Difficulty in stopping.	Deadman lever out of adjustment?	Adjust deadman lever.
	Pump neutral setting incorrect?	Adjust pump neutral setting.
Engine will not start.	Low on fuel or fuel tank empty?	Add fuel.
	Engine ON/OFF switch in OFF position?	Set engine ON/OFF switch to ON position.
	Fuel Shut-off valve CLOSED?	Open Fuel shut-off valve.

## TROUBLESHOOTING (ELECTRIC)

Troubleshooting (Power Buggy Electric)		
Symptom	Possible Problem	Solution
Loss of Power.	Defective motor controller?	Check or replace motor controller.
	125A main fuse blown?	Check or replace fuse.
	10A ignition fuse blown?	Check or replace fuse.
	Emergency Stop Switch open?	<b>CLOSE</b> switch. Pull to close.
	Low electric motor RPM?	Check electric motor voltage.
	Defective batteries?	Check or replace batteries.
	Defective contactor?	Check or replace contactor.
Loss of Travel Speed.	FWD/REV speed cable signal not present?	Check or replace 5K ohm potentiometer.
	REV speed switch signal not present?	Check or replace switch inside reverse lever.
	Parking brake in free-wheel position?	Place parking brake lever in set (AUTO) position.
System jerky when started.	Defective motor controller?	Check or replace motor controller/software.
	FWD/REV speed signal intermittent?	Check or replace 5K ohm potentiometer.
Difficult to steer.	Low tire pressure?	Check tire pressure.
	Defective damper or steering rod?	Check or replace damper or steering rod.
Parking brake will not hold.	Defective electric motor?	Check or replace electric motor.
	Defective motor controller?	Check or replace motor controller/software.
Difficulty in stopping.	Defective deadman microswitch?	Check or replace microswitch.
	Defective brake motor?	Check or replace electric motor.
	Defective motor controller?	Check or replace motor controller/software.
Electric motor will not start.	Defective motor controller?	Check or replace motor controller.
	125A main fuse blown?	Check or replace fuse.
	10A ignition fuse blown?	Check or replace fuse.
	Emergency Stop Switch open?	Close switch. Pull to close.
	Defective batteries?	Check or replace batteries.
	Defective contactor?	Check or replace contactor.
	Defective ignition switch?	Check or replace ignition switch.

## DIAGNOSTICS

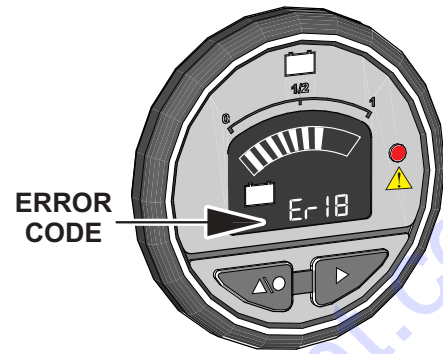
### NOTICE

The Curtis 1229 controller is not repairable in the field. Please contact your nearest Multiquip Authorized Service Center (ASC) for repair or replacement.

The Curtis1229 controller detects a wide variety of faults or error conditions. Diagnostic information will be shown on the Curtis 3100R diagnostic display (Figure 75). Error or faults will be displayed in the format “Er ##”.

The error code shown in Figure 75 is an **encoder** failure (Er 18). Reference the error code table shown below for additional codes.

Some errors may be corrected by simply turning the ignition key off, then back on and see if the fault clears. If that does not work turn the ignition to the off position and remove the 35-pin connector from the controller.

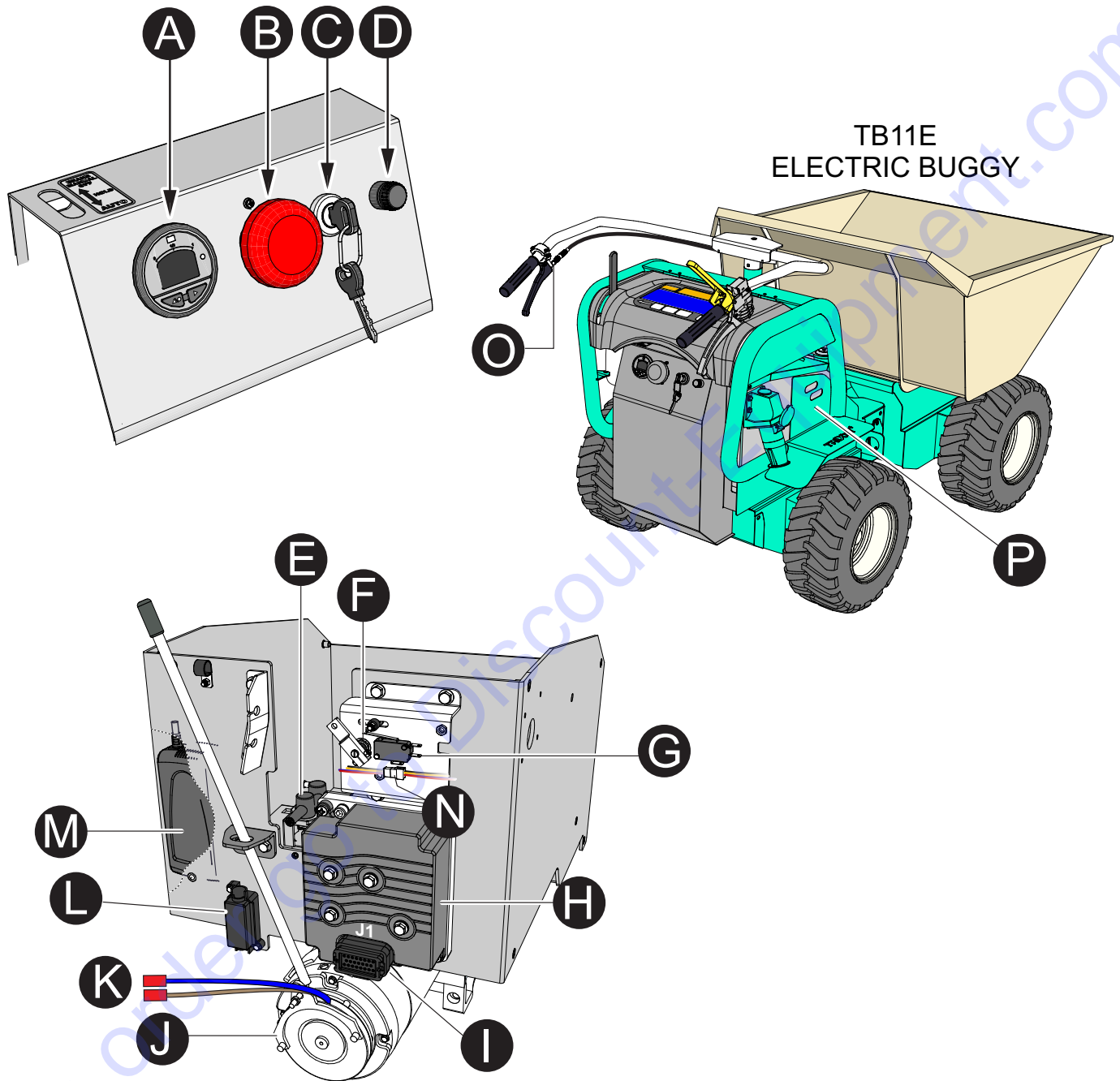


**Figure 75. Curtis 3100 Diagnostic Gauge**

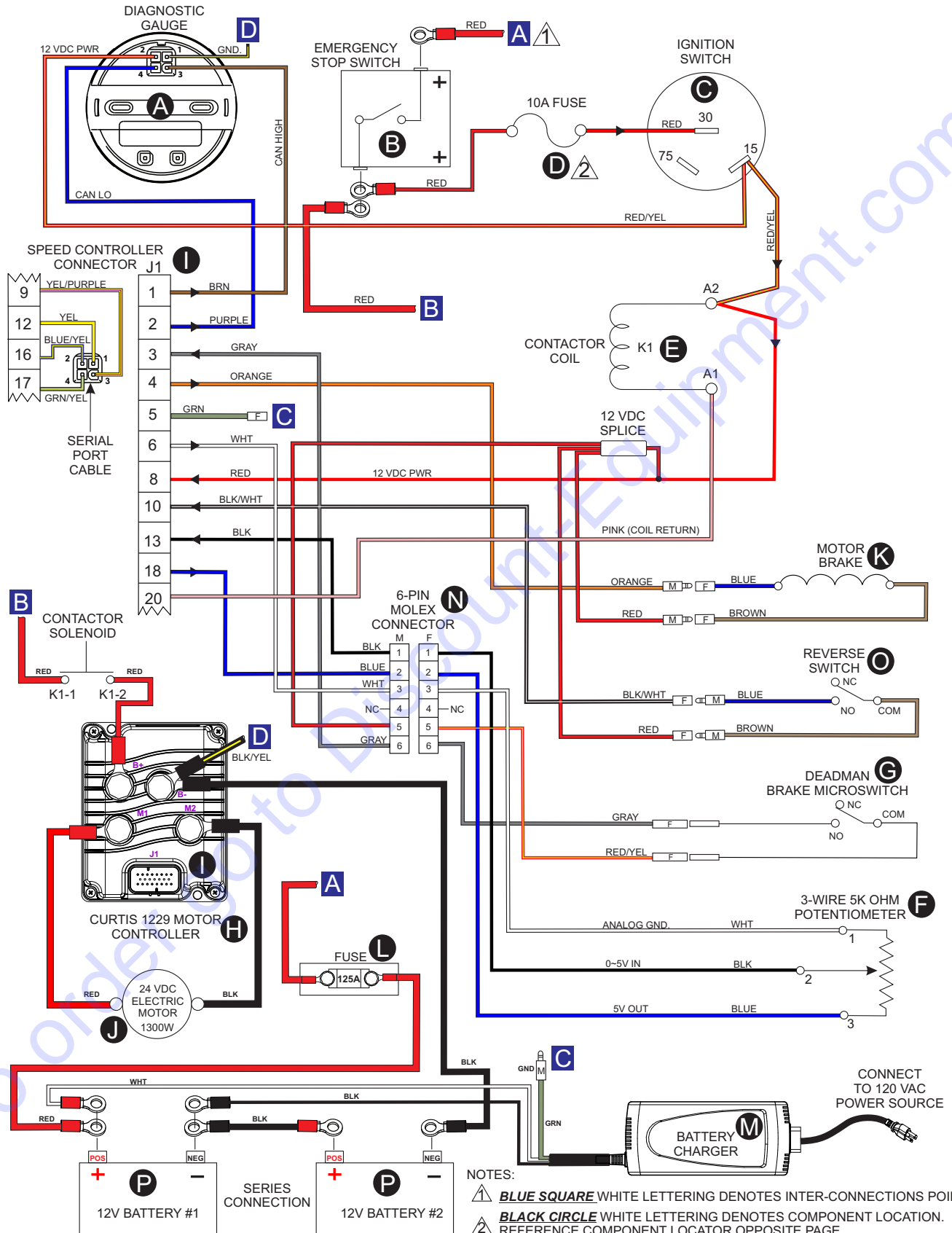
Check the connector for corrosion or damage, clean if necessary and reinsert. If that does not correct the problem, please contact your nearest Multiquip Authorized Service Center (ASC) for repair or replacement.

Error Codes			
1	HW Failsafe	29	Supervisor SW 4 Fault
2	PLD Clock Fail	30	Supervisor SW 5 Fault
9	Calibration Reset	31	Supervisor KSI Voltage Fault
10	Main Brake Driver Overcurrent	32	Supervisor Motor Speed Fault
11	Main Driver Open Drain	33	Supervisor Dir Check Fault
12	EMR Redundancy	34	External Supply Fault
13	EEPROM Failure	36	EM Brake Driver Open Drain
15	Main Contactor Dropped	37	EM Brake Driver On
16	Current Sensor	41	Pot 1
17	Main Contactor Welded	42	Pot 2
18	Encoder	43	Pot 3
19	PDO Timeout	50	Severe Undervoltage
20	Supervisor Comms	52	Controller Severe Undertemp
21	Supervisor Watchdog	53	Controller Severe Overtemp
22	Supervisor Pot 1 Fault	54	Precharge Failed
23	Supervisor Pot 2 Fault	70	Driver Shorted
24	Supervisor Pot 3 Fault	71	Driver 3 Fault
25	Supervisor Pot H Fault	72	Driver 3 Overcurrent
26	Supervisor SW1 Fault	73	Driver 4 Fault
27	Supervisor SW2 Fault	74	Driver 4 Overcurrent
28	Supervisor SW3 Fault	75	Driver 5 Fault
		76	Driver 5 Overcurrent
		77	Driver 6 Fault
		78	Driver 6 Overcurrent
		79	Correlation Fault
		80	HPD Sequencing
		81	Parameter Change
		82	NV Memory Fault
		90	Motor Temp Hot Cutback
		92	Motor Open
		93	Controller Overcurrent
		94	VBAT Too High
		95	Controller Undertemp Cutback
		96	Stall Detected
		97	Controller Overtemp Cutback
		98	Overvoltage Cutback
		99	Undervoltage Cutback
		101	User Fault Estop
		102	User Fault Severe

# ELECTRONIC COMPONENT LOCATOR



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