SK-8550 BATTERY CHECKER Technical Guidebook

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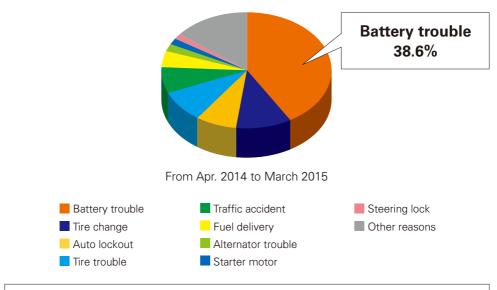
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MARKET DEMAND

The most major roadside assistance is, **Battery Trouble!***1



Battery trouble : Significant percentage at 38.6%!

Lead battery equipped with the vehicles is a kind of consumables which could be exhausted accidentally or suddenly, especially in case of the weak maintenance condition. Battery trouble is increasing in recent years by reason of a lot of car electrical devices, or fuel-efficient systems such as start-stop system or braking energy recovery system that could put an excessive burden on the battery.

Accurate and periodical battery check comes to be more important to prevent battery trouble and to maintain the battery in good condition.

^{*1} According to the survey by Japan Automobile Federation.

^{*2} Braking energy recovery system : Fuel reducing system to stop generating from alternator when accelerating, and to regenerate and recharge the battery when braking.

^{*3} Start-stop system : automatically shuts down and restarts the automobile engine to reduce the engine-idling time.

UPGRADED FUNCTIONS FOR SK-8550

1 New &1st Header/Footer Function See page 4

You can print a store name or sales coupon on the printing paper as "Header" and "Footer". Favorite image and words can be added by downloading "Head/Footer Editor Application" from KAISE website.

*1 : As image printing and Japanese input software (as of Feb. 2016)

²Blighter LCD ····

Easy-to-read white LCD with backlight.

(3) New &1st Bookmark the Battery as Favorite See Page 12

You can bookmark the frequently-test battery as "Favorites". This function allows easy battery setting when testing.

%Also effective for CCA/m Ω input batteries. %2 : as of February, 2016

4 Direct Print Key

No need of complicated operation for printing. Just pressing this key in the Test Result screen, you can print out the result immediately.

5 Test Count Display See Page 13

You can see the test count history stored in the internal memory. This function is useful to check the sales rate of the tested batteries.

6 Detachable Battery Cable See Page 13

Unfortunately, battery cable tends to be damaged under tough battery checking. For SK-8550, you can replace the cable easily at your side.

Tough Cable Connector ······

Toughly-improved connector prevents cable disconnection under battery checking.



FEATURES OF SK-8550

- ①Supported with the newest JIS standards. EN/DIN and SAE/BCI applicable.
- 25-grades testing results.
- ③Double Differential Pulse Measurement for accurate measurement
- (4) The newest data base and software program for testing the batteries corresponding to start-stop system and braking energy recovery system.
- (5) Auxiliary battery checking for hybrid vehicles.
- ⁶Start performance test and charging system test for 12V & 24V batteries.
- ⑦Easy-to-read printing paper from built-in printer.
- (8) Header/Footer Function enables to print store name or sales coupon. * Internet access is required to use this Header/Footer function.
- ⁽⁹⁾Detachable battery cable which allows easy cable replacing.
- ⁽¹⁰⁾Unused battery test mode to check the in-stock battery conditions.
- Industrial battery (deep cycle battery) testing.
- ¹²Test Count Display that can store the test count history in the internal memory (resettable).
- ⁽³⁾Capable of saving up to 359 test results data in the internal memory.
- ⁽¹⁾PC output of the saved test results as text data.
- ⁽⁵⁾Temperature sensor embedded in the battery clip performs temperature adjustment for more accurate testing.
- ⁽⁶⁾Free software upgrading through KAISE website. **Internet access is required.

High Valued Professional Battery Checker!

HEADER / FOOTER FUNCTION (NEW!

You can print a store name or sales coupon on the printing paper as "Header" and "Footer". Favorite images and texts can be added by downloading "Head/Footer Editor Application" from KAISE website.

In addition to make the original images, free image templates are also available in the KAISE website. Just downloading these images, you can make the attractive printing paper easily.



See page 32 of instruction manual for more details of Header/Footer Editor Application and for free image templates download.

HEADER / FOOTER FUNCTION NEW!

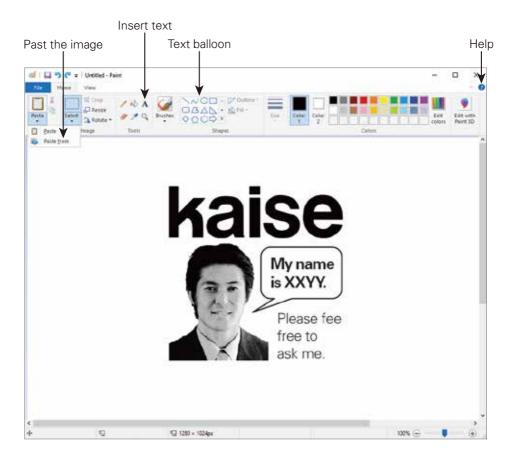
Header : Making the Original Image

Make the Original Image with an Image Editor Software!

Printing company logo or pictures on the Header is recommended to make the attractive test report. Try to make the original image by using "Paint", the pre-installed image editor App for Windows PC.

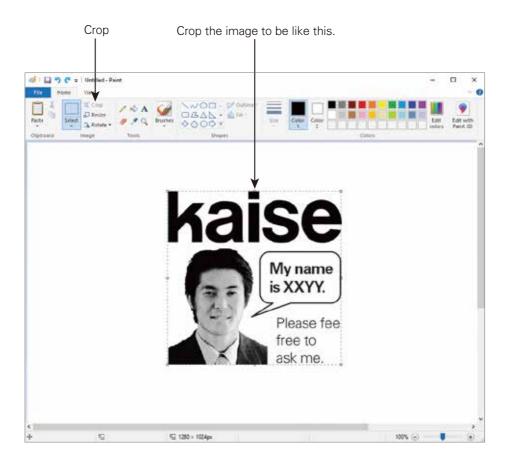
①Paste company logo or picture data on the Paint App. Add text balloon, and the adjust the image layout.

*See "HELP" to get help on using "Paint".



HEADER / FOOTER FUNCTION (NEW!)

②Crop the image without any blank spaces.



TIPS!

High-contrast picture is recommended to get beautiful print out.

HEADER / FOOTER FUNCTION NEW!

③Click "Resize". Choose "Pixels, and type "380" in Horizontal.



Type 380 In Honzonta

TIPS!

The maximum Header/Footer image size is 380×380 pixels. Making the image with this pixels is recommended to get beautiful print-out.

The image less than 380×380 is printed in the center of the paper width. The image more than 380×380 is automatically shrunk.

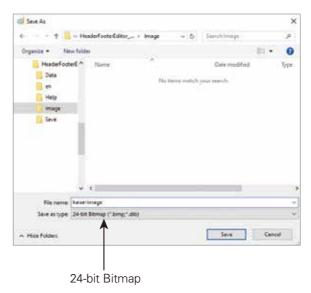
The maximum Header/Footer image size is 380×380 pixels! Make the image with this pixels!

HEADER / FOOTER FUNCTION NEW!

④Save the image as BMP picture.



 Set "Save as type" to "24-bit Bitmap", and save the image into the Image folder of the Header/Footer Editor Application.
 See page 31 of instruction manual how to download the Header/Footer Editor Application.

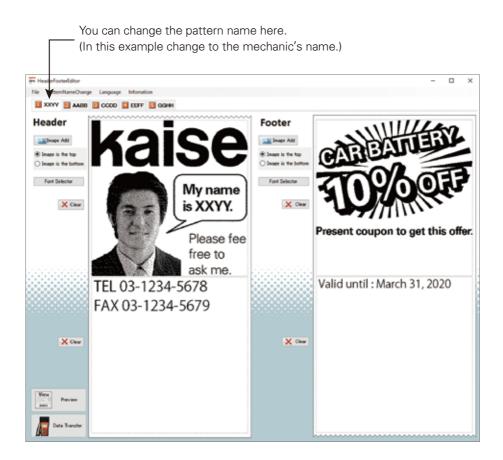


Making original image is done. See page 36 of instruction manual how to use this image.

Changing the Pattern Name

Change the Image Pattern Name to be More Useful

You can save up to 5 image patterns in the Header/Footer Editor Application. Pattern name can be changed freely such s mechanic's name, etc.



HEADER / FOOTER FUNCTION NEW!

Footer : Making Individual Footer

Print the Individual Footers for Each Test Result!

When printing the coupon on the footer, changing the contents depending on the test results is recommended for more effective sales promotion. Refer to the following examples. (for details, see page 41 of instruction manual.)



Test result : Good or Good/Change



Test result : Attention or Replace

You can print the individual footers depending on the test results!

Footer : More Practical Example

Print QR Code on the Footer!

You can print QR code on the footer by saving its image in the Header/Footer Editor Application.

This is useful to guide the customers to your website to get mode detailed information or sales campaigns.

%You cannot create QR code in the Header/Footer Editor Application.

%QR code is registered trademark of Denso Wave Incorporated.



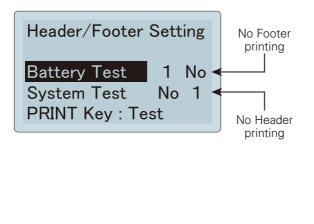
Visit our website for campaign details.

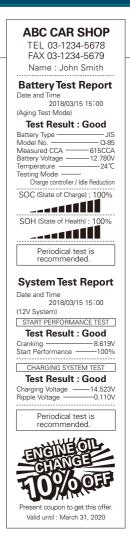
HEADER / FOOTER FUNCTION (NEW!

How to set Header / Footer When Printing Battery Test and System Test Results in One Paper

Set No-Footer for Battery Test, No-Header for System Test!

To print the results of Battery Test and System Test in one paper, set Battery Test as "No Footer" and System Test as "No Header". See page 39 of instruction manual for details.





Check Header / Footer Design

Use Test-Print Function to Check Header/Footer!

You can print test-print paper by pressing **B** PRINT Key in the above Header/Footer Setting screen. This function is useful to check Header/Footer design.

FAVORITES FUNCTION (NEW!)

★ FAVORITES 01/M-42 02/60B24 03/55D26 04/S46B24

Favorites List

You can bookmark the frequently-testing batteries as "Favorites". This function is useful for easy battery setting when testing.

Q-85 ▲▼:Select <┚:Enter MENU:space ★:Input(Upper Case) ⊃:Delete PRINT:Exit

Renaming the Battery

You can rename the battery when or after saving to the favorites list.

(in alphabet / numeral / symbol / digit)



Saving the CCA Rating to Favorites List

You can save CCA rating of EN(DIN) and SAE(BCI) batteries to favorites list. Renaming it to the battery model name like left figure is useful for quick testing.



Saving Industrial Battery

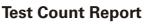
You can save $m\Omega$ value of industrial batteries to favorites list. Renaming it to the practical name like left figure is useful for quick testing.

TEST COUNT DISPLAY (NEW!)

You can see the test count history stored in the internal memory, just choosing "View Test Count" in the MENU screen.

View Test Count	
Battery Test	285
Syetem Test	192
, ₽ress Hold : F	eset

Test Count Screen



Date and Time		
	2018/03/15 15:00	
Battery Test - System Test -		

Printing out is possible

This function is useful to calculate the sales rate of the tested batteries as below formula (monthly sales rate, etc.).

$\frac{\text{Battery sales quantity}}{\text{Testing times}} \times 100 = \text{Sales rate (\%)}$

DETACHABLE BATTERY CABLE NEW!

Battery cable tends to be damaged under tough battery checking. For SK-8550, you can replace the cable easily at your side even if it is damaged.



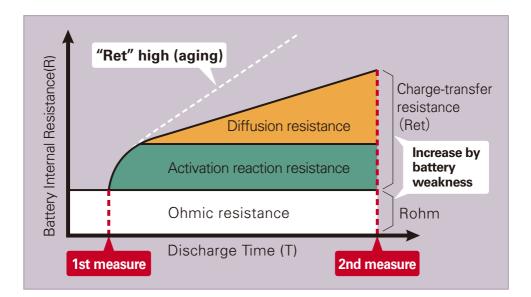
Battery Cable Model No. : 800

DOUBLE DIFFERENTIAL PULSE MEASUREMENT

What is Double Differential Pulse Measurement?

Vehicle battery has two types of internal resistances. One is "Rohm", the internal resistance which contained in each battery. Another one is "Ret", the charge-transfer resistance that increases in direct proportion to discharge time of the battery current. For the weak battery, "Ret" becomes higher and that makes the battery discharging time shorter.

Double Differential Pulse Measurement is specified to test the battery twice and input the calculated "Ret" in the internal CCA calculation. By this method, SK-8550 can assure more accurate testing than other CCA testers.



What is CCA?

CCA stands for Cold Cranking Amperes. It is defined as the current a battery at 0°F (-18°C) can discharge for 30 seconds and maintain at least 7.2V (for JIS, SAE and BCI). And it is defined as the current a battery at 0°F (-18°C) can discharge for 10 seconds and maintain at least 7.5V (for EN and DIN). The battery which has the bigger CCA, the higher ability to start an engine, CCA is one of the criterion for selection of the battery.

DOUBLE DIFFERENTIAL PULSE MEASUREMENT

Temperature Sensor

Battery discharging characteristic should be varied according to the battery temperature. For SK-8550, temperature sensor is embedded in the battery clip enabling to adjust the battery test data to be under -18° C condition.

CCA Value Characteristics for SK-8550

In-vehicle batteries are not always in full-charged due to the effects of driving condition or fuel saving systems. If its charging level is weak, dischargeable CCA value becomes also lower.

For SK-8550, CCA value corresponds to the charging level of the testing battery.

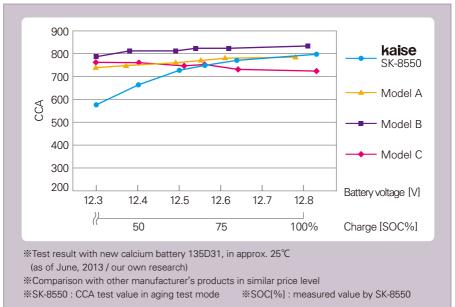
For testing the battery with low charging level and with low voltage, CCA test result also becomes low as shown in the chart in the next page.

In another chart comparing measurement characteristics between new and weak batteries, you can see the charging capacity goes down for the weak battery, and its CCA% value becomes lower than the new battery.

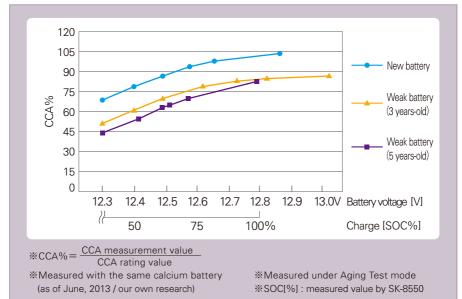
For lead-acid batteries, sulfation occurs when they are subjected to insufficient charging during normal operation. The sulfation clung to the electrode plate can be the resistance which decreases the battery power.

*What is "Sulfation"? : Crystallization of lead sulfate which occurs when discharging.

DOUBLE DIFFERENTIAL PULSE MEASUREMENT



CCA value comparison : SK-8550 vs. other models



Measurement characteristics for new and weak batteries (by SK-8550)

START-STOP & BRAKING ENERGY RECOVERY SYSTEMS

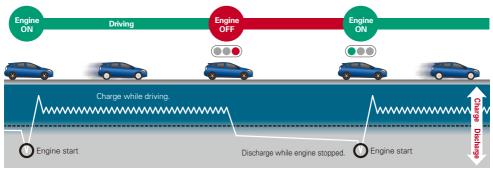
Start-stop and braking energy recovery systems are essential for the recent vehicles to improve fuel efficiency and to meet emissions regulations.

These fuel-efficient technologies tend to put a load on battery such as to use under low charging condition (P-SOC^{*}), or to take frequent discharging under engine ON and OFF. Therefore, the battery with high-durability, high-power, and high-charging ability (quick charging ability) are required for the vehicles with these systems.

Using normal battery for the vehicles with braking energy recovery system should accelerate the battery weakness and could cause the battery-dead in a short period. For the vehicles with start-stop system, normal battery cannot be used. Using the specified battery to cope with the each battery model is required.

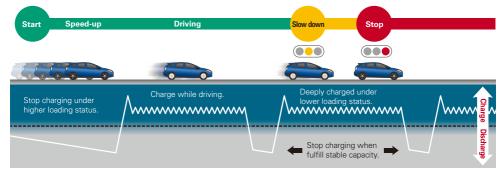
SK-8550 can test these special batteries accurately by using their own testing programs. For start-stop system batteries, model database is available in the SK-8550. You can select the battery model easily from the battery list displayed on the screen.

*P-SOC (Partial-State of Charge) : Using the battery under low charging condition.



Charge/Discharge image for the vehicle with start-stop system

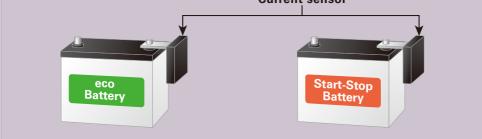
Charge/Discharge image for the vehicle with braking energy recovery system



START-STOP & BRAKING ENERGY RECOVERY SYSTEMS

Batteries for the vehicles with start-stop and braking energy recovery systems

Current sensor is attached to the batteries suitable for the vehicles with such fuel-efficient systems.



Model classification

Check the specified model codes as below. (Example for JIS) $55B24L \rightarrow N-55$ $55D23L \rightarrow Q-55$

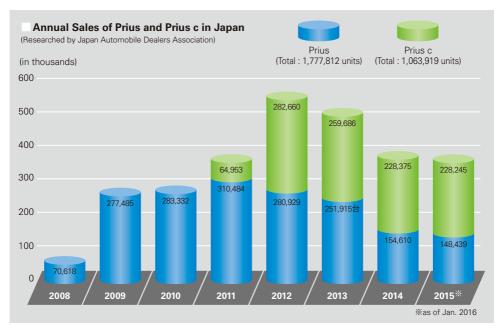
Battery Model Classification by Dimensions			nensions
Normal Battery	Start-Stop Battery	Normal Battery	Start-Stop Battery
B17	J	D26	S
B19	K	D31	Т
B20	М	E41	U
B24	N	F51	V
D20	Р	G51	W
D23	Q	H52	Х

(SBA S 0101:2006, Battery Association of Japan, for start-stop battery)

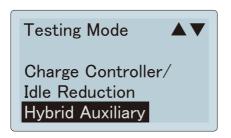
AUXILIARY BATTERY FOR HYBRID VEHICLES

There are two batteries inside the hybrid vehicles. One is the main battery, lithium ion or nickel hydride battery, to supply electric power to the motor. Another is the auxiliary lead battery to supply electricity to the hybrid system, ECU, and installed electric devices. Battery test is required for this auxiliary battery.

For SK-8550, auxiliary battery data equipped with Prius or Prius c is installed (S34B20 / S46B24 / S55D23 / S65D26). You can test these batteries just choosing from the list.



Sales of Prius c is glowing over 1 million units! For Prius, maintenance demand is increasing!



Hybrid auxiliary battery select screen

INDUSTRIAL BATTERY TESTING

There is two types of lead-acid batteries, one is the vehicle battery to start the engine or to supply electric power to the installed electric devices by repeatedly chage-discharge. Another is the industrial "deep-cycle" battery to use with UPS, or power-operated vehicle such as electric cart. This battery designed to be regularly deeply discharged using most of its capacity by repeatedly recharging.

It is difficult to control the deep-cycle battery life, because there is an inverse correlation between the depth of discharge (DOD) of the battery and the number of charge and discharge cycles it can perform. And also, surrounding temperature should affect its charging voltage or discharging condition.

SK-8550 has industrial battery test mode. You can check the battery condition by comparing tested internal resistance with the initial one written on the battery. If you cannot find the initial internal resistance, test the new battery first as per the steps from page 21.

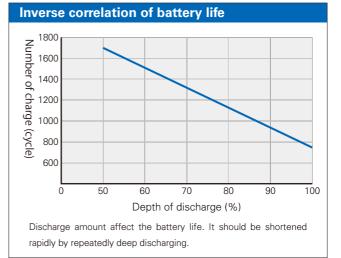
Adding initial internal resistance to Favorites List is recommended for easy testing!

*Only 12V lead battery can be tested.

**SK-8550 shows "Replace" test result when the tested resistance becomes double of the initial resistance, because generally, the industrial batteries need replacement with this value. However, the actual good/bad threshold may differ from batteries models. Please note this when replacing.



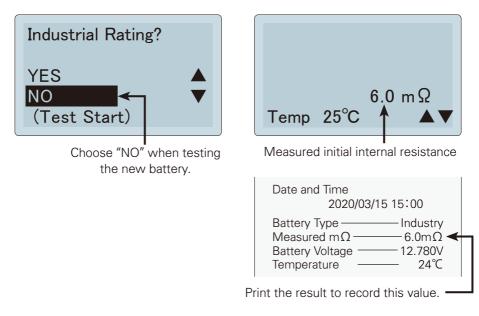
Electric cart



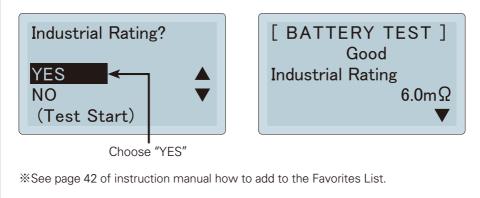
INDUSTRIAL BATTERY TESTING

How to test the industrial battery

(1) Test the new battery (before using, full charged) to measure and record the initial internal resistance.

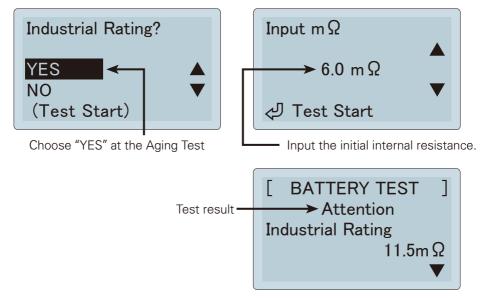


Adding the initial internal resistance to the Favorites List is recommended. Test the above battery again with inputting the measured resistance.



INDUSTRIAL BATTERY TESTING

②Input the initial internal resistance when doing the Aging Test.



You can skip the step to input the initial internal resistance by adding this value to the Favorites List!



Favorites List Screen

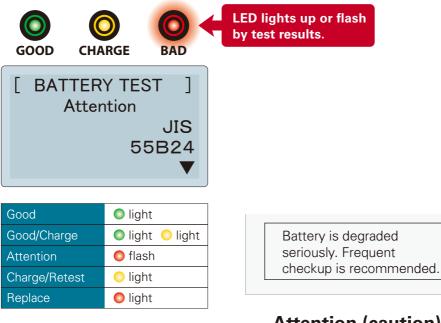
(Renamed the battery in the above example)

*See page 43 of instruction manual how to choose from the Favorites List.

TEST RESULT LED

5-levels Test Result

Easy-to-see testing result by LCD display and LED lamp."Attention (caution)" result is useful to let the customer know the necessity of battery replacement to prevent unexpected battery-down.



Test result in 5-levels

Attention (caution) comment on printing paper.

UNUSED BATTERY TEST MODE

Even in the unused (new) condition, the battery capacity subject to be decreased by self-discharging. Also, the battery should be weakened when leaving for a long time under lower capacity condition,

Unused battery test mode is effective to keep them in good condition preventing unexpected battery aging during storage.

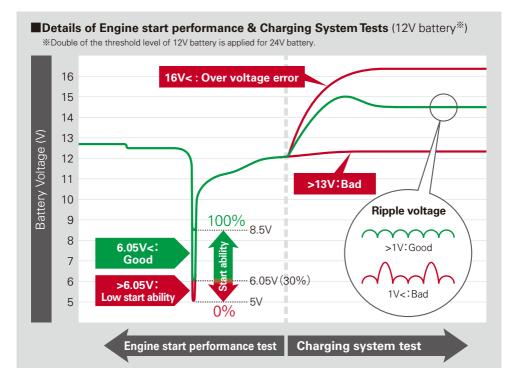
Which Test Mode?	
Aging Test Unused Battery Test	

Test Mode select screen

Check the manufacturing date.

Unused battery test comment on printing paper.

System Test function is equipped with the SK-8550. There are two testing - one is Engine Start Performance Test is to check the starting ability of the battery, and another is Charging System Test to check the generating condition of the alternator.



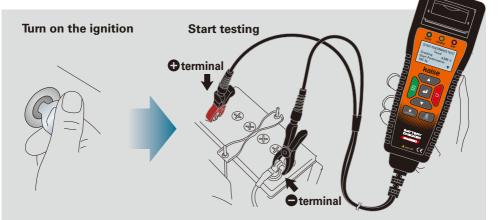
Engine Start Performance Test

Engine Start Performance Test is to check the starting ability of the battery. Testing can be started automatically just turning off the battery loadings, such as electric devices, and then turning on the vehicle ignition. Measured voltage is the lowest battery voltage when activating the starter motor.

Sampling rate : 100 μ (micro) s

Start Performance Test result is affected by the balances between battery grade and vehicle class. When they are in the same grades, engine start performance decreases in proportion to the battery weakness and charging condition. If the battery grade is higher than the vehicle class, start performance shows 100% in spite of the severe battery weakness. In case that the start performance shows "Weak Start Power" in spite of the good battery condition, lower battery grade than the vehicle class, low battery charging, or any problem in the vehicle are suspected.

*Start performance test result is possibly to be affected by the vehicle and battery conditions.



Engine Start Performance Test



Test result printing



Engine starter

Engine Start Performance Test

When testing the vehicle with 24V battery as shown in the below figures, choose "24V System Test" in the Battery System Test screen.

If the test result shows "Weak Start Power", battery weakness is considered. In addition to this, weakness differences of the series-connected batteries, or connecting cable problem are also suspected. Using the new and the same two batteries are recommended when replacing.

Battery performance should be changed depending on the temperature. Periodical testing with SK-8550 is effective to check the balance between battery and vehicle.



24V vehicle Battery System Test

Battery Test for 24V vehicle: Test the connected two 12V batteries separately to check their weakness balance.



24V vehicle Battery Test

Charging System Test

The screen automatically shifts to the Charging System Test after fihishing the Engine Start Performance Test. In this screen, the current charging voltage is displayed together with the test result.

If the charging voltage is low, less than 13V, turn on the electric devices such as air conditioner or headlight observing the screen message. Try the Charging System Test again under this loading condition, and check if the charging voltage increases or not. %26V or less for 24V System Test.

Charging voltage test result is fixed by pressing I ENTER Key, and the instrument goes to the ripple voltage test. Then the Charging System Test result is displayed on the screen. In case of the bad test result with low charging voltage, check the alternator, or the engine belt error.

Ripple Voltage is the small change of charging voltage which occurs when rectifying the generated voltage by diode. If diode is damaged, the ripple voltage fluctuated sharply and adversely affects battery and in-vehicle apparatus.

CHARGING SYSTEM TEST
Test Result : Good
Charging Voltage — 14.523V
Ripple Voltage — 0.110V

Test result printing

[CHARGING SYSTEM TEST] Good Charging 14.500 V

<[┛]Key Test Result



Alternator

Can check current charging voltage! Press ENTER Key to see the result!

BUILT-IN PRINTER

SK-8550 has built-in printer that can print the test result quickly. Showing the test result to the customer on site is effective for easy understanding of the detailed battery condition.

%Printing language is the same as the display language.

Easy-to-read printer!



Battery Test Report sample

	Battery Test Report
Test date & time ——	 Date and Time 2018/03/15 15:00
Battery test mode	• (Aging Test Mode)
Battery test result Condition of tested battery	• Test Result : Good Battery TypeJIS Model NoO-85 Measured CCA615CCA Battery Voltage12.780V Temperature24°C Testing Mode Charge controller / Idle Reduction
Battery charging level (SOC) Battery aging	SOC (State of Charge) : 100%
level (SOH) Comment for test result	Periodical test is recommended.

Test Result

(1)Good (2)Good/Charge (3)Attention (4)Charge/Retest(5)Replace

"Attention" test result

Battery weakness is in progress. Frequent battery test is recommended.

Tips for battery charging

Recently, vehicle battery tends to be used in over discharge condition due to fuel saving technology.

Short-distance driving such as town driving or infrequent driving could accelerate the battery weakness or could decrease the charge-receiving ability of the battery. This may disturb the vehicle function and could cause the start/stop system trouble, etc.

To extend the battery life, periodical battery charging is recommended.

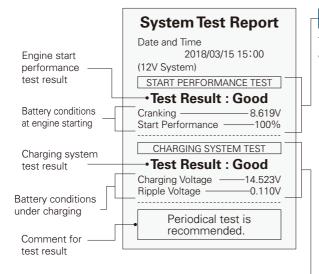
State of Health (SOH)%

Test result shows "Replace" when SOH becomes 30% or lower.

SOH% is obtained from the ratio of rated CCA value and measured CCA value, and amount of charge of the battery (SOC)% comprehensively.

BUILT-IN PRINTER

System Test Report sample



%Printing language is the same as the display language. (If the display setting is English, test data saved in Japanese should be printed in English.)

Start Performance Test

Test result shows "Weak Start Power" when start performance is 30% lower. %Cranking is the lowest battery voltage when activating the starter motor.

(Sampling rate :100 μ s)

Tips for start performance

You can see the overall battery condition in combination with the results of Engine Start Performance Test and Battery Test.

If the battery test result in the summer season is "Attention" with around 25% start performance, early replacement is recommended before winter season.

Start performance may be tested lower if the tested battery is new, but smaller than the actual engine displacement.

Charging System Test (for 12V battery)

Charging voltage : Good in 13V to 16V Ripple voltage : Good in 1V or lower %They should be double for 24V vehicle.

SAVING TEST RESULT

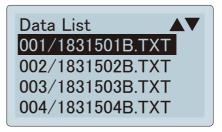
SK-8550 can save up to 359 test results in the internal memory. You can see the saved data on the unit display (connect to the battery is needed). Printing out is also possible.

If the printing does not work in case that the tested battery is too weak, save the test once, and try re-printing by connecting the SK-8550 to the good battery.

*Display language is retained for the saved test result data.



Data saving menu screen



Saved data list screen

PC CONNECTION

SK-8550 can connect to PC via provided USB cable for sending the saved test result date to the PC in text format.

You can easily make the attractive maintenance report by using these data.



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KAISE CORPORATION

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Product specifications and appearance are subject to change without notice due to continual improvements.