Champion Power Equipment

2000 W Inverter

Service Manual

73531i
73552i

Table of Contents

1.0 Specifications

Dimensions	Overall Length		19.3 in / 490 mm
	Overall Width		13.2 in / 335 mm
	Overall Height		16.3 in / 415 mm
	Dry Weight		48 lbs / 21.7 kg
Generator	Generator type		Multi pole rotation
	Generator structure		Self-ventilation drip-proof alternator
	Excitation		Self-excitation (Magnet type)
	Frequency regulation		AC-DC-AC conversion
	AC output	Frequency	60 Hz
		Voltage	120 V
		Rated output	1.6 kVA
		Rated current AC	13.3A
	Rated rotation speed		4300 rpm
	ECON no load speed		3000 rpm
Engine	Engine type		4-stroke single cylinder OHV
	Displacement		79.7mL
	Bore x Stroke		48.6mm x 43.0mm
	Compression ratio		8.7
	Ignition system		T.C.I
	Engine oil capacity		13 fl oz / 0.4L
	Carburetor		Float type
	Lubrication system		Forced splash
	Air cleaner		Semi-dry type
	Cooling system		Forced air-cooled
	Spark plug		E6RTC (NHSP)
	Starting system		Recoil starter
	Fuel		Automotive unleaded gasoline
Run Time		Rated	3.8hr
		1/4 Load	9.5hr
Fuel Tank Capacity			1.0 gal / 3.8L
Noise level		Full Load /7m	65 dBA
		1/4 Load @ 7m	54 dBA

2.0 Maintenance Schedule

		Interval		
Item	**Routine**	**First 20 Hr or First Month**	**Every 100 Hr or 6 Months**	**Every 300 Hr or 12 Months**
Engine oil	Check oil level in engine			
	Replace engine oil	●	●	
Fuel system	Check fuel leakage			
	Clean fuel filter / strainer			●
	Check fuel hose for cracks or damage			
Air filter element	Check and Clean		●	
Spark arrester	Clean and replace if necessary		●	
Spark plug	Clean and replace if necessary		●	
Valve clearance	Check and adjust			●

Note: Perform each routine at the shorter of the two intervals – whichever comes first

3.0 Troubleshooting

3.1 Engine

3.1.1 Engine will not start

1. Check that the Engine Switch is in ON position
2. Check the Engine Oil level. If low, the Low Oil Sensor will ground the Spark Plug.
3. Check that the Fuel Valve is turned to ON position
4. Check that the Choke is pulled completely out (full choke)
5. Check that the fuel level in tank is at adequate
6. Check that the Vent in the Fuel Cap is turned to ON
7. Check to see if there is fuel in the Carburetor
    a. If no fuel in Carburetor, check fuel line for blockage
8. Is the Spark Plug wet or dry?
    a. If Wet – dry it off and try to start engine
    b. If Dry – Check Carburetor port and nozzle
9. Check Spark strength
    a. If weak – See Ignition System trouble shooting
10. Check Compression: 116-138 psi @ 1100 rpm and 58-72 psi @ 600 rpm
    a. If pressure is high – Check head cylinder carbon
    b. If pressure is low – Check Valve Clearance

3.1.2 Engine starts, but will not run

1. Check that the fuel level in tank is adequate
2. Check that the Fuel Valve is turned to completely to ON position
3. Check fuel filter – clean or replace
4. Check Fuel Hose for blockage or damage. Clean or replace if needed.
5. Check Carburetor gasket for damage and confirm nuts are tight.
6. Check Compression: 116-138 psi @ 1100 rpm and 58-72 psi @ 600 rpm
    a. If High – Check head cylinder carbon
    b. If low – Check valve clearance
7. Check air gap of Pulser Coi: 1.0mm (0.040 in) gap
    a. Adjust if needed
8. Check Pulser Coil. Replace if needed.
9. If engine will still not run, see Throttle Control trouble shooting

3.1.3 Engine RPM are low or not steady

1. Check Air Filter element. Clean or replace if dirty needed.
2. Check Valve Clearance – 0.1mm (.004 in)
    a. Adjust if needed
3. Check Spark Plug – clean or replace if needed
4. Check Main Jet Choke – clean as needed
5. Check Carburetor Joint and Gasket for damage and confirm nuts are tight.
6. Check Compression – 116-138 psi @ 1100 rpm and 58-72 psi @ 600 rpm
    a. If High – Check head cylinder carbon
    b. If low – Check valve clearance
7. If engine will still not run, see Throttle Control trouble shooting

3.2 Ignition System

3.2.1 No Spark

1. Check the Low Oil Sensor (confirm crankcase is full). Disconnect the Low Oil Sensor wire and check for spark
    a. If the Spark Plug sparks, then the Low Oil Sensor needs to be replaced
2. Install a new Spark Plug and check for spark
3. Pull recoil starter and check if the Oil Warning Light flashes
    a. The flashing Oil Warning Light indicates that the Oil Level Sensor needs replacing
4. Check Engine Switch for continuity
    a. Replace if needed
5. Check air gap and resistance of the Pulsar Coil <need spec from Yamashita>
    a. Adjust air gap or replace Pulsar Coil if needed
6. Check Ignition Coil <need detail>
    a. Replace if needed
7. Check Wire harness for damage
    a. Replace if needed

3.3 Throttle Control System

3.3.1 Engine RPM not steady

1. Check Stepper Motor movement
    a. Starting: Full Open→ close
    b. Stopping: Full Open
    c. Replace Stepper Motor if needed
2. Check Stepper Motor Resistance: 40-50 ohms
    a. Replace if resistance is out of spec
3. Check Wire Harness for damage
    a. Replace if needed
4. Replace Control Unit

3.3.2 ECON switch does not work

1. Check Stepper Motor Resistance: 232 - 267 ohms (20 degrees C)
2. Check ECON Switch for continuity
    a. Replace if needed
3. Check Wire Harness for damage
    a. Replace if needed
4. Replace Control Unit

3.4 Generator

3.4.1 Low AC output

1. With Engine running, check if the Overload light is ON
    a. If Overload light is ON – remove overload. If light stays ON, replace the Control Unit
2. Check Engine RPM
    a. ECON ON: less than 3000 rpm
    b. ECON OFF: 4300 rpm
3. Check Wire Harness Connector
4. Check Main Coil voltage: 228 – 342 V AC
    a. Low voltage: Replace Rotor
    b. No voltage: Check Main Coil resistance – 1.2 Ohm ±0.24
        i. If resistance out of spec, replace Stator
5. Check Sub Coil Voltage: 228 – 342 V AC (20 degrees C)
    a. Low voltage: Replace Rotor
    b. No voltage: Check Main Sub resistance – 0.12 Ohm ±0.02
        i. If Main Sub resistance is out of spec, replace Stator
        ii. If Main Sub resistance is OK, replace Control

4.0 Maintenance

4.1 Check Oil Level

1. Stop the engine and place the unit on a level surface
2. Remove the Maintenance Cover (4 screws)
3. Remove the Oil Filler Cap/Dipstick
4. Check the oil level on the Cap/Dipstick. Add oil if the dipstick does not reach the oil level.

4.2 Change Engine Oil

1. It is best to change the oil when it is warm. Start the unit and let it run for 4-5 minutes to warm the oil.
2. Stop the engine and place the unit above an appropriate oil collection pan.
3. Remove the Maintenance Cover and remove the Oil Filler Cap/ Dipstick.
4. Tilt the unit towards its side to allow the oil to drain completely
5. Place the unit back in the upright position
6. Add approximately 0.4 liter. Use the Cap/Dipstick to check for proper level.
7. Replace the Maintenance Cover.

4.3 Air Cleaner

1. Stop the engine and remove the Maintenance Cover.
2. Remove the Air Cleaner Cover (1 screw)
3. Remove the foam Air Cleaner element. Wash foam element in warm soapy water, rinse, and dry.
4. Saturate the clean element in clean engine oil. Squeeze out any excess oil.
5. Replace the foam element in the unit.
6. Inspect the seals on the Air Cleaner Cover. Clean as needed. Replace and fasten Cover.
7. Replace the Maintenance Cover.

NOTE:

- *A dirty Air Cleaner will restrict airflow to the carburetor and reduce engine performance. Clean the Air Filter more often if used in dusty conditions.*
- *Never run the unit without a filter element or with a damaged element.*

4.4 Spark Plug

1. Stop the engine and remove the Maintenance Cover.
2. Remove the Spark Plug Maintenance Cap on top of the unit.
3. Disconnect the Spark Plug Wire.
4. Remove the Spark Plug. The Spark Plug Maintenance Cap provides tool access.
5. Remove carbon or other deposits with a wire brush
6. Measure the spark plug gap and adjust as needed. **0.6 – 0.7mm (0.024" – 0.028")**
7. If needed, replace spark plug with **E6RTC (NHSP)** or **BPR6HS (NGK)**
8. Install the new spark plug by until finger tight to seat the washer. Then use a plug wrench and torque the new spark plug to **20 N-m (14.4 ft-lb)**
9. Replace the spark plug wire.
10. Replace the Spark Plug Maintenance Cap.
11. Replace the Maintenance Cover.

4.5 Valve Clearance

NOTE: Valve clearance MUST be checked while the engine is cold

4.5.1 Measuring Valve Clearance

1. Remove the Maintenance Cover.
2. Remove the Handle
3. Remove the Top Cover
4. Remove the Fuel Tank
5. Disconnect the spark plug wire
6. Remove the Spark Plug
    a. Torque to **20 N-M (14.4 ft-lb)** when putting the unit back together
7. Remove the Breather
8. Remove the Clip
9. Remove the Cylinder Head Cover

a. Torque to **11 N-M (7.9 ft-lb)** when putting the unit back together

10. Remove the Cylinder Head Cover Gasket
11. Remove Air Shroud
12. Rotate the Rotor clockwise until the Piston is at top dead center
13. Measure the Valve clearance by inserting a feeler gage between the Rocker Arm and the Valve
    a. Both Intake and Exhaust Valves must be **0.1mm (0.004")** clearance

4.5.2 Adjusting Valve Clearance

1. Loosen the Adjusting Screw Lock Nut
2. Turn the Adjusting Screw in or out as needed
3. Hold the Adjusting Screw with a wrench and torque the Lock Nut to **7 N-m (5.1 ft-lb)**
4. Measure the Valve clearance to verify it is correct. Repeat as needed.
5. Assemble the unit by performing steps **1-11** of section **4.5.1** in reverse order

4.6 Fuel Filter

Danger - Gasoline is highly flammable. It can cause serious burns. Keep heat, flame, and sparks away. Clean up any spills immediately.

1. Remove the Fuel Cap
2. Remove the wire mesh Fuel Filter
3. Clean the Fuel Filter to remove any obstructions
4. Inspect for damage. Replace if needed.
5. Install the Fuel Filter and Fuel Cap

4.7 Fuel Strainer

Danger - Gasoline is highly flammable. It can cause serious burns. Keep heat, flame, and sparks away. Clean up any spills immediately.

1. Turn Fuel valve OFF

2. Remove the Knob of the Fuel Valve
3. Remove the Handle
4. Remove the Top Cover
5. Remove the (3) screws that hold the Fuel Tank in place.
6. Lift the Fuel Tank and disconnect the fuel line from the Fuel Tank
7. Drain the Fuel tank into an appropriate container.
8. Remove the Fuel Strainer from the Fuel tank (Fuel Strainer is connected to the Fuel Valve)
9. Remove any obstructions. Inspect for damage. Replace if damaged.
10. Clean the Fuel Tank with a cleaning solvent and let it dry completely.
11. Install the Fuel Valve in the Fuel Tank.
12. Connect the fuel line to the Fuel Valve
13. Install the removed parts in the reverse order of removal.

4.8 Spark Arrestor

1. *Make sure Muffler has cooled completely before servicing the Spark Arrestor*
2. Remove the Handle
3. Remove the Corner Cover
4. Remove the Side Cover panel on the Muffler side of the unit.
5. Remove the Spark Arrestor from the Muffler by loosening the clamp around the muffler pipe.
6. Clean the carbon from the steel mesh of the Spark Arrestor using a stiff wire brush.
7. Check for any damage and replace if needed.
8. Install the removed parts in the reverse order of removal.

4.9 Engine Switch / Econ Switch

1. Check for continuity to determine if the switches are working properly.
    a. Switch ON – continuity
    b. Switch OFF – No continuity

4.10 Ignition Unit

1. Unplug the 10 Pin connector from the module.
2. Measure the resistance by connecting one test probe to the metal case of the Engine and the other test probe to the pin on the 10 pin connector. See Table 1 below for correct values.

Table 1 - Resistance Values

Color	Circuit Name	Resistance
Blue	Primary Ignition Coil	0.8 – 1.5 Ohm
Yellow	Oil Level Switch	No Continuity with proper Oil Level
Green/White	Trigger Coil	80 – 132 Ohm
Yellow/Green	Ground Wire	Continuity
Green	Igniter Unit Power Coil Winding	0.5 – 0.9 Ohm
Black	Engine Switch	No Continuity with Switch ON, Continuity with Switch OFF

4.11 Oil Level Switch

1. Place the oil alarm in the position shown below.
    a. There should be NO continuity between the Oil Level Switch and the Ground Wire.
2. Rotate the oil alarm 180 degrees and check continuity.
    a. There should be continuity between the Oil Level Switch and the Ground Wire.
3. Completely immerse the oil alarm in oil.
4. Wait two minutes
5. Check the continuity. If working properly, there should be NO continuity.

4.12 AC Receptacle

1. Check the electrode contact disk inside the receptacle. If it is burned or discolored, replace the receptacle.

4.13 Stepper Motor

1. Measure the resistance of the Stepper Motor lead-out wires
    a. Between 1 and 3: 45 – 55 Ohm
    b. Between 2 and 4: ??? <need spec from Yamashita>

4.14 Generator

1. Ignition Coil
    a. Measure the resistance between the Blue terminal and Yellow/Green terminal. It should measure 0.1 – 0.2 Ohm
2. DC Coil
    a. Measure resistance between the two green terminals. It should measure 0.1 – 0.2 Ohm
3. Sub Coil
    a. Measure resistance between yellow terminals. It should measure 0.1 – 0.2 Ohm
4. AC Coil
    a. Measure resistance between red terminals. It should measure 1.5 – 2.0 Ohm

4.15 Trigger

1. Attach the two test probes to the Trigger and measure the resistance. It should measure 120 Ohm ±24.
2. Measure the clearance between the Trigger and the Projection Part of the Rotor. The clearance should be 0.3 – 0.5mm (0.012 – 0.020”).

4.16 Ignition Coil

1. Check the Primary Resistance.
    a. Attach the two test probes to the primary coil plug of ignition coil. The resistance should measure 1.1 Ohm ±0.22.
2. Check the Secondary Resistance.
    a. Attach one test probe to the Spark Plug Cap and the other probe to each terminal of the primary coil plugs of the Ignition Coil. The resistance should be 12.2K Ohm ±2.4K

4.17 Valve Stem Outside Diameter

1. **Intake Valve**
    a. **Standard:** 4.948 – 4.960mm (.1948 - .1953”)
    b. **Service Limit:** 4.908mm (.1932”)
2. **Exhaust Valve**
    a. **Standard:** 4.928 – 4.940mm (.1940 - .1945”)
    b. **Service Limit:** 4.908mm (.1932”)

4.18 Valve Spring Free Length

1. **Standard**: 27.4mm (1.078”)
2. **Service Limit**: 24.4mm (.961”)

4.19 Cam Height

1. Intake A
    a. **Standard height**: 20.490 – 20.590mm (.8067 - .8106”)
    b. **Service Limit**: 20.390mm (.8028”)
2. Intake B
    a. **Standard height**: 16.139 – 16.239mm (.6354 - .6393”)
    b. **Service Limit**: 16.039mm (.6315”)
3. Exhaust A
    a. **Standard height**: 20.490 – 20.590mm (.8067 - .8106”)
    b. **Service Limit**: 20.390mm (.8028”)
4. Exhaust B
    a. **Standard height**: 16.139 – 16.239mm (.6354 - .6393”)
    b. **Service Limit**: 16.039mm (.6315”)

4.20 Cylinder - Inner Diameter

1. **Standard**: 48.600 – 48.620mm (1.9134 – 1.9142”)
2. **Service Limit**: 48.620mm (1.9142”)

4.21 Piston Skirt – Outside Diameter

1. **Standard**: 48.574 – 48.594mm (1.9124 – 1.9132”)
2. **Service Limit**: 48.53mm (1.9106”)

4.22 Piston Pin – Outside Diameter

1. **Standard**: 11.996 – 12.000mm (.4723 – .4724”)
2. **Service Limit**: 11.950mm (.7854”) <ask Yamashita to verify>

4.23 Piston Ring – Side Clearance

1. Top Ring
    a. **Standard**: 0.04 – 0.08mm (.0016 – .0032”)
    b. **Service Limit**: 0.12mm (.0047”)
2. Second Ring
    a. **Standard**: 0.02 – 0.06mm (.0008 – .0024”)
    b. **Service Limit**: 0.10mm (.0039”)

4.24 Crankshaft Pin – Outside Diameter

1. **Standard**: 21.969 – 22.000mm (.8649 – .8661”) <ask Yamashita to verify>
2. **Service Limit**: 21.985mm (.8656”)

4.25 Carburetor Float Height

1. **Standard**: 17mm (.669”)
2. Replace the Carburetor if the Float Height is not correct