

TORO

MODEL NO. 07403–200000001 & UP

**OPERATORS
MANUAL****120 VOLT AC GENERATOR
for Workman Vehicle****SAFETY INSTRUCTIONS****WARNING**

To assure maximum safety, optimum performance, and to gain knowledge of the product, it is essential that you or any other operator of the generator read and understand the contents of this and the vehicle manual before the vehicle engine is started or the generator is switched on. Pay particular attention to the SAFETY INSTRUCTIONS highlighted by this symbol–



The safety alert symbol means CAUTION, WARNING or DANGER – personal safety instruction. Failure to comply with the instruction may result in personal injury or death.

SAVE THESE INSTRUCTIONS FOR FUTURE REFERENCE**BEFORE OPERATING**

1. Read and understand the contents of this manual before operating the generator. Become familiar with all controls and know how to stop quickly. Keep this operators manual in vehicle manual tube for reference during operation. A free replacement manual is available by sending complete model and serial number to:

The Toro Company
8111 Lyndale Avenue South
Minneapolis, MN 55420–1196

2. Do not allow children to operate the generator. Do not allow adults to operate the machine without proper instruction.

3. Never operate the vehicle, generator or other attachments when under the influence of drugs or alcohol.

4. Become familiar with the controls and know how to stop the engine quickly.

5. Keep all shields, safety devices and decals in place. If a shield, safety device or decal is malfunctioning, illegible, or damaged, repair or replace it before operating the machine. To assure generator is in safe operating condition, tighten loose nuts, bolts and screws. Visually inspect generator, electrical conduit and control box for damage or wear. Replace any damaged or worn parts. Inspect generator cooling air inlet and outlet and clear any obstructions.

6. **WARNING** – If faulty electrical equipment is connected to the generator, an electrical shock hazard

exists that can result in severe injury or death. Check all electrical equipment for frayed cords or breaks in the insulation before using.

7. Always wear substantial shoes. Do not operate machine while wearing sandals, tennis shoes or sneakers. Do not wear loose fitting clothing or jewelry which could get caught in moving parts and cause personal injury. Jewelry contacting electrical contacts can cause a shock or burn.

8. Wearing safety glasses, safety shoes, long pants and a helmet is advisable and required by some local safety and insurance regulations.

9. Keep everyone, especially children and pets, away from the areas of operation.

10. Never operate the generator in wet or damp conditions.

11. **WARNING** – To reduce the risk of electric shock, use only an extension cord suitable for outdoor use. Replace damaged extension cord immediately.

12. Since fuel is highly flammable, handle it carefully.

A. Use an approved fuel container.

B. Do not remove cap from fuel tank when engine is hot or running.

C. Do not smoke while handling fuel.

D. Fill fuel tank outdoors and to about one inch below top of tank (bottom of filler neck). Do not overfill.

E. Wipe up any spilled fuel.

SAFETY INSTRUCTIONS

13. Before operating the vehicle, always check all parts of the vehicle and any attachments. If something is wrong, stop using vehicle. Make sure problem is corrected before vehicle or attachment is operated again.

14. Check the vehicle safety interlock system daily for proper operation. If a switch should malfunction, replace the switch before operating machine. After every two years, replace the interlock switches in the safety system, whether they are working properly or not. Never bypass interlock system.

15. Alterations to this generator installation could be a hazard and will void the warranty of the Toro Company.

WHILE OPERATING

16. Local codes may require that the generator be electrically connected to a grounding electrode (water pipe, earth-driven grounding rod, etc.) during operation.

WARNING: Engine exhaust contains carbon monoxide which is an odorless, deadly poison. Carbon monoxide is also known to the State of California to cause birth defects. Do not run engine indoors or in an enclosed area.

17. Do not operate generator near hazardous materials as indicated by but not limited to the following examples:

- A. In or around fuel storage tanks or buildings
- B. In locations with explosive dust conditions
- C. In battery storage and or charging areas
- D. In areas with poor ventilation or low areas where vehicle exhaust gases could accumulate
- E. Do not fill fuel tank with vehicle engine running; fuel spills must be cleaned up before operating vehicle or generator

18. Do not operate the vehicle and generator in any type of enclosure that could allow exhaust gases to accumulate. Direct exhaust away from areas where people or animals are gathered and away from buildings or enclosures.

19. Do not operate generator with protective covers, access covers or control panel removed.

20. Apply parking brake and chock wheels before operating generator. Do not release parking brake or move vehicle while operating generator.

21. Do not abuse extension cord. Never yank cord to disconnect from receptacle. Keep cord away from heat, oil and sharp edges. Replace damaged extension cords immediately.

22. Turn off vehicle ignition, apply parking brake and remove ignition key before performing any inspection or maintenance of the generator.

23. Have a fire extinguisher nearby in case of fire. Maintain extinguisher properly and become familiar with its use. Extinguishers rated ABC by the NFPA are appropriate for all applications. Consult the local fire department for the correct type of extinguisher for various applications.

24. When using an electric appliance that is grounded, it is advisable to also ground generator.

25. When servicing use only identical replacement parts. Replace or repair damaged extension cords.

26. If vehicle or generator makes any unusual noises or vibrates abnormally, stop use immediately, turn engine off, switch generator off, wait for all motion to stop and inspect generator or vehicle for damage. If damaged, repair or replace any components before operating.

27. Use extreme caution when operating generator near other electric power sources. Failure to properly ground generator ground lug to an earth ground can be hazardous to the operator or bystanders in the area of the vehicle. The generator, vehicle and associated power cords and equipment can conduct enough external electrical current to cause injury or death.

MAINTENANCE

28. Keep generator clean. Remove all dust, dirt, grass or debris which may restrict air flow and damage generator. Refer to Generator Maintenance section for cleaning instructions.

29. Ensure generator is in safe operating condition. Keep nuts, bolts and screws tight.

30. To assure optimum performance and continued safety certification of the machine, use genuine Toro replacement parts and accessories. Replacement parts and accessories made by other manufacturers may result in non-conformance with the safety standards, and the warranty may be voided.

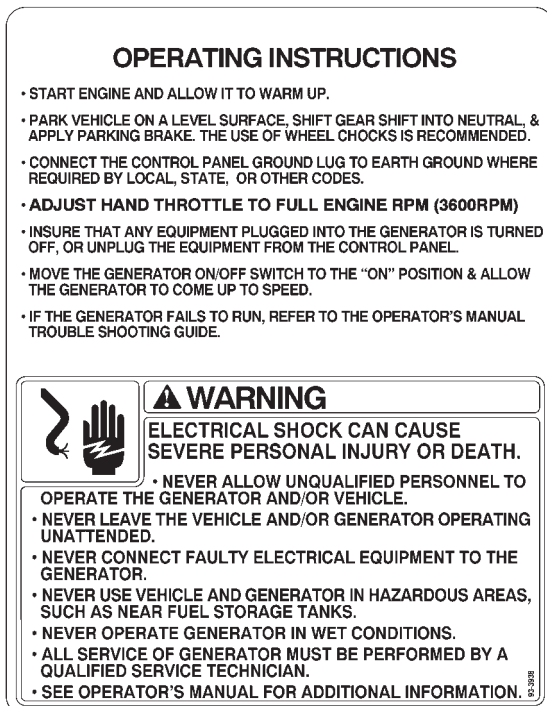


SAFETY AND INSTRUCTION DECALS

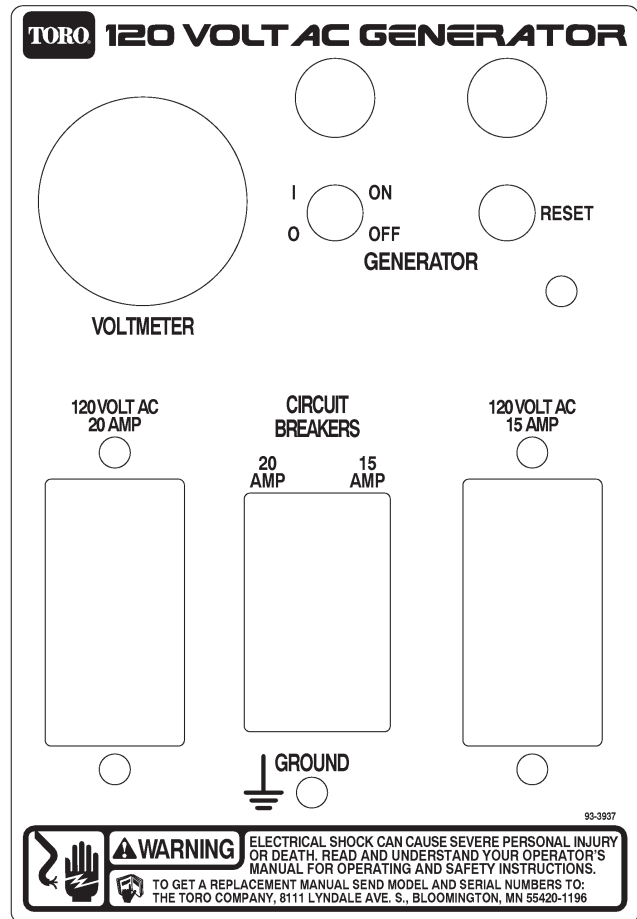
The following decals are installed on the generator. If any become damaged or illegible, replace it. The decal part number is listed below and in your parts catalog. Replacement decals can be ordered from your Authorized Toro Distributor.



ON CONTROL BOX
(Part No. 93-3939)



ON CONTROL BOX
(Part No. 93-3938)



ON CONTROL PANEL
(Part No. 93-3937)



ON CONTROL BOX BRACKET
(Part No. 36-3400)

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SPECIFICATIONS

Required Equipment:

Model 07416 Hand Throttle Control Kit
Model 07399 Auxiliary Power Unit Kit (For Workman 3100 only)

Application: Stationary use only.

Operating Temperature Range: –4° F. to 110° F.
(–20° C to 43° C).

Voltage: 120 volts no load
115 volts, 35 amps full load

Receptacles: (1) duplex 20 amp with ground fault circuit interrupt (GFCI) and (1) duplex 15 amp with GFCI.

Frequency: 60 HZ ± 3 HZ

Engine Governor Setting: 3600 RPM

WARNING: Do not exceed governor speed setting of 3600. Excess speed can damage generator or electrical devices attached.

Safety Interlock:

A. Generator ON/OFF switch must be in "OFF" position to start vehicle engine.

B. Parking brake must be applied to run generator.

C. Frequency must be above 58 HZ to run generator.

Voltage Control: Capacitor

Design: Brush–less

Cooling: Internal Fan

Bearings: Heavy duty ball type, front and rear

Drive: Belt drive, matched set of (2) belts

Continuous Rating: 4025 watts full load

Generator Rating: 4200 watts

NOTE: Reduce ratings 1% for each 10° F. (5.5° C.) rise above 60° F. (15.5° C.).

SPARK ARRESTER

In some areas a spark arrestor muffler must be used because of local, state or federal regulations. The spark arrester is approved by the United States Department of Agriculture and the United States Forest Service. Refer to page 12, Figure 19 for Spark Arrester installation instructions.

When the machine is used or operated on any California forest, brush or grass covered land, a properly operating spark arrester must be attached to the muffler. The operator is violating state law, Section 442 Public Resources Code if a spark arrester is not used.

LOOSE PARTS

Note: Use this chart as a checklist to assure all parts have been received. Without these parts, total set-up cannot be completed. If any parts are damaged replace before generator is installed.

DESCRIPTION	QTY.	USE
Wire Harness Cable Tie Wire Assembly	1 12 1	Mount to vehicle
Fuse Block Screw – #10–24 x 3/4” lg. Locknut – #10–24 Decal – Fuse Fuse – 20 amp	1 2 2 1 1	Mount fuse block
Parking Brake Switch Spacer – Long Spacer – Short Screw #10–24 x 2–1/4” lg. Screw #10–24 x 2” lg. Washer #10 Nut #10–24	1 1 1 1 1 2 2	Mount parking brake switch
Pulley Flatwasher – .813 x 1–1/2 Nut – 3/4–16	1 1 1	Mount pulley
Control Box Assembly w/ Generator Cover Flange Locknut – 1/4 – 20 Mounting Bracket Capscrew – 5/16–18 x 3/4” lg. Locknut – 5/16–18 Mounting Tabs Screw – M5–.80 x 16 Nut – M5 x 16	1 4 1 4 4 2 2 2	Mount control box assembly
Generator Assembly Capscrew – 5/16–18 x 1–1/4” lg. Locknut – 5/16–18	1 4 4	Mount generator
Generator Shield Capscrew – 3/8–16 x 3/4” Lg. Capscrew – 3/8–16 x 4” Lg. Flangenut – 3/8–16 Capscrew – 1/2–13 x 4” Lg. Flangenut – 1/2–13 Spacer Tube Frame Trim Fuel Fitting Assembly Fuel Line Hose Clamps Baffle	1 2 2 4 2 2 4 1 1 1 2 1	Mount shield, baffle & fuel tank
Spark Arrestor w/screw	1	
Air Inlet Hose Cable Tie	1 1	Modify late model Workman air cleaner air inlet
Registration Card	1	Fill out and return to Toro
Operator’s Manual Parts Catalog	2 1	Read before operating machine.

Specifications and design subject to change without notice.

SET-UP INSTRUCTIONS



WARNING

Improper installation of generator can result in personal injury or death.

- Kit must be installed by a qualified technician.
- Each step of installation instructions must be carefully completed.
- Inspect installed wire harnesses to assure they are well secured and protected to avoid damage by moving parts of the machine or from rubbing against sharp edges.

1. Position vehicle on a clean, level surface, stop engine, engage parking brake and remove key from ignition switch. Disconnect cables from battery.
2. Unscrew and remove all knobs from console levers.
3. Remove (6) screws securing outside edge of center console cover plate to console and remove cover plate (Fig. 1).

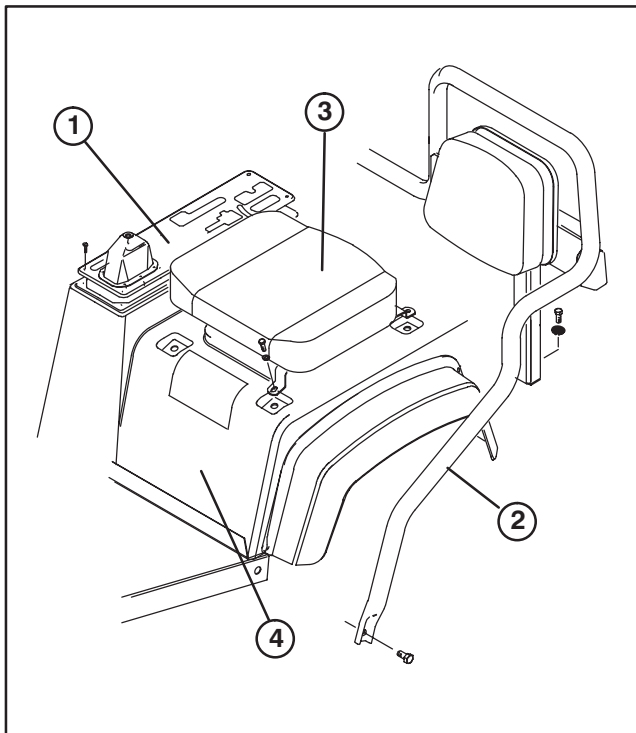


Figure 1

- | | |
|-------------------------|----------------------------|
| 1. Center console cover | 3. Seat assembly |
| 2. Seat frame | 4. Skirt & fender assembly |

4. Loosen (2) capscrews and locknuts securing front legs of seat frame to sides of vehicle floor (Fig. 1).

6

5. Remove (2) capscrews and lockwashers securing seat frame brackets to vehicle frame (Fig. 1). Pivot seat frame forward.

6. Loosen hose clamp securing overflow tube to radiator and slide tube off radiator opening (Fig. 2). Plug overflow tube to prevent coolant from escaping.



CAUTION

Pressurized hot coolant escaping can cause serious burns.

- Allow engine to cool enough to touch before removing overflow tube or radiator cap.

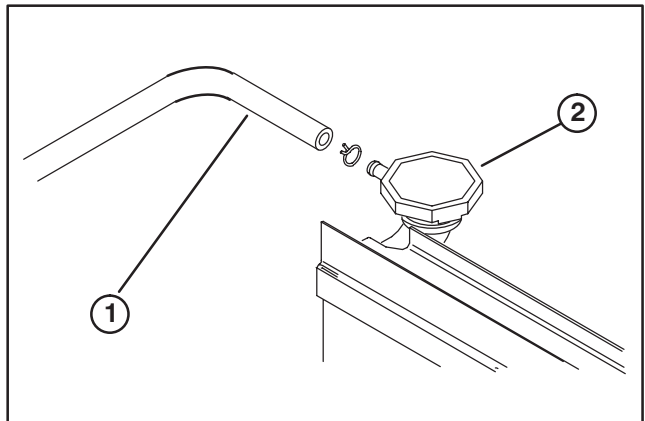


Figure 2

- | | |
|------------------|-------------|
| 1. Overflow tube | 2. Radiator |
|------------------|-------------|

7. If so equipped, remove mud flaps and mounting brackets from skirt and fender assembly.

8. Remove (4) capscrews and lockwashers securing each set of seat brackets to vehicle frame and remove seat assemblies (Fig. 1). Lift off skirt and fender assembly.

9. Remove head light bulbs from both headlights.

Note: Do not touch bulbs with fingers as oil from hands may lead to early bulb failure.

10. Remove (15) screws and washers securing front hood to vehicle frame and remove hood.

11. Insert end of harness up through opening in vehicle floor board, toward dash panel, following vehicle wire harness.

12. If vehicle is equipped with a APU Electric Clutch Kit, proceed to step 15.

13. Locate, above brake fluid reservoir, the grey, safety interlock jumper wire connected to vehicle wire harness (Fig. 3). Unplug and discard jumper wire.

SET-UP INSTRUCTIONS

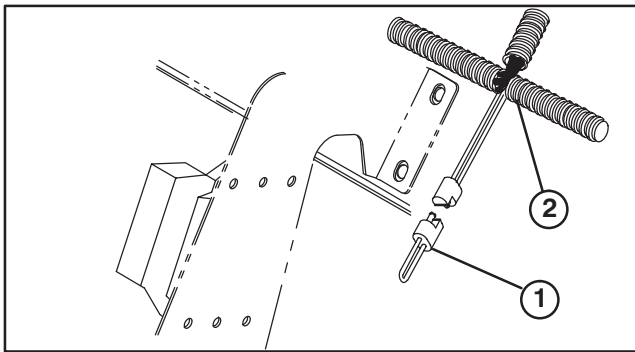


Figure 3

1. Jumper wire
2. Vehicle Wire harness

14. Using generator wire harness supplied in kit, plug open connector with grey lead wires into vehicle harness where interlock jumper wire was removed. Do not remove jumper wire from remaining connector.

15. If machine is equipped with an APU Electric Clutch Kit:

- A. Unplug clutch wire harness connector from vehicle harness.
- B. Unplug jumper wire from kit harness connector.
- C. Plug clutch harness connector and vehicle harness connector into kit harness connectors.



CAUTION

A malfunction of the interlock system can result in personal injury or death.

- Check operation daily to assure interlock system is operating.
- If system is malfunctioning repair it before operating.

16. If machine is equipped with a 1/3 Platform Lift, proceed to step 18.

17. Insert ring terminal end of single wire assembly up through opening in vehicle floor board and route toward dash panel, following vehicle wire harness. Connect ring terminal end of wire to "I" terminal of fuel gauge.

18. Secure harness's to vehicle wire harness with (2) cable ties. Harness must not interfere with operation of brake pedal return spring or any moving parts.

19. Remove screws securing vehicle fuse block to frame (Fig. 4).

20. Slide new fuse block assembly onto front of existing vehicle fuse block (Fig. 4).

21. Mount fuse blocks to vehicle frame with fasteners previously removed and (2) new screws and locknuts (Fig. 4).

22. Affix 20 Amp decal to any unused circuit on vehicle fuse block decal (Fig. 4).

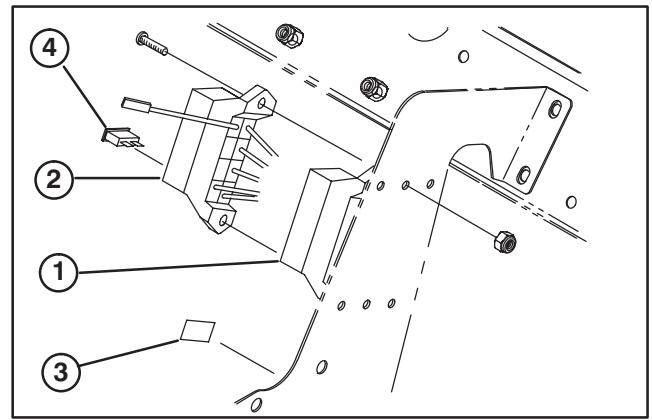


Figure 4

1. Vehicle fuse block
2. New fuse block
3. Decal
4. Fuse

23. Plug new fuse block lead wire into vehicle wire harness and plug wire into circuit chosen in step 22.

24. Remove nut securing vehicle ground wires to frame. Re-secure ground wire from harness and vehicle wires to frame with nut removed.

25. Remove fasteners securing wire harness cover to under side of vehicle floor and remove cover.

26. Route wire harness's rearward along main harness to control console. Route harness with (2) black connectors, and single wire assembly (if applicable) to parking brake.

Note: Single wire assembly is not used when a 1/3 platform lift is mounted to vehicle.

27. Using dimensions shown in figure 5, locate, mark and drill (2) .218" (7/32") dia. holes in vehicle console.

Note: On Workman Vehicles with serial numbers 50001 & Up, holes are provided in console.

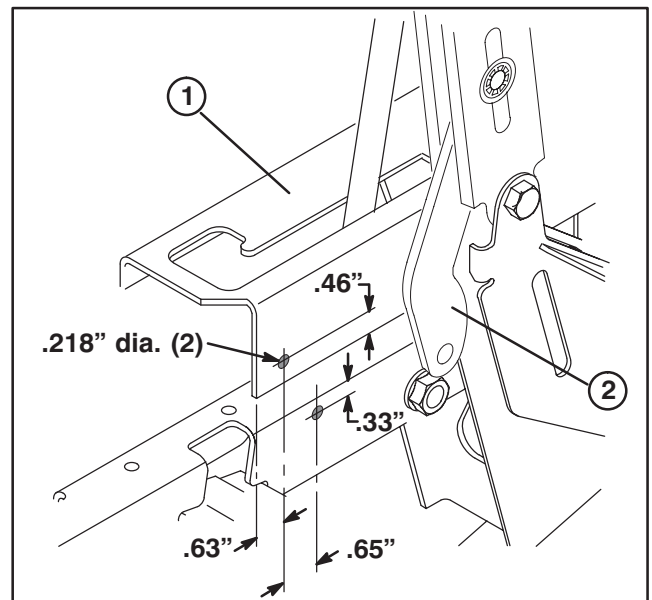


Figure 5

1. Vehicle console
2. Parking brake lever

SET-UP INSTRUCTIONS

28. Loosely mount parking brake switch to vehicle console with (2) spacers, #10–24 screws, washers and nuts, as shown in figure 6. Different length spacers are used to mount switch level as shown in figure 6.

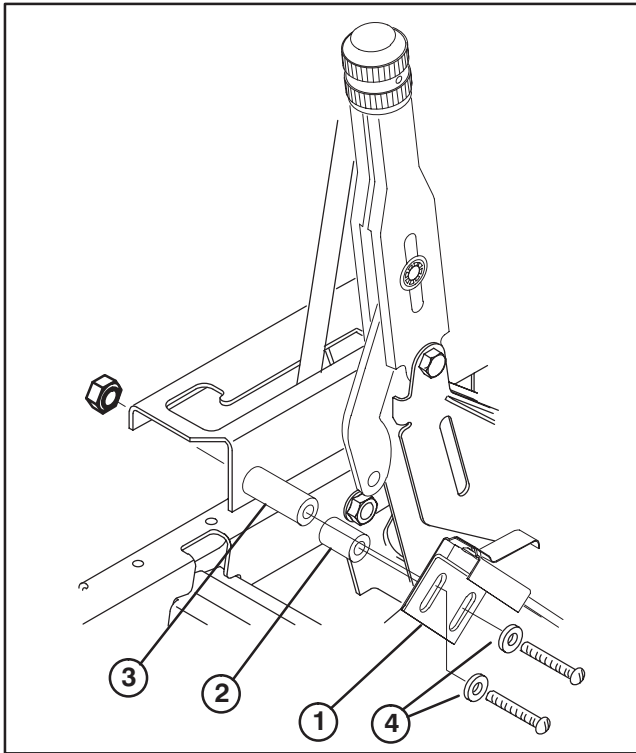


Figure 6

1. Parking brake switch
2. Short spacer
3. Long spacer
4. Washer

29. Plug single wire assembly, if applicable, and parking brake switch connector into generator harness.

Note: If machine is equipped with a 1/3 Platform Lift:

- A. Unplug 1/3 Platform Lift wire harness from parking brake switch.
- B. Plug lift wire harness into generator harness.
- C. Plug generator wire harness into parking brake switch.

30. To adjust parking brake switch:

- Disengage parking brake.
- Move switch into parking brake lever until switch is activated, then tighten mounting nuts.
- Slowly engage parking brake to check operation of switch.

IMPORTANT: Do not move switch too close to lever as switch damage may occur.

31. Install wire harness cover over harness's and secure to under side of vehicle with fasteners previously removed.

32. Route end of wire harness, with (2) connectors, toward lift valve mounted to left frame rail (Fig. 11).

33. Route remaining connector along accelerator cable, around air cleaner toward jackshaft support tube (Fig. 7).

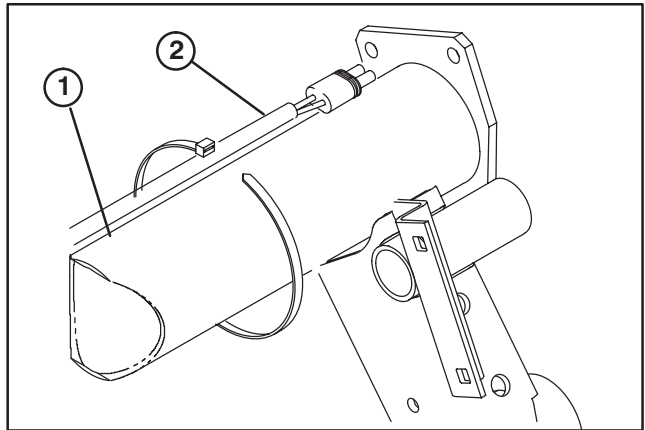


Figure 7

1. Jackshaft support tube
2. Wire harness

34. Secure wire harness to jackshaft support tube with a cable tie.

35. Reinstall front hood to frame with fasteners previously removed.

36. Reinstall light bulbs in head lights.

37. Reinstall skirt, mud flaps (if so equipped), seats, seat frame and console cover plate.

38. Reinstall overflow tube to radiator. Check coolant level and replenish, if required.

39. Remove (4) capscrews and flange nuts securing fuel tank supports to right frame rail (Fig. 8). Remove and support fuel tank.

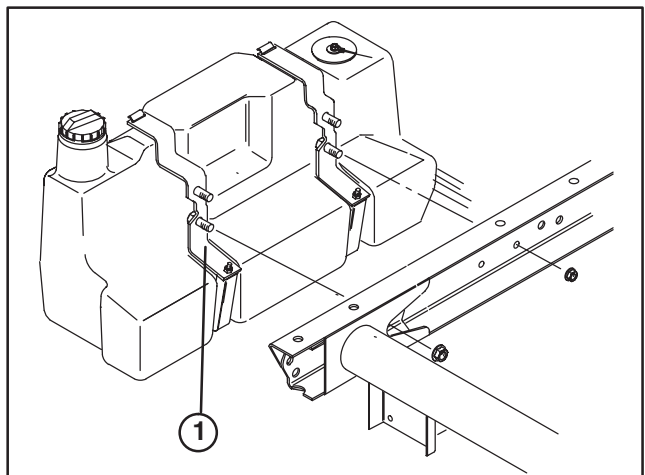


Figure 8

1. Fuel tank supports

IMPORTANT: Use caution not to damage fuel sending unit wire or fuel line when removing tank.

40. Loosen idler pulley mounting nut, move pulley to decrease belt tension to hydraulic pump pulley.

41. Remove belt from jackshaft pulley (Fig. 9).

SET-UP INSTRUCTIONS

Note: On Workman 3100, install Auxiliary Power Unit Kit and mount pulley in place of bearing hub. Refer to kit installation instructions.

Note: Bearings must be applied without applying pressure to inner race of bearing.

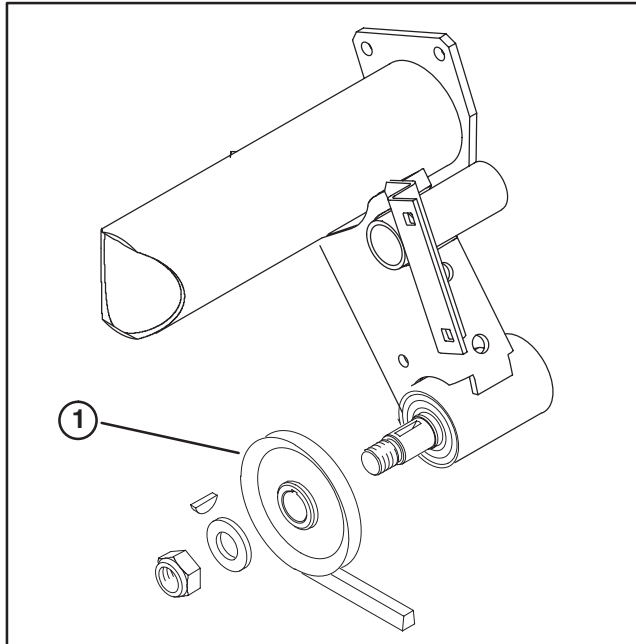


Figure 9
1. Jackshaft pulley

42. Remove nut and washer securing hydraulic pump pulley to jackshaft and remove pulley (Fig. 9).

43. Install new pulley to jackshaft with new nut and washer. Pulley to be positioned so small sheave is toward front of machine (Fig. 10).

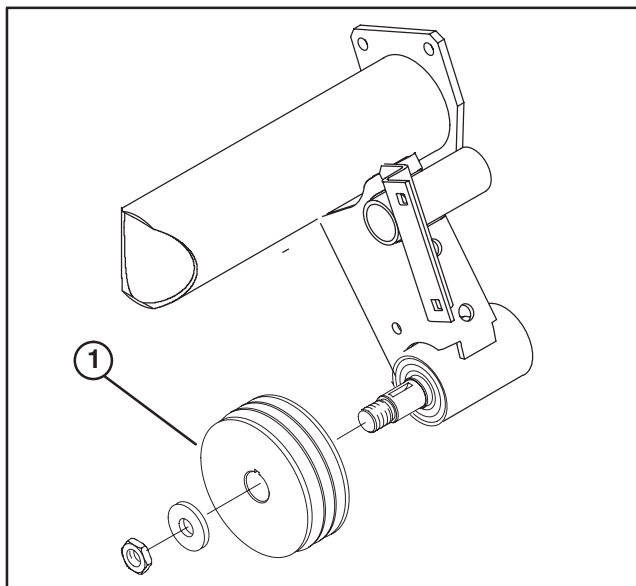


Figure 10
1. Jackshaft pulley

44. Remove front (upper and lower) capscrews and nuts securing lift valve mounting bracket to left frame rail (Fig. 11). Also, remove front (upper and lower) capscrews and nuts securing auxiliary valve mounting bracket to left frame, if so equipped.

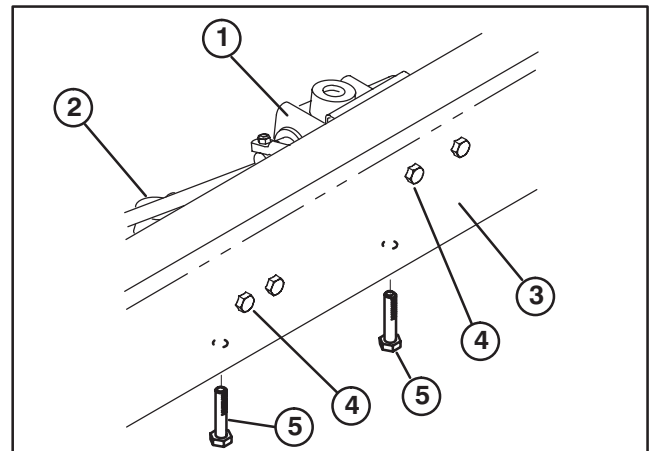


Figure 11
1. Auxiliary valve & bracket
2. Lift valve
3. Left frame rail
4. Upper front mounting capscrews
5. Lower front mounting capscrews

45. Loosely secure (2) mounting tabs and mounting bracket to control box bracket with (4) 1/4–20 flange locknuts, as shown in figure 12.

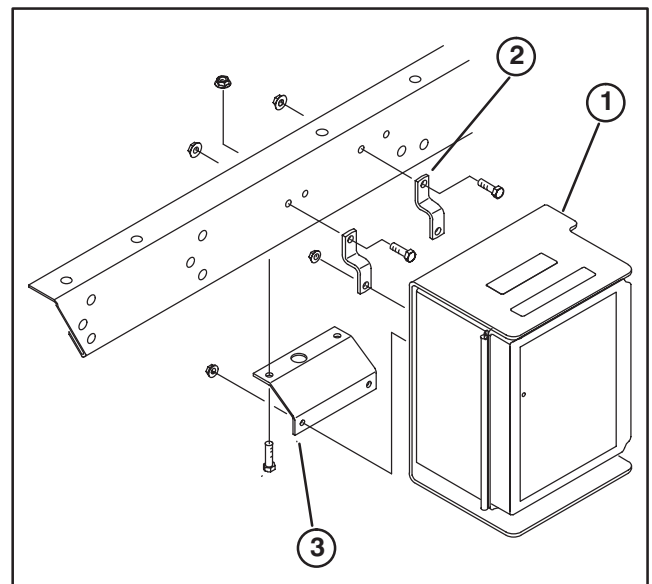


Figure 12
1. Control box bracket
2. Mounting tab
3. Mounting bracket

46. Mount control box assembly to left frame rail with (4) 5/16–18 x 3/4" lg. capscrews and nuts (Fig. 12).

47. Tighten carriage bolts and nuts securing mounting brackets to control panel bracket.

48. Place generator assembly on floor beneath right frame rail (Fig 15).

SET-UP INSTRUCTIONS

Note: On Liquid Cooled Workman Vehicles, with serial numbers 80101 or higher, the air cleaner must be updated to allow clearance for generator clutch. If updating is required, proceed to next step, otherwise, proceed to step 49.

A. Remove air inlet hood from air inlet hose. Retain hood for re-installation.

B. Loosen hose clamp securing air inlet hose to air cleaner body and remove air inlet hose from air cleaner body. Discard hose.

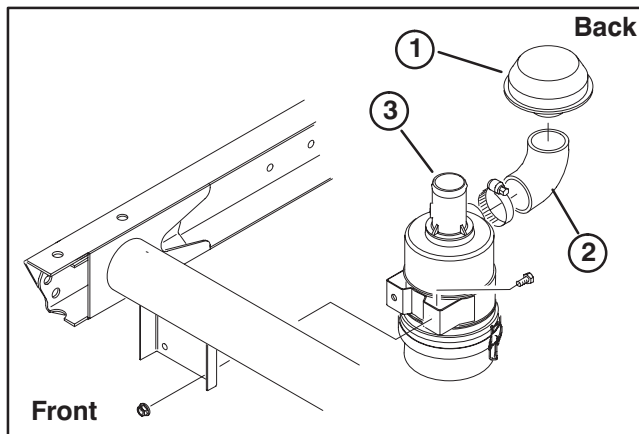


Figure 13

1. Air inlet hood
2. Air inlet hose
3. Air outlet

C. Loosen hose clamp securing air outlet hose to air cleaner body. Disconnect hose from air cleaner.

D. Remove (2) capscrews and nuts securing air cleaner band to frame plate. Remove air cleaner.

E. Loosen screw and nut clamping air cleaner band to air cleaner body. Remove air cleaner body from band.

F. Trim 3/8" of material from bottom corner of air cleaner mounting band.

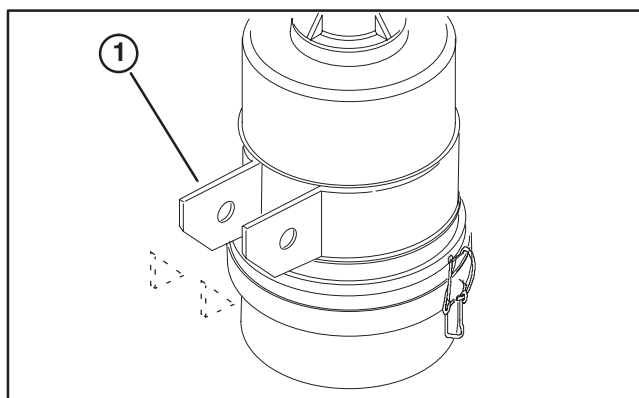


Figure 14

1. Air cleaner band

G. Rotate air cleaner body so inlet opening points to front right corner of vehicle. Insert air

cleaner body into mounting band. Loosely secure mounting band to air cleaner body.

H. Mount air cleaner band to frame plate with (2) fasteners previously removed.

I. Loosely mount new inlet hose onto inlet port of air cleaner with hose clamp previously removed. Route hose along radiator and under frame tube. Hose to be positioned so curved end is up.

J. Reinstall air outlet hose to air cleaner body with hose clamp previously removed.

K. Install air inlet hood to new inlet hose.

IMPORTANT: Make sure air inlet hood has access to clean air and all air cleaner components are clear of any moving or hot parts.

L. Secure new inlet hose frame tube with cable tie. Tighten all fasteners.

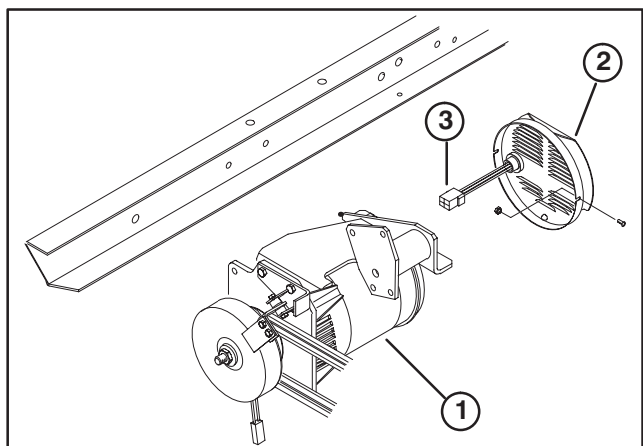


Figure 15

1. Generator
2. Cover
3. Harness Connector

49. Route generator cover and harness from control box, along underside of vehicle frame, along cross member and above belly guards to generator (Fig 15).



WARNING

Damaged wiring could cause a shock or fire.

- Never install generator if wiring is damaged.
- Thoroughly inspect the wiring before installing generator. If wiring is damaged, frayed or cut do not install generator. Contact your Authorized TORO Distributor for assistance.

50. Plug (3) harness connectors into generator. Connect ground wire ring terminal to screw on generator.

Note: Orange wires are interchangeable.

SET-UP INSTRUCTIONS

51. Mount generator cover to generator with (2) M5-80 x 16 screws and nuts (Fig 15).

52. Remove all paint from mating areas of jackshaft support tube and generator mounting bracket with sand paper, to assure generator is grounded to vehicle frame (Fig. 16).

53. Mount generator to jackshaft support with (4) 5/16-18 x 1-1/4" lg. capscrews and flangenuts.

54. Secure generator harness to vehicle frame cross member with cable ties. Make sure harness does not come in contact with any hot, sharp or rotating parts.

Note: Spacer included with APU Electric Clutch kit, is not required because generator mounting bracket, in same position, acts as a spacer.

55. Ensure belts are correctly aligned in pulley grooves and tension belts. Each belt should deflect 0.14" (3.6mm), when 11 to 12 (5 to 5.5 Kg) pounds of force is applied at mid span of pulleys.

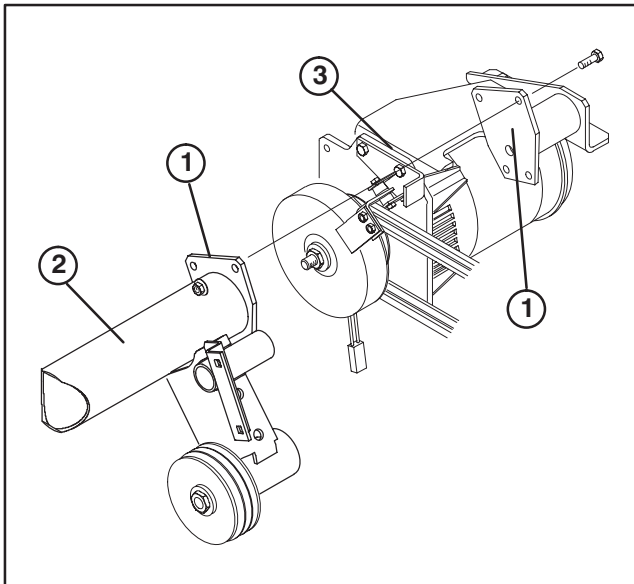


Figure 16

- 1. Mating surfaces
- 2. Jackshaft support tube
- 3. Belt adjustment tab

Note: A light bar may be inserted between jackshaft support tube and belt adjustment tab to help move generator when adjusting belts.

IMPORTANT: Belt tension should be checked after the first 8 hours of operation, and after every 50 hours of operation thereafter. When tensioning belts after operation, each should deflect 0.14" (3.6 mm) when 8 to 9 lbs. (3.6 to 4.1 Kg) of force is applied at mid span of pulleys.

56. Plug electric clutch connector into wire harness connector.

57. Insert 20 Amp fuse into fuse block at location shown on decal (Fig. 4).

58. Using dimensions shown in figure 17, locate and mark generator baffle mounting position on generator shield.

59. Remove adhesive backing from baffle and affix to shield at position located.

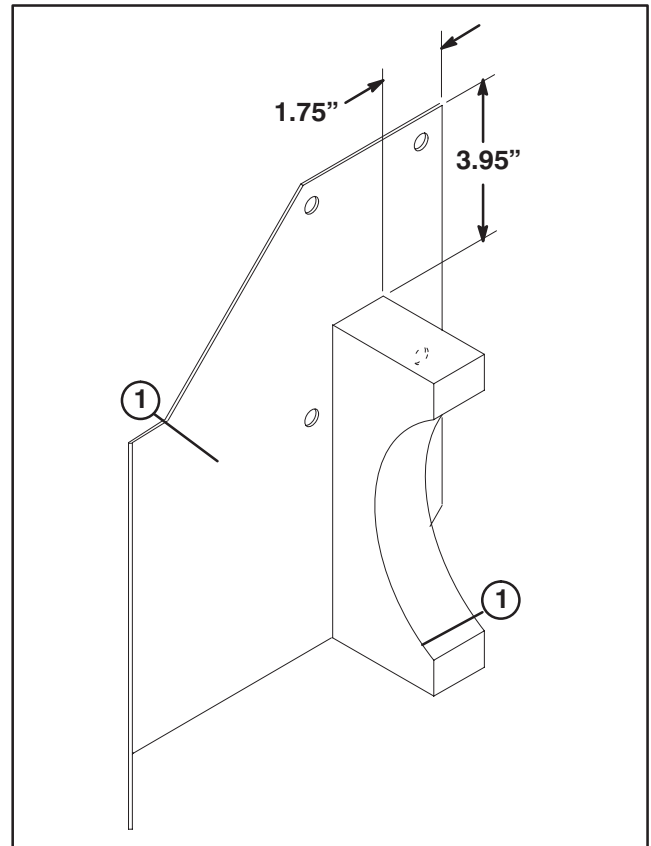


Figure 17

- 1. Generator shield
- 2. Generator baffle

60. Place generator shield and baffle assembly against right hand frame channel, aligning rear holes in baffle with rear fuel tank mounting holes. Using front holes in baffle and frame secure together with (2) 3/8-16 x 3/4" lg. capscrews and flange nuts (Fig. 18).

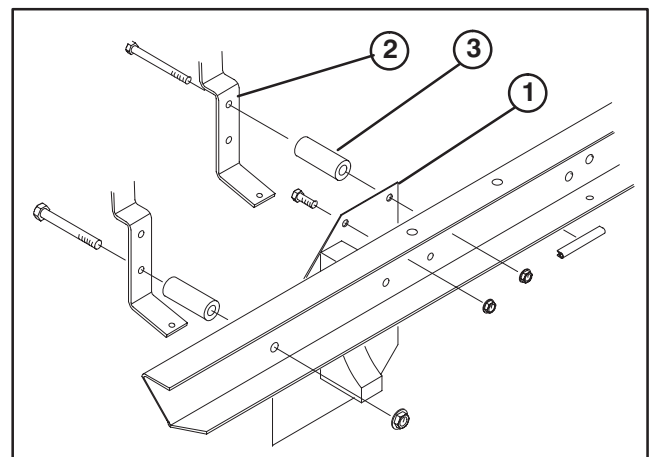


Figure 18

- 1. Shield & baffle assembly
- 2. Fuel tank supports
- 3. Fuel tank spacers

SET-UP INSTRUCTIONS

Note: On Workman Vehicle Models 07200 and 07216 (liquid cooled gas), the fuel line between fuel filter and fuel tank must be replaced. Proceed to step 61 for replacement procedure, otherwise proceed to step 67.

61. Clamp off fuel line between the fuel filter and tank. Disconnect fuel line at front side of fuel filter.

62. Remove clamp, loosen fuel tank cap and drain fuel tank into an approved fuel container.

63. Remove hose from tank and replace with 22" long hose provided. Secure hose to fuel tank with hose clamp.

64. From hose removed, cut off a piece 2.25" long and install on fuel elbow fitting assembly (included in kit) with hose clamp.

65. Install elbow fitting assembly and hose to the fuel filter with clamp. Secure fuel tank hose to elbow fitting assembly (Fig. 19).

66. Install frame trim to vehicle frame, centered on the fuel line, to prevent fuel line from rubbing on frame (Fig. 18).

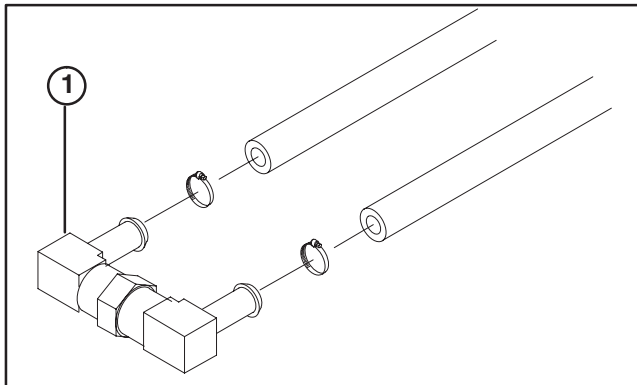


Figure 19

1. Fitting assembly

67. Secure rear fuel tank support to shield and frame with (2) 3/8-16 x 4" lg. capscrews, spacers and nuts (Fig. 18).

68. Secure front fuel tank support to frame with (2) 1/2-13 x 4.5" lg. capscrews, spacers and nuts (Fig. 18).

Note: Route fuel line from fuel tank to rear of vehicle cross member, along vehicle frame and under fuel filter.

69. Secure the new fuel line to the existing fuel line between fuel pump and filter with cable tie to keep it away from engine.

70. Insert spark arrester into muffler exhaust pipe and secure with screw (Fig. 20).

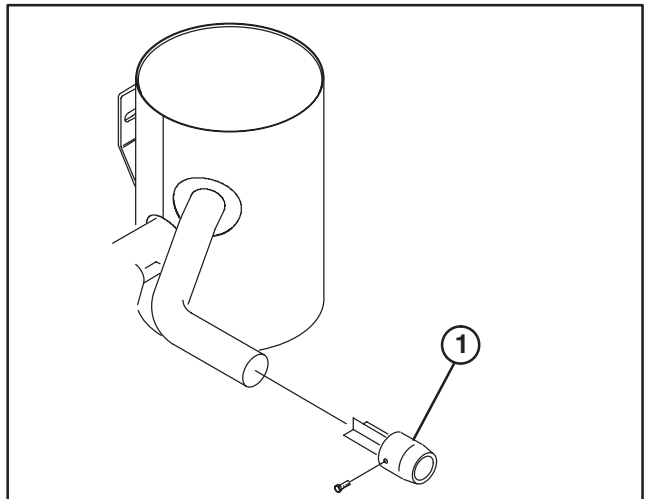


Figure 20

1. Spark Arrester

71. Adjust engine high idle to 3600 rpm at maximum setting of hand throttle kit as well as with foot throttle. Follow adjustment instructions located in vehicle operators manual and in throttle installation instructions.

IMPORTANT: Engine governor must be correctly adjusted to assure proper operation of the generator. If engine speed drops below approximately 3375 rpm, the speed sensor will turn the generator off. If additional loads are added to the engine, engine speed may drop below generator speed and cause the generator to shut off.

72. The generator clutch must be burnished in order to obtain full capacity. To burnish clutch:

- Start the Workman engine and allow it to warm up. Set hand throttle to full throttle, (3600 rpm).
- With no electrical load plugged into control box, switch the control panel switch on for 5 seconds, then off for 10 seconds and repeat 25 to 30 times.

OPERATING INSTRUCTIONS

GROUNDING GENERATOR

Local, State or other codes may require that the generator be electrically connected to a grounding electrode during operation. Consult with your local electrical authority for regulations in your area.

A grounding lug (Fig. 21) is provided on generator control panel for connecting generator to a grounding electrode conductor. Use a minimum of 10 gauge copper wire when connecting grounding lug to grounding electrode.

Grounding Lug

1. Switch control panel on-off switch to "OFF" position (Fig.21).
2. Loosen screw on control panel grounding lug (Fig.21).
3. Insert grounding wire into lug and tighten lug screw.

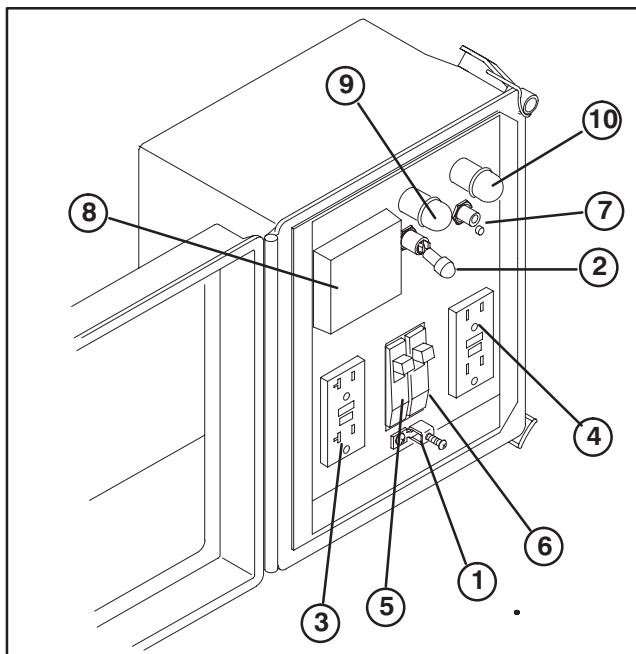


Figure 21

- | | |
|----------------------|---------------------|
| 1. Grounding lug | 6. 15 amp breaker |
| 2. ON/OFF Switch | 7. Reset button |
| 3. 20 amp receptacle | 8. Voltmeter |
| 4. 15 amp receptacle | 9. ON indicator |
| 5. 20 amp breaker | 10. Reset indicator |

4. Secure other end of wire to grounding electrode with clamp or devise as designated by local, state or other codes.

Typical Grounding Electrodes

- Underground metal water pipes which are in direct contact with the earth for more than 10 feet.
- Ground rod or ground pipe with a minimum length of 8 feet.
 1. Galvanized pipe or galvanized conduit (3/4 inch

trade size minimum)

2. Solid iron, steel rod or stainless steel rod (5/8 inch minimum diameter)
3. Nonferrous rod (1/2 inch minimum diameter)

- Other metal underground grounding systems or structures.

NOTE: Aluminum electrodes are not permitted.

Installation Requirements

1. A minimum length of 8 feet of the grounding conductor must be in contact with the soil (Fig. 22).
2. The grounding conductor must be driven to a depth of 8 feet minimum except when a rock bottom is found. The grounding conductor can then be driven at an oblique angle not to exceed 45 degrees, or buried in a trench that is at least 2.5 feet deep (Fig. 22).

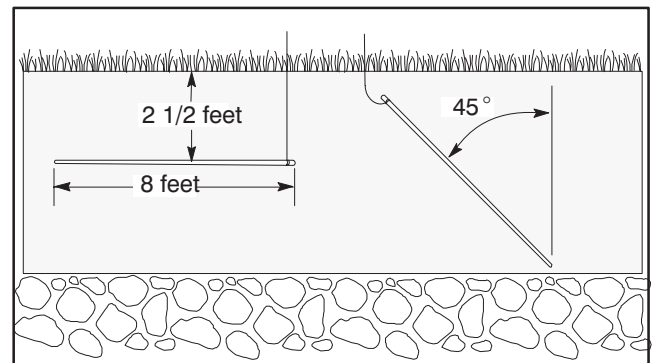


Figure 22

3. The top of the electrode must be flush or below ground level unless it is protected against damage.

NOTE: Never use a metal underground gas pipe as a grounding electrode.

For additional information refer to the National Electrical Code, Local or State Electrical codes or contact a local licensed electrical contractor.

OPERATION

1. Start engine and allow it to warm up.
2. Park vehicle on a level surface, shift gear shift into neutral, apply parking brake and chock wheels.
3. Connect the control panel ground lug to earth ground where required by local, state or other codes.
4. Adjust hand throttle to full engine RPM (3600 RPM).
5. Insure that any equipment plugged into generator is turned off or unplug the equipment from the control panel.
6. Move generator ON/OFF switch to "ON" position (Fig.21).

OPERATING INSTRUCTIONS

7. Wait 10 seconds and check the voltmeter:
- If meter reads 115 to 125 volts the generator is ready to use.
 - If amber reset indicator light (Fig.21) has come ON, remove all loads, move generator ON/OFF switch to "OFF" position and press the reset button before attempting to restart the generator.
 - If generator fails to run, refer to Trouble Shooting Chart, page 18.



WARNING

Interruption of electrical power to life support apparatus can cause serious injury or death.

- **Never use generator directly or indirectly, with life support apparatus or associated circuitry.**



WARNING

Using electrical devices in wet conditions can cause electrical shock and damage to generator or electrical device.

- **Except in an emergency, never use the generator in rain, snow or other wet areas.**



WARNING

Connecting generator to any building or fixed wire system can cause serious injury or death.

- **Hazardous voltages can flow from the generator set into the utility line.**
- **Do not connect generator to any building or fixed wire system.**

IMPORTANT: Unusual noise or vibration from the generator or generator clutch indicates something is wrong with the generator, generator clutch or the belt drive. Switch the generator off and turn the vehicle ignition off immediately. Determine cause and correct before using vehicle or generator. Refer to the generator trouble shooting guide.

Emergency Shut Down

A. Switch control panel on-off switch to off position.

OR

B. Switch workman vehicle ignition switch to off position.

EXTENSION CORD REQUIREMENTS

Use an extension cord suitable for outdoor use and one that complies with the requirements specified in the International Electric Code. Make sure your cord is in good condition; if damaged, replace. Use a cord that is large enough to carry the current the appliance will draw. The following chart shows the correct size cord to use for appliances of 20 amps or less.

Note: When in doubt about what size extension cord to use, choose the next heavier gauge. The smaller the gauge number, the heavier the cord. An undersized cord causes a drop in line voltage which results in a loss of power and overheating.

EXTENSION CORD CHART

If length of extension cord is less than or equal to:	30 ft.	50 ft.
Assure wire size gauge (A.W.G.) in cord is:	12	10

Figure 23

Note: Use of an extension cord over 50 feet is not recommended.



WARNING

A damaged electrical cord could cause a shock or fire.

- **Never use an electrical cord that is damaged.**
- **Thoroughly inspect electrical cord before using generator. If cord is damaged, do not operate generator. Replace or repair damaged cord immediately. Contact your Authorized TORO Distributor for assistance.**

MOVING VEHICLE

The generator must be taken out of service before moving vehicle.

1. Switch all appliances or tools off.
2. Disconnect all appliances, tools and extension cords from control box.
3. Switch generator to OFF position.
4. Move hand throttle speed limiter lever to the speed limiter position and place in OFF position.
5. Close and latch control box cover.
6. Remove wheel chocks and release parking brake.

OPERATING INSTRUCTIONS

GROUND FAULT CIRCUIT INTERRUPTER

Ground Fault Circuit Interrupter Duplex Receptacles (GFCI Outlets), One twenty amp capacity and one fifteen amp capacity have been included to help protect you against hazardous electrical shock that may be caused if your body becomes a path through which electricity travels to reach ground. This could happen when you touch an appliance or cord that is "live" through faulty mechanism, damp or worn insulation, etc. You don't even have to be on the ground itself to be shocked; you could be touching the vehicle or other material that leads to ground.

When protected by the GFCI you may still feel a shock, but the GFCI should cut it off quickly enough so a person in normal health should not have serious electrical injury (infants and very small children may still be affected.)

WARNING: The GFCI will NOT protect against:

- A. Line-to-line shocks (like the kind received by touching metal inserted in both straight slots of an outlet)
- B. Current overloads or line-to-line short circuits
- C. Current sources external to the vehicle generator system

CAUTION: If the GFCI trips of its own accord, this indicates a possible ground fault condition , which is potentially hazardous. Investigate the ground fault condition at once by making a thorough check to determine where the ground fault exists in the equipment plugged into your GFCI. Correct the defect at once. Carry out the test procedure as outlined to

ensure that your GFCI is operating properly. If the GFCI does not reset, this indicates a ground fault still exists, and must be corrected.

GFCI TEST PROCEDURE

Like a fire extinguisher or other safety device your GFCI outlets should be checked every month to make sure they are operating properly to protect you. Just follow the simple instructions below and then record the test date in the charts below.

1. Start the generator. Push the black "TEST" button. The red "RESET" button should pop out from the inner surface. This should result in the power being OFF at the outlet. Verify by plugging test lamp into outlet. Repeat for the second outlet.

CAUTION: If the RESET button does not pop out or if test lamp remains lit when RESET button does pop out. DO NOT USE ANY OUTLETS ON THE CONTROL CONSOLE. CALL A QUALIFIED ELECTRICIAN!

2. If the GFCI tests okay, restore power by pushing the RESET button back in. Test lamp should again light. THE RESET BUTTON MUST BE PUSHED FIRMLY AND FULLY INTO PLACE UNTIL IT LOCKS AND REMAINS DEPRESSED AFTER PRESSURE HAS BEEN REMOVED. IF THE GFCI FAILS TO RESET PROPERLY, DO NOT USE – CALL A QUALIFIED ELECTRICIAN.

3. IF GFCI TRIPS BY ITSELF, reset and perform test procedures 1. and 2. above. IF RESET BUTTON DOES NOT POP OUT WHEN TEST BUTTON IS DEPRESSED, **DO NOT USE CONTROL CONSOLE OR OUTLETS.** CALL A QUALIFIED ELECTRICIAN.

GROUND FAULT CIRCUIT INTERRUPT TEST RECORD

YEAR ▼	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC

OPERATING INSTRUCTIONS

GENERATOR SAFETY INTERLOCK TEST

Use the following procedure to test the safety interlock system of the generator.

IMPORTANT: The generator safety interlocks should be tested daily to insure they are operating properly.

1. Make sure the optional 540 Rear PTO is disengaged, generator is off, optional Mid PTO is off and parking brake is applied. Depress vehicle clutch and attempt to start the vehicle engine. It should crank and start. If it fails to crank, start and run, determine cause and repair.
2. Set the vehicle hand throttle to half throttle or about 2500 RPM. Switch the generator on. It should start and then stop running after three to five seconds. If the generator clutch does not disengage, determine cause and repair.
3. With vehicle running adjust throttle to full engine RPM. Check engine RPM. If engine is not running at 3600 RPM determine cause and adjust.

4. With the vehicle engine operating at 3600 RPM, generator off, depress reset button. It should latch in the "IN" position. Switch the generator on, it should start and stay running. If it fails to run determine cause and repair.

5. With generator running, sit in the operator's area and apply vehicle foot brake and hold. Release the hand parking brake. The generator should stop running. If the generator continues to run the parking brake interlock has malfunctioned. Determine cause and repair.

Motor Starting

Motors may take up to seven times their rated full – load current to start. This will vary with the type of motor and the specific application. Attempting to start too large of a motor or too many motors can overload the generator. Always start the largest motor first followed by the small ones. Never exceed a total current draw of 35 amps. The circuit breakers will protect the generator in most cases; however, repeated attempts to start motors which do not start and run at operating speed can overheat and damage the generator.

LOAD CALCULATION

The generator has a maximum continuous capacity of 4200 watts when the cooling air going into the generator is at 60° F. (15.5° C.). The capacity of the generator decreases 1% for each 10° F. (5.5° C.). increase in temperature of the cooling air. The Engine can increase the cooling temperature as much as 30° F. (16.6° C.) depending on ambient temperature.

1. Generator capacity calculation:

Sample capacity calculation:

Ambient air temperature	80° F.
Add Engine air temperature increase:	+30° F.
Total Generator cooling air temperature:	110° F.
Minus Generator rated temperature:	-60° F.
Increase in cooling air temperature:	50° F.

Divide increase temperature by 10: $50 / 10 = 5$ % decrease in capacity
Decrease capacity in Watts: $5\% \times 4200 \text{ Watts} = 210 \text{ Watts}$
Net capacity of generator: $4200 \text{ Watts} - 210 \text{ Watts} = 3980 \text{ Watts}$

The 3980 Watts is the maximum full load capacity of the generator and should not be exceeded for continuous operation.

2. Generator load calculation:

- A. Light bulbs are rated in watts. ie. 50, 100, 200 etc. Simply add up the total watts of each bulb to determine lighting load.

Five 100 watt bulbs: $5 \times 100 \text{ Watts} = 500 \text{ Watts}$
Four 200 watt bulbs: $4 \times 200 \text{ Watts} = 800 \text{ Watts}$
Total: 1300 Watts

The generator has the capacity to light bulbs up to the total capacity calculated in step 1 above.

- B. Electric heaters are also rated in watts and are added together in the same manner as light bulbs.
- C. Electrical appliances as radios and TV's usually have a name tag that indicates the current draw in amps, and the wattage use must be calculated.

Appliance current X Voltage = Wattage

An appliance with a 5 Amp current draw $5 \text{ Amps} \times 120 \text{ Volts} = 600 \text{ Watts}$

- D. Electric motors are usually rated by the current needed to operate at full load however they require several times their operating current to start and come up to operating speed. There are several different types of motors and the starting current varies between the types, the hardest starting being about seven times the operating current. Most are in the area of three to four times.

Motor with an operating current of 10 Amps.

Motor current x Starting factor x Voltage = Starting power requirement

$10 \text{ Amps} \times 3 \times 120 \text{ Volts} = 3600 \text{ Watts}$

Once the motor has started the power requirement drops.

Motor current x Voltage = Running power requirement

$10 \text{ Amps} \times 120 \text{ Volts} = 1200 \text{ Watts}$

Once the motor has started additional loads can be added as long as the motor stays running up to the total capacity of the generator as determined in step 1. However, if the motor cycles on and off, additional loads can not be operated.

MAINTENANCE

GENERATOR MAINTENANCE

The generator requires no normal maintenance other than keeping the rear air inlet cover and the front air outlet, clear of obstructions. Inspect rear cover vents and front outlet openings often. Deflectors are provided to reduce accumulation of mud, dirt, grass, snow, ice and other materials that can block cooling air. Dirt build-up can usually be removed with a garden hose. Loose materials such as grass and leaves can be removed by vacuum. Snow and ice should be allowed to melt and generator allowed to dry before use.

To wash generator, turn generator switch to "OFF" position, stop vehicle engine and allow generator to cool sufficiently. Spray generator with a garden hose to remove all debris. Allow generator to drip dry for 5 minutes.

Generator is fully insulated so washing will not harm it.

To dry generator, disconnect all electrical loads, bring engine to full throttle (3600 RPM), move generator switch to "ON" position and allow generator to run for 30 to 60 seconds.

CAUTION: Rapid cooling of the generator may cause damage. Do not spray water on a hot generator.

Do not use high pressure washers, compressed air or objects like screw drivers to clean the generator as the dirt can forced into the generator or mechanical and electrical damage could occur.

Make sure that fasteners on the generator are secure. Tighten mounting and inspect wiring, generator and control enclosure for damage.

NOTE: Use only copper wire or terminal connectors marked "AL" "CU" for repair of any generator circuit. Refer all repairs to a Qualified Electrician.

GENERATOR BELT TENSION ADJUSTMENT

Initial belt tension should be set so each belt will deflect 0.14" (3.6 mm) with a force of 11 to 12 lbs. (5 to 5.5 Kg) is applied at mid span between the pulleys.

IMPORTANT: Belt tension should be readjusted after the first 8 hours of operation, and after 100 hours of operation thereafter. When re-tensioning belts each belt should deflect 0.14" (3.6 mm) with 8 to 9 (3.6 to 4.1 Kg) pounds of force applied at mid span between the pulleys.

TROUBLE SHOOTING GUIDE

Generator clutch does not engage	1. Parking brake interlock switch 2. Blown fuse 3. Electric clutch does not engage (No power to clutch) 4. Engine governor not set at 3600 rpm	1. Adjust or replace 2. Replace fuse 3. Test circuit 4. Adjust governor
Generator is running but does not generate	1. Faulty Capacitor 2. Circuit breaker open due to short circuit or overload 3. Shorted or open armature winding 4. Shorted or open field winding	1. Replace capacitor 2. Inspect wiring and repair 3. Replace generator 4. Replace generator
Generator voltage low, 20 volts or less	1. Faulty capacitor 2. Drive belts loose, slipping 3. Engine speed too low, faulty speed switch 4. Loose wire 5. Improper wire crimp	1. Replace capacitor 2. Adjust belt tension 3. Adjust engine speed and speed switch 4. Inspect and repair 5. Repair
Generator volt meter shows 120 volts but outlets are dead	1. Circuit breaker has tripped 2. GFCI has tripped 3. Outlet contact damaged or not making contact with plug	1. Check load and cords. Reset breaker 2. Determine cause and repair 3. Replace receptacle
Generator starts but does not continue to run	1. Workman vehicle engine not running at 3600 RPM 2. Hand Throttle is not at full engine rpm setting 3. Engine governor out of adjustment	1. Adjust engine governor/hand throttle to 3600 rpm 2. Adjust hand throttle 3. Adjust governor to 3600rpm
Generator noise	1. Worn or Dry electric clutch bearing 2. Worn or Dry generator bearing 3. Generator dirty	1. Replace bearing 2. Replace bearing 3. Clean generator
Generator loss of power	1. Loose wire in control box 2. Loose wire terminal in control box or generator 3. Broken wire in conduit 4. Generator armature damage 5. Generator field damage	1. Inspect and repair 2. Tighten terminal 3. Replace conduit assembly 4. Replace generator 5. Replace generator
Generator parking brake interlock malfunction	1. Loose connection 2. Interlock switch	1. Repair 2. Repair
Generator/Vehicle start interlock malfunction	1. Loose connection 2. Generator on/off switch	1. Repair 2. Repair
Generator control panel reset malfunction	1. Engine not at 3600 rpm 2. Time delay	1. Adjust throttle/governor 2. Replace
Generator speed interlock switch malfunction	1. Faulty transformer 2. Faulty speed switch	1. Replace 2. Replace

ELECTRICAL SCHEMATIC

