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Warning

Please read this manual carefully and operate this product according to instructions.

1. Notes

- 1) The operation site must be ventilated with good environment. It's better to do the test under room temperature.
- 2) Do not use it outdoors when weather is bad such as rainy, snow, etc. and keep it away from rom open flame, water, and inflammable, explosive objects as far as possible when using.
- 3) Before using the instrument, you must correctly distinguish the positive pole (+) and negative pole (-) of battery, then connect the red casing clip of instruiment to the positive pole (+) of battery, and connect the black casing clip to the negative pole (-) of battery. And connection must be firm.

8. Supplementary instruction

The manufacturer of this product will offer a one-year warranty. But manufacturer may not take any responsibility for any failure caused by operation not in accordance with the instructions, in violation of the relevant knowledge or violate the laws and regulations. Manufacturer reserves the right to modify the product without notifications for the difference generated by the modification made in this manual.

seconds or start the motor again. In fact, the power is consumed the most when starting the engine, the battery voltage can be dropped to 10.5V and below from normal 12.5V at the moment of large ampere output.

The greater of the cold cranking ampere has larger help for such unsmooth starting.

◆ CA - Cranking Ampere

Its meaning is similar to CCA, unit is also Ampere, its only difference from CCA is the temperature. CCA is the result under the temperature of -17.8°C, while CA is the result under 0°C. If the battery marked with CCA and CA, the CA value will be lower than CCA, because the lower of the temperature, the worse performance of battery it will be.

◆ AH - Ampere Hour

It is the standard defined by Japanese industrial standard (JIS). Simply put, the battery is discharged at a fixed ampere can maintain for 20 hours, voltage can be 10.5V and above, 21 this fixed amperes multiply by hours is Ampere Hour. For example, 20hours and discharged at fixed 20 Ampere, the ampere hour of battery is 100.

◆ DIN - Germany standard

The ampere of battery can reach 9.0V for 30s under the cold temperature of 0°F(-18°C), and maintain the minimum voltage, while at 8.0V, maintain for 150s.

◆ IEC - The international association of electronic science and technology

Under the average current intensity, each battery soaked in 0°F (18°C) for cooling, the lowest voltage is 8.4V and maintained for 60s.

◆ BSR - British national inspection standard

Under the average current intensity, each battery soaked in 0°F(-18°C) for cooling, the lowest voltage is 6.0V and maintained for 180s.

◆ BCI - The international association of battery

Under the average current intensity, each battery soaked in 0°F (-18°C) ~ -20°F(-29°C)for cooling, the lowest voltage is 7.2V and maintained for 30s.

4) Do not use this instrument to do a load test for too long, and do not continuous load testing without interruption.

5) Do not touch the iron shell at the front and back of the instrument with fingers when testing and in a short period after test completes, so as to avoid burns.

6)After completion of the test, as far as possible to the instrument first cooling after a period of time, store again.

7) Please keep the instrument properly when you don't use it, store it in a clean and safe room. If the appearance of instrument is found to be damaged or LED Digital display abnormal, do not use it.

2. Introduction

This is a product designed for traction and start-up lead-acid battery, which can satisfy the loading capacity of traction lead-acid battery and cranking ability test of start-up lead-acid battery, also it provides internal resistance parameters while testing as well.

The instrument is featured by excellent design, convenient operation, accurate reading and complete functions. Instrument adopts lattice LCD display, test process and results acousto-optic hint. Its inner side adopts precise circuit and powerful digital processing unit, using four-wire Kelvin test connection method to complete a series of complicated data collection and calculation and obtain the test data of each item. In addition, the inner of instrument has strengthened the input protection, to prevent polarity reversed connection, and access voltage too high, poor contact of test clip head, over temperature prompt and other protection measures, in order to make the operation more security and convenient.

The shell of instrument is made of solid ABS engineering materials, at the same time, its top and bottom add steel plate with opening for simulating heating part of load and equipped with fans to strengthen cooling in order to make the testing process more stable and reliable. Test lines are made of pure copper thicker test wire, with four-wire Kelvin test clamp connection, test sampling value directly from the battery terminal, in order to restore the actual working condition of battery, make the test results more accurate.

The excellent materials, reliable process and design, advanced circuit control, and good details and quality control system guarantee the high quality, accuracy and reliability of the instrument.

3. Specifications

◆ Traction lead-acid battery

- 1) Used on ordinary 6V, 12V traction lead-acid battery.
- 2) Load test current: < 80A.
- 3) Battery capacity test range: 40Ah-200Ah.
- 4) Maximum voltage value: DC19.99V.
- 5) Internal resistance of battery: 1.00 milliohm – 99.99 milliohm.
- 6) L E D Status indication :

Battery status: “ GREEN ”(battery sufficient) ,“ YELLOW ”(battery low) , “RED ”(replace battery);

- 7) Battery capacity preset: 40 - 200 A h continuing adjust, 5 A h increment.
- 8) Test time: less than 10s; test interval : about every 5 minutes.

◆ Start-up lead-acid battery

- 1) Used on 12V start-up lead-acid battery.
- 2) Maximum voltage value: DC19.99V.
- 3) Internal resistance of battery: 1.00 milliohm – 99.99 milliohm.
- 4) Optional battery standards:

CCA : 100 ~ 1700

IEC : 100 ~ 1000

EN : 100 ~ 1700

DIN : 100 ~ 1000

JIS: Need to look-up table and contrast CCA

Battery acid is mixed by distilled water + pure sulfur acid at the proportion of 1.260 / 20 °C, for a brand new battery, if the battery acid is under the normal range, the acidity is fixed, if the battery acid is less than the normal level, add distilled water in addition to maintain water level, PH value should also be maintained.

If the battery is working properly, then in addition to PH value is fixed, the proportion value will be in a certain range.

Battery for small vehicle		
Voltage (V)	Power (%)	Proportion
>12.7	100%	1.26~1.28
12.6	90%	1.24
12.4	70~80%	1.22
12.1	50%	1.16
<12	25%	<1.13

After the batter is fully charged, the proportion of battery acid can't reach 1.26 ~ 1.28, measured voltage cannot reach to 12.7V and above, which indicates the storage capacity of the battery has been decreased, at this time if the proportion of battery acid is deliberately adjusted to 1.26 (adding sulfuric acid water proportion), will not bring the dying back to life, but may let the battery dead faster, because acidity of battery acid will also increase, but not increase the voltage.

7-3 Meaning of common standard abbreviation of battery

◆ RC-Reserve Capacity

Each battery has 25A power at average load per minute at 80°F(27°C), and can keep the lowest voltage at 10.5 V or so.

◆ CCA- Cold Cranking Ampere

Under the fixed ampere strength, each battery soaked in 0°F(-18°C)~ -20°F(-29°C) for cooling can hold 30seconds, maintain the lowest voltage of 7.2 V. Cold cranking ampere unit is Ampere. For common vehicle, especially old vehicle, the engine cannot be started smoothly, must be hold for a few

Continued

Type	Same type	DIN	EN	Type	Same type	DIN	EN
55531	55545 55559L	255	420	63013		470	680
55559	55530 88056	255	420	63545	63549	420	680
55564	55552 55563	255	420	64020	64317 64318	325	550
55564	55565 55548	255	420	64028	64035	520	760
55570	55567 55565L	255	420	64036		460	760
56012		230	390	64317	64318 64323	540	900
56048	56068 56069	250	390	65513		540	900
56049	56069 56073	250	390	65514	65515	570	900
56077	56030	300	510	67043	67045	600	1000
56091	55811	360	540	68032	68034	600	1000
56111	55048	300	540	70029	70038 70027	630	1050
56218	56092	300	510	70036	68040 68021	570	950
56219	56216	300	510	71014	71015	700	1150
56220		280	510	72512		680	1150
56225	56323	300	510	73011		740	1200
56318	56312 56311	300	510				

7. How much do you know about vehicle battery

7-1 Internal resistance of different types of battery is different

The same type of battery, internal inconsistencies are different due to different chemical characteristics. Battery internal resistance is small, we usually use the milliohm unit to define it. Resistance is an important technical indicator to measure the battery performance. Under normal condition, the battery discharge capacity of small internal resistance is strong, while the battery discharge capacity of large internal resistance is weak.

7-2 The amount of storage capacity of the battery cannot be measured by intuition

You can use the hydrometer to measure the working state of the battery.

5) LED Status indication:

Battery status: " GREEN "(service life and battery good) , " YELLOW "(service life and battery abnormal) , " RED "(replace battery);

◆ General

1) Test clip poor contact protection / Test clip reversed connection protection / Input over voltage protection.

2) Operation condition: 14 °F - 131 °F (- 10 °C ~ 55 °C) , relative humidity: lower than 80%.

3) Overall dimensions : 4.5 * 2.8 * 8 inch (11.5 * 7.0 * 20.5 cm) ;single weight: 2 lb (900 g).

4. The instrument panel description diagram



5. Function instructions

Instrument has three main functions : traction lead-acid battery test, start-up lead-acid battery test, battery charging system test.

◆ Turn off the vehicle engine and the electric circuit, connect the positive pole (red clip) and negative pole (black clip) of instrument to the battery accordingly (red clip connects to positive output of charging system, black clip connects to negative output).



◆ Press <▲> <▼> buttons to select test item then press <ENTER> for further function selection.

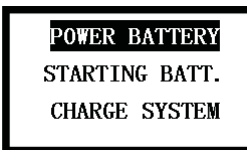
5-1 Traction lead-acid battery

Operating steps :

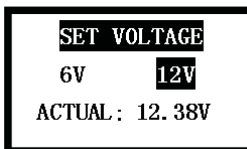
1) Turn off the vehicle engine and the electric circuit, pay attention to nominal capacity of the battery.

2) Connect the test clips of instrument respectively to positive and negative terminal of battery.

3) Instrument powers on, press <▲> <▼> to select power battery, press <ENTER> to further selection.



4) Based on rated voltage of battery, press <▲> <▼> to set the test voltage, press <ENTER> to confirm: (" Current voltage:12.38 V " on screen is the measured voltage between two terminals)



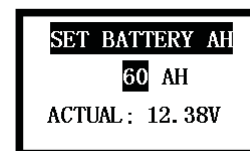
6-2 DIN, EN Type comparison table

Type	Same type	DIN	EN	Type	Same type	DIN	EN
52805	52815	180	240	56420	56322 88066	300	510
53517		175	300	56530	56618 56638	300	510
53520	53521 53522	150	240	56618	56619 56620	300	510
53625	53638 53836	175	300	56633	56647 56641	300	510
53646	53621 88038	175	300	56820	56821 56828	315	540
53653	53624 53890	175	300	57024	57029	315	540
54038	54039	175	300	57113	57539	400	680
54232		175	300	57114	56821 88074	400	680
54313	54324 54464	220	330	57218	57219	420	720
54317	54312 88146	210	360	57220	57217	420	720
54437	54466 54459L	210	360	57230		380	640
54459	54434 88046	210	360	57412	57413 57412L	400	680
54469	54449 54465	210	360	57512	57513 57531	350	570
54519	54533 54612	210	360	58515	58424	450	760
54523	54524	220	300	58521	58513	320	540
54537	54545 54801	190	300	58522	58514	320	540
54551	54580	220	300	58815	58821	395	640
54533	54577 54579	220	300	58820	58515 58527	395	640
54584	54578	220	300	58827		400	640
54590		210	330	58838	58833 88092	400	680
54827		240	360	59040	59017 59018	360	600
55040	88056	265	450	59218	59219	290	480
55041	55042	220	360	59226	59215	450	760
55044	55414 88056	265	450	59514		320	540
55046		300	510	59518	59519	395	640
55056		320	540	59615	59616	360	600
55057	54827 88156	320	540	60018	60019	250	410
55068	55069 55548	220	390	60026	58811	440	720
55218		255	420	60044	60038	500	760
55414	55415 55421	265	450	60527	60528	410	680
55422	55566 55040	265	450	61017	61018	400	680
55428	55423 55427	300	510	61023	62529	450	760
55457		265	450	61047	61048	450	760
55529		220	360	62034	62038 62045	420	680

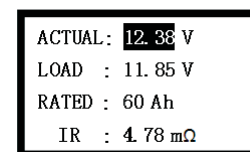
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BATTERY		CCA			BATTERY		CCA		
NEWJIS	OLDJIS		MF	CMF	NEWJIS	OLDJIS		MF	CMF
36B20R	NS40Z	275	300	360	85B60K				500
36B20L	NS40ZL	275	300	360	85BR60K				500
36B20RS	NS40ZS	275	300	360	95D31R	NX120-7	620	660	850
36B20LS	NS40ZLS	275	30	360	95D31L	NX120-7L	620	660	850
36B20R	NX60-N24	330	340	410	95E41R	N100	515	640	770
38B20RS	NT60-N24S	330	340	410	95E41L	N100L	515	640	770
38B20L	NX60-24L	330	340	410	105E40R	N100Z	580	720	880
38B20LS	NX60-24LS	330	340	410	105E40L	N100ZL	580	720	880
40B20L		330			105F51R	N100Z	580		
40B20R		330			105F51L	N100ZL	580		
42B20R		330			115E41R	NS120	650	800	960
42B20L		330			115E41L	NS120L	650	800	960
42B20RS		330			115F51R	N120	650	800	960
42B20LS		330			115F51L	N120L	650	800	960
46B24R	NS60	325	360	420	130E41R	NX200-10	800		
46B24L	NS60L	352	360	420	130E41L	NX20010L	800		
46B24RS	NS60S	325	360	420	130F51R			800	
46B24LS	NS60LS	325	360	420	130F51L			800	
46B26R		360			145F51R	NS150	780	920	
46B26L		360			145F51L	NS150L	780	920	
46B26RS		360			145G51R	N150	780	900	1100
34B19RS	NS40ZAS	270	325	400	80D26R	NX100-5	580	580	630
34B19LS	NS40ZALS	270	325	400	80D26L	NX110-5L	580	580	630
46B26LS		360			145G51L	N150L	780	900	1100
48D26R	N50	280	360	420	150F51R	NT200-12	640		
48D26L	N51L	280	360	420	150F51L	NT200-12L	640		
50D20R		310	380	480	165G51R	NS200	395	980	
50D20L		310	380	480	165G51L	NS200L	935	980	
50D23R	85BR60K	500			170F51R	NX250-12	1045		
50D23L	85B60K	500			170F51L	NC250-12L	1045		
50B24R	NT80-S6	390			180G51L	NT250-15L	1090		
50B24L	NT80-S6L	390			180G51L	NT250-15L	1090		
50D26R	50D20R		370		195G51R	NX300-51	1145		
50D26L	50D20L		370		195G52L	NX300-51L	1145		
55D23R		355	480	500	190H52R	N200	925	1100	1300
55D23L		355	480	500	190H52L	N200L	925	1100	1300
55B24R	NX100-S6	435	420	500	245H52R	NX400-20	1530	1250	
55B24L	NX100-S6L	435	420	500	245H52L	NX400-20L	1530	150	

5) Based on rated AH capacity of battery to adjust the range 40 - 200 Ah , increment of 5 Ah , press <▲> <▼> to adjust the corresponding AH capacity:



6) After setting reted voltage and reted AH capacity of battery, press < N T E R >, instrument automatically starts the rest test, as the result less than 10s of discharging, test result is displayed on screen, at the same time, prompts the status of battery (Battery status: “ GREEN ”(battery sufficient) , “ YELLOW ”(battery low) , “ RED ”(replace battery);



Details:

Test results:

“Current voltage:12.38 V”: voltage is the battery not connected to the load provided by instrument, the voltage will be changed when testing output voltage of battery.

“Load voltage: 11.85V”: the voltage is battery connected to the load provided by instrument and basically stabilized, this value is the retention value of the result of discharging test.

“Rated capacity: 60 Ah ”: rated nomanil AH capacity of battery set by user. "Internal resistance of battery: 4.78 mΩ" : the internal resistance parameter of battery, determined in test process. In order to facilitate a better understanding of the battery status, you can use no-load voltage of measured battery of the instrument for determination (DO NOT need to hold the load switch). The determination conditions are shown in the table below.

◆ (12V battery)

Voltage meter displayed value	<12.00V	<12.20V	<12.40V	≥12. 6V
The remaining amount of battery %	<25%	<50%	<75%	100%

◆ (6V battery)

Voltage meter displayed value	<6.00V	<6.10V	<6.20V	≥6. 3V
The remaining amount of battery %	<25%	<50%	<75%	100%

Test result analysis :

Test result	Battery status
“ Sufficient ” (LED green)	The battery is in good status. Power is sufficient.
“ Low ” (LED yellow)	If the brightness of LED is stable, battery is OK, but power is insufficient.
“ Replace ” (LED red)	At this time, there will be alarm, indicating the battery is failed. Under this situation, we should loosen the load switch, and check the no-load voltage value displayed on LED digital display. If the value returns to 12V and above rapidly, indicating battery is failed. If voltage value is slowly recovered, the battery may not fail, but you need to do further testing.

Note:

During the test, if the battery no-load power voltage is less than 11.80 V (12 V battery system) or less than 5.60 V(6V battery system), press < test> button, the instrument will prompt low voltage, you need to charge the battery first before simulative battery load test. Instrument will prompt low voltage as follows:

The battery voltage is low, please recharge the test.

Reference data (12V system)		
Status	Battery voltage	Engine performance
No headlights and air-conditioning(need to step on the gas for detection)	>13.5	Normal
	13.2~13.5	Common
	13.0~13.2	Attention
	<13	Needs detection in factory immediately
Headlights and air-conditioning turned on(need to step on the gas for detection)	13.4-14.6	Normal
	13.2-13.4	Common, needs attention
	<13.2	Needs detection in factory immediately
The above numbers are for reference only, if the battery has a problem, also can affect the data		

6. Battery specification

(The following table is the reference data, the actual value will be subject to manufacturer's data)

6-1 JIS code conversion table

BATTERY		CCA			BATTERY		CCA		
NEWJIS	OLDJIS		MF	CMF	NEWJIS	OLDJIS		MF	CMF
26A17R		200			55B24RS	NT80-S6S	430	420	500
26A17L		200			55B24LS	NT80-S6LS	430	420	500
26A19R	12N24-4	200	220	264	55D26R	N50Z	350	440	525
26A19L	12N24-3	200	220	264	55D26L	N50ZL	350	440	525
28A19R	NT50-N24	250			60D23R		520		
28A19L	NT50-N24L	250			60D23L		520		
32A19R	NX60-N24	270			65D23R		420	540	580
32A19L	NX60-N24L	270			65D23L		420	540	580
26B17R		200			65D26R	NS70	415	520	625
26B17L		200			65D26L	NS70L	415	520	625
28B17R		245			65D31R	N70	390	520	625
28B17L		245			65D31R	N70L	390	520	625
28B19R	NS40S	245			70D23R	35-60	490	540	580
28B19L	NS40LS	245			70D23L	25-60	490	540	580
32B20R	NS40	270			75D23R		500	520	580
32B20L	NS40L	270			75D23L		500	520	580
32C24R	N40	240	325	400	75D26R	F100-5	490		
32C24L	N40L	240	325	400	75D26L	F100-5L	490		
34B17R		280			75D31R	N70Z	450	540	735
34B17L		280			75D31L	N70ZL	450	540	735
34B19R	NS40ZA	270	325	400	80D23R		580		
34B19L	NS40ZAL	270	325	400	80D26L		580		

4) If the measured charging system is online, the instrument will prompt the following image, start the engine and rise the speed to 2,500 to 3,000, press <ENTER > into the next step; if the measured charging system is offline, then skip this step, directly into Step 5 of the charging system function testing interface.

Start engine and
Speed up to 2500
To 3500 rpm,then
Press <Enter>

5) Enter into test interface of charging system, as follows:

MAX: 14.10V<15.00V
VOLT: 13.88 V
MIN: 13.58V>13.30V

The maximum output of charging system figure displays the current test voltage is 13.88V, standard maximum voltage 15.00V (for 6 V charging system, the standard maximum voltage is 7.50V), and measured maximum voltage is 14.10V.

The minimum output of charging system figure displays the current test voltage is 13.88V, standard minimum voltage 13.30V (for 6 V charging system, the standard minimum voltage is 6.60V), and measured minimum voltage is 13.58V.

Charging system specification:

★ If the voltage reading is higher than 15.0V (for 6 V charging system, the highest standard voltage is 7.50 V), please check the voltage regulator.

★ If the voltage reading is lower than 13.3V (for 6 V charging system, the lowest standard voltage is 6.60 V), please check the connecting points, lines and engine.

During the test, use the instrument for load discharge test, the load components will produce a certain temperature rise, when the temperature reaches a level, instrument will enter a state of protection, if users continue to test, the instrument will prompt high temperature protection, users need to wait for a moment, It is not allowed to do further test until the temperature of load component goes down to normal status.

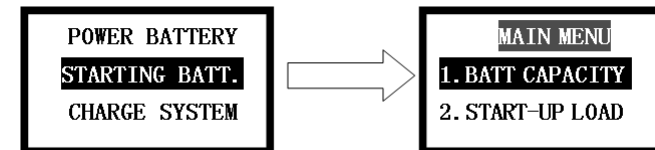
SUPER HEAT,
PLEASE WAIT!!!

Note:

The environment temperature will have obvious effect on the battery status. Standard test environment temperature is 69.8 °F (21 °C). When the temperature is lower than it, especially at low temperature, the battery power will be markedly reduced. In general condition, the temperature is lower than standard temperature of about 6°C, the battery capacity will drop about 10%.

5-2 Start-up lead-acid battery

Connect the instrument test clips respectively to the positive and negative terminals of the battery. Instrument powers on, press <▲> <▼> to select starting battery, press <ENTER > to further selection.



5-2-1 Battery ability

Preparation before test.

◆ If the vehicle is running, please shut down and turn the key to OFF position.

◆ After driving for a while, the battery is just full and voltage will be slightly higher than the normal value, please turn on the head light for 2 ~ 3 minutes, let the voltage drops back to normal before testing.

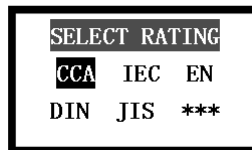
Operating steps:

1) Connect red clip to the positive pole of battery, black clip to negative pole of battery. Contact must be good, lest affect the test results.

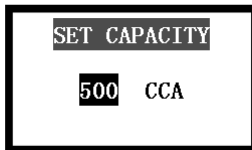
2) Press <▲> <▼> to select battery capacity function test, then press <ENTER> to further selection, as follows :



3) Based on the standard of battery, press <▲> <▼> to select the test standards, if battery is "JIS" standard, you need to look up CCA, then select "CCA" (SAE) as test standard, after the test standard selected, press <ENTER> to next step, as shown in figure:

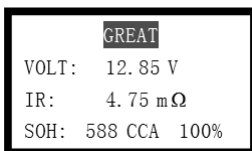


4) Based on the standard value indicated on battery, press <▲> <▼> to adjust the test reference standard value of battery, hold <▲> <▼> to continuous value adjustment. As shown in the figure:



5) After the test reference standard value of battery is adjusted, press <ENTER> to start test.

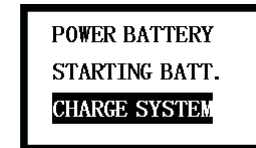
6) After test completes, test results will be shown on display screen:



acid battery charging equipment, instrument divides the charging system test into online and offline test.

◆ Respectively connect the test line to positive and negative terminals of battery.

◆ As instrument powers on, press <▲> <▼> to select battery charging system, press <ENTER> to further selection.



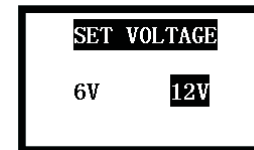
Preparation before test:

◆ If the vehicle shuts down, please start the engine; or switch on offline lead-acid battery charging equipment.

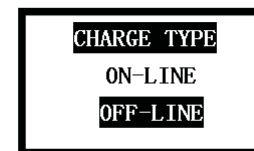
Operating steps:

1) When the vehicle is running or offline lead-acid battery charging equipment is switched on, connect red clip to the positive pole of battery, black clip to negative pole of battery, select battery charging system. Contact must be good, lest affect the test results.

2) Based on the nominal voltage of charging system, press <▲> <▼> to select the test voltage, press <ENTER> to confirm: (Instrument can be used for testing 6 V and 12 V lead-acid battery charging equipment.)



3) Based on the status of charging system (on line: in the vehicle; off line: independent charging equipment off the vehicle), press <▲> <▼> to set selected status, press <ENTER> to confirm:



5-2-3 Maximum load system testing

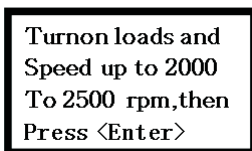
Operating steps :

1) When the vehicle is running, connect red clip to the positive pole of battery, black clip to negative pole of battery. Contact must be good, lest affect the test results.

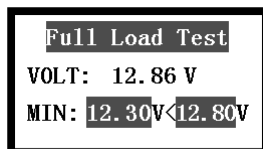
2) Press <▲> <▼> to select the maximum load system test, test item as follows:



3) After entering, instrument will prompt the following image:



4) After operate as indicated in Step 3, press <ENTER> to enter into the test interface of the maximum load test, as follows:



5) Read the lowest voltage. If the voltage reading is higher than 12.8V, indicates the system is normal.

6) Press <ESC> to exist and return to Step (2).

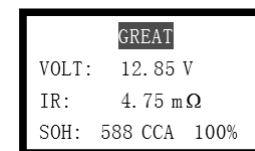
★ If the voltage reading is lower than 12.8 V, please check whether the generator belt wears out or circuit is short.

5-3 Battery charging system

For the online charging system in the vehicle and general offline lead-

Battery test results description:

◆ Normal test result



Battery voltage 12.41 V

Fully charged 100 % 12.78 V

75 % 12.54 V

50 % 12.30 V

25 % 12.12 V

Fully discharged 11.94 V

CCA value 588 CCA

Determination of the battery status

Internal resistance 4.75 mΩ

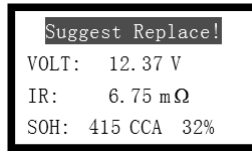
The higher of CCA value of battery, the internal resistance is lower generally.

Note: the standard of the internal resistance will be different due to the different materials of battery of battery manufacturers, so there is no definite standard. But the same manufacturer uses the same type of battery, the internal resistance of battery will not differ too much.

Service life shows the using state of the battery, when the service life of battery is lower than 45%, the battery should be replaced.

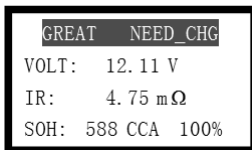
Service life	Test result	Remark
>80%	Good	Battery is in good condition
>60%	General	Battery status barely passable
>45%	Needs attention	Battery life will run out, needs attention
<45%	Recommended replacing	Battery life has run out, please replace

◆ Recommended replacing



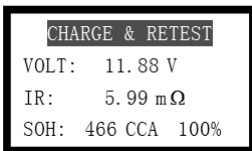
Test result indicates the service life of battery is only 32%, please replace the battery.

◆ Service life test is normal, test result shows battery voltage is low



Test result indicates the service life of battery is 100%, but voltage is only 12.11V, so battery needs charge.

◆ Service life test is normal, test result shows battery voltage below level



Test result indicates the battery voltage is only 11.88V, voltage below level may affect the test result, please charge the battery and retest.

5-2-2 Cranking load test of starting system

Operating steps :

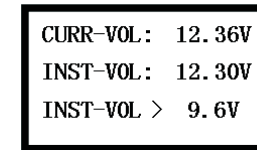
- 1) If the vehicle is running, please shut down and turn the key to OFF position.
- 2) Connect red clip to the positive pole of battery, black clip to negative

pole of battery. Contact must be good, lest affect the test results.

- 3) Press <▲> <▼> to select start-up load function, as follows :



- 4) After test item selected, press <ENTER> to enter into cranking load test interface, as shown in figure:



The current test voltage (static voltage) 12.36V and standard voltage 9.6 V are displayed in figure, and the lowest starting voltage is 12.30V in the cranking process.

- 5) Start the vehicle engine, testing instrument can automatically measure and record the minimum voltage of battery output in the process of engine starting. Under normal condition, the voltage of battery in the process of engine starting should be more than 9.6 V.

- 6) Press < E S C > to exit and return to Step(2).

Starting system instruction:

- ★ If the minimum voltage reading is higher than 9.6 V, indicates starting system is good.
- ★ If the minimum voltage reading is lower than 9.6 V, indicates starting system is NOT good.

Please check the related parts such as connecting points, lines and engine, battery terminals are corrosive or not.

Reference data(12 V system)		
Starting voltage	Battery discharge performance	Battery disposal
10.7V and above	Good	No need replacing
10.2~10.7V	Normal	Needs observing
9.6~10.2V	Poor	Needs replacing recently
9.6V and below	Failed	Needs replacing immediately