Yuasa SecurePower Testing Advantage:
The Midtronics SecurePower battery tester uses Midtronics patented conductance technology to determine relative battery state of health. This means you can safely, quickly, and accurately test a battery anywhere.

Conductance Technology:
Conductance is a measurement of the plate surface available in the battery, which determines how much power (or current) the battery can supply. As a battery ages, the plate surface can sulfate or shed active material which adversely affects its ability to perform. In addition, conductance can be used to detect cell defects, shorts, and open circuits, which will reduce the ability of the battery to deliver current.

Using conductance, Midtronics testers are able to determine the battery's true state of health. A conductance tester does not put a load on the battery, which means no heat or sparks are created during testing. This makes the Yuasa SecurePower safe to use anywhere, and it is sized to take everywhere!

YUASA SECUREPOWER SPECIFICATIONS

Voltmeter Operating Range:	+6.0 to +19.99 Vdc
Voltage Accuracy:	+/–50 mV across operating range
Operating Temperature:	–18 to 50 °C (0 to 120 °F)
Voltage Test Limits:	12 V High = 13.80 V
	12 V Low = 12.00 V
	6 V High = 6.90 V
	6 V Low = 6.00 V
Siemens Range:	20 to 1200 S

CAUTION: Attempting to operate the Yuasa SecurePower beyond its specified operating range may permanently damage it.

Limited Warranty

This battery tester is warranted to be free of defects in materials and workmanship for a period of two year from the date of purchase. Midtronics will, at our option, repair the unit or replace the unit with a remanufactured tester. This limited warranty applies only to Midtronics battery testers and does not cover any other equipment, static damage, water damage, overvoltage, dropping unit or damage resulting from extraneous causes including owner misuse. Midtronics is not liable for any incidental or consequential damages for breach of this warranty. The warranty is void if owner attempts to disassemble the unit, or to modify the cable assembly.

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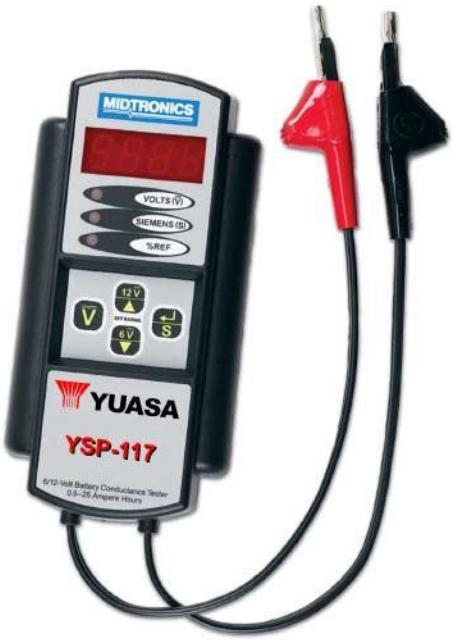
Yuasa SecurePower YSP-117 INSTRUCTION MANUAL



For testing 6 and 12-volt batteries rated between 1.2 and 55 ampere hours

SAFETY PRECAUTIONS

- **Always comply with facility safety standards when performing maintenance.**
- **Because of the possibility of personal injury, always use extreme caution when working with batteries. Safety glasses should be worn.**
- **To avoid electrical shock, remove personal metal items such as rings, bracelets, necklaces, watches, etc.**
- **To determine if the battery can be safely tested, inspect the battery for a bulging case, leakage, cracks in the case, or other visible signs of defects/problems.**

CONDUCTANCE AND VOLTAGE MEASUREMENTS

The Yuasa SecurePower measures and displays the direct current voltage (Vdc) and conductance for any 6 or 12 volt battery rated between 1.2 and 55 ampere hours (Ah) of discharge capacity. DC voltage is a measure of a battery's electrical potential. Conductance is a relative measure of a battery's ability to meet its rated capacity. The Yuasa SecurePower displays the conductance value in siemens (S). In general, a high relative conductance measurement is an indication of a good battery, and a low measurement indicates a battery in degraded condition.

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ESTABLISHING A CONDUCTANCE REFERENCE VALUE

Battery performance is temperature dependent. Allow the batteries to reach room temperature before testing—ideally around 25 °C (77 °F). (Refer to the **Battery Temperature Compensation Scales** below for the compensation factor.)

Because conductance is a relative measure, you must first establish a reference value by testing a sample number of new batteries. To establish a reference value, record the average of at least 10 fully-charged batteries of the same or similar models, preferably within 90 days of their installation. Midtronics recommends that the batteries should all test within 20% of each other (+/–10% of the average). (Consult your battery supplier for conductance standards.) If new batteries are not available, record the average of installed batteries of the same or similar models regardless of age. If the installed batteries test within 10% of each other, the highest value can be used as a temporary reference until new batteries are available for testing.

Example: Within 90 days of installation, measure a sample of 20 new batteries (12 V, 17 Ah) that average 300 S each when fully charged. Conductance will decline as a battery ages. The amount of acceptable loss will depend on the type of application for which the battery is used. As a general rule:

<**30% loss** = **Strong Battery**—no significant capacity loss (300 x 0.70 or more ε 210 S)

30 to 40% loss = **Marginal Battery**—nearing the end of its serviceable life (180 to 210 S)

>**40% loss** = **Degraded Battery**—may not meet the required load (300 x 0.60 or less δ180 S)

Consult your battery supplier to ensure that the rated battery capacity is sufficient for the applicable equipment runtime while allowing for the appropriate aging factor of the batteries.

BATTERY TEMPERATURE COMPENSATION SCALES

Battery Temperature	Multiply SecurePower %Ref. Value by
35 °C (95 °F) or warmer	0.930
30 °C (86 °F)	0.965
25 °C (77 °F)	1.000
20 °C (68 °F)	1.035
15 °C (59 °F)	1.070
10 °C (50 °F)	1.105
5 °C (41 °F)	1.140
0 °C (32 °F) or colder	1.175

Examples:
Using a reference value of 300, the Yuasa SecurePower reports 63%, 190 S. If the battery temperature is 35 °C (0.63 x 0.93 = 0.59 or 59%), the battery should be replaced.

Again using a reference value of 300, the Yuasa SecurePower reports 63%, 190 S. If the battery temperature is 0 °C (0.63 x 1.175 = 0.74 or 74%), the battery is good.

YUASA SECUREPOWER KEYPAD AND LEDS

UP ARROW: Press for 12-volt batteries and to scroll to the reference value (20 to 1200 siemens).

VOLTMETER: Press at any time to read DC voltage

ENTER: Press to select the reference value, to start the test, and to display conductance in siemens (S)

DOWN ARROW: Press for 6-volt

The red LEDs above the keypad indicate the test mode and the numerical value shown on the display (voltage, siemens, and percent of reference). You can use the Yuasa SecurePower as a voltmeter at any point in the test procedure by pressing the VOLTMETER button.

BATTERY TEST PROCEDURE

1. Disconnect the battery from the system.
2. Connect the tester clamps to the battery: red to positive (+), black to negative (–).
3. Select the voltage by pressing the UP ARROW button for 12 volts or the DOWN ARROW button for 6 volts. Press ENTER.
4. Scroll to the reference value by pressing the UP or DOWN ARROW buttons. Press ENTER. (The tester will default to the last reference value entered.)
5. Start the test by pressing ENTER. A series of dots will flash on the display while the Yuasa SecurePower measures conductance and voltage, and calculates a percentage of reference.
6. The first value displayed is the percentage of reference.
7. To display the actual conductance value (S), press and hold the ENTER button.
8. To display voltage, press the VOLTMETER button.

TROUBLESHOOTING

TOO LO: The battery's voltage is below the specified operating range (< 6.00 V for a 6 V battery or <12.00 V for a 12 V battery).

Note: If the battery is below 5.5 V the tester will not operate.

TOO HI: The battery's voltage is above the specified operating range (> 6.90 V for a 6 V battery or >13.80 V for a 12 V battery).

999 (or **9999** when ENTER is pressed): The battery has exceeded the range specified. Refer to **Yuasa SecurePower Specifications** for the tester's operating range.

Excessive electromagnetic interference may cause the tester to reset. If the tester resets during testing, simply disconnect it from the battery, reconnect and start the test process again.