MATCO TOOLS

MAXIMUS 3.0

User Manual

(V1.0)

www.matcotools.com
www.maximus3.com

MATCO TOOLS DIAGNOSTICS

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Safety Precautions

Before using Maximus 3.0, please read the following safety information carefully.

- Never collide, throw, or punch Maximus 3.0, and avoid falling, extruding and blending it.
- Do not use Maximus 3.0 in exceptionally cold or hot, dusty, damp or dry environments.
- In places where Maximus 3.0 is forbidden or using Maximus 3.0 may cause interference or generate a potential risk, please turn it off.
- To ensure a safe driving, please do not use Maximus 3.0 while driving.
- Turn off Maximus 3.0 before boarding any airplane.
- Do not dismantle Maximus 3.0 by yourself. If there is any inquiry, please contact the dealer.
- Never place Maximus 3.0 into apparatus with strong electromagnetic field.
- Keep Maximus 3.0 far away from magnetic devices because its radiations may erase the data stored on Maximus 3.0.
- Store Maximus 3.0 out of reach of children and do not allow children to use it unsupervised.
- Please use the included battery and charger. Otherwise, explosion

may happen.

- Do not disconnect power abruptly when Maximus 3.0 is being formatted or in process of uploading or downloading. Or else it may result in program error.

Precautions on Using Maximus 3.0

- The ignition switch should be OFF while plugging or unplugging the VCI device.
- If your vehicle keeps unattended for a week or a long period, it is suggested to unplug the dongle from vehicle's DLC to save battery power.
- While diagnosing a vehicle, you are not advised to use phone or messaging, because it may cause a data communication interruption. If it happens, it is abnormal and just try to re-do it.

Precautions on Operating Vehicle's ECU

- Do not disconnect the vehicle inner consumer when the ignition switch is ON. High voltage transients may encounter at the moment of disconnecting, which may damage the sensors and the ECU.
- Protect the computer from magnetic object.
- Do cut off the power supply of ECU system before welding on the vehicle.
- Pay more attention to the ECU and the sensors when the operation is next to them.
- Ground yourself when you disassemble PROM, otherwise ECU and sensors will be damaged by static electricity.
- Do connect ECU harness connector firmly, otherwise electronic elements, such as IC inside ECU, will be damaged.

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1 Introduction

1.1 Product Profile

Maximus 3.0 is an evolutionary smart solution for specialized automotive diagnosis and maintenance. It inherits from LAUNCH's advanced diagnosing technology and is characterized by covering a wide range of vehicles, featuring powerful functions, and providing precise test result.

Through the wireless communication between VCI dongle and Maximus 3.0 handset, it achieves full car model and full system vehicle trouble diagnosis, which include Reading DTCs, Clearing DTCs, Reading Data Stream, Actuation Test and Special Functions.

Moreover, taking advantage of the mobile Internet, it also integrates One-click Update, Tech-To-Tech (Remote Diagnosis) and Repair Data, which helps to diagnose vehicle issues more efficiently, and greatly increase customer's retention and boost shop revenue.

Maximus 3.0 adopts a higher performance-price ratio display tablet, which comes loaded with the powerful 8-core 2GHz processor, 4G RAM, and a 10.1" sunlight readable capacitive touch screen with a resolution of 1920 x 1200 pixels.

1.2 Features

1. Diagnose:
   - Smart Diagnosis: This module allows you to use the VIN information of the currently identified vehicle to access its data (including vehicle information, historical diagnostic records) from the cloud server to perform quick test.
   - Local Diagnosis: To perform diagnosis by executing on-screen commands step by step. Diagnosis functions include: Read DTCs, Clear DTCs, Read Data Stream, Special Functions etc.
   - Tech-To-Tech (Remote Diagnosis): This option aims to help repair shops or technicians launch instant messaging and remote diagnosis, making the repair job getting fixed faster.
   - Maintenance & Reset: All kinds of common maintenance and reset items, such as Oil lamp reset, DPF regeneration, ABS bleeding etc can be done.
   - I/M Readiness: I/M refers to Inspection and Maintenance that is legislated by the Government to meet federal clean-air standards. I/M Readiness indicates whether or not the various emissions-related systems on the vehicle are operating properly and are ready for Inspection and Maintenance testing. Moreover, this module also has a direct access to generic OBD, saving time to enter into the system.
   - One-click Update: Lets you update your diagnostic software online.
   - Diagnostic History (Previous Session): Provides a quick access to the tested vehicles and users can choose to view the test report or resume from previous diagnostic session, without the necessity of starting from scratch.
   - Pre- and Post- Repair Result Comparison: By comparing the pre-repair and post-repair report, you can clearly determine which vehicle issues have been fixed and which remained unsolved.
   - Diagnostic Feedback: Enables you to submit the vehicle issue to us for analysis and troubleshooting.
   - Vehicle Coverage: Quick dial to view the vehicle models that Maximus 3.0 covers.
   - Backup/Restore: This feature lets you back up the recorded files to external storage device/restore the recorded data from external storage device.
2. WLAN connection is supported.

3. Web browser: Users can make online search and visit any website.
4. Equipped with multiple universal serial BUS ports for connecting PC, and other add-on modules such as Scopebox, Sensorbox and Batterybox.
5. Other Android-based applications can be customized to install or uninstall.
6. File Manager: Lets you manage files or downloaded files stored in memory card efficiently.
7. Settings: To configure your personalized Maximus 3.0.

1.3 Technical Specifications

1.3.1 Maximus 3.0 Tablet

Item	Description
Operating system	Android 7.1
CPU	8-core processor, 2GHz
Display	10.1 inch capacitive touch screen with 1920 x 1200 resolution
Memory	4GB
Hard disk	64GB
Connectivity	• WLAN (802.11 b/g/n/ac) • Universal serial BUS Ports (1 x Type-C + 1 x Type-A) • BT 2.1 & 2.4
Cameras	8MP front-facing camera + 13MP rear-facing camera
Sensor	Gravity Accelerometer 3-Axis Acceleration Sensor
Power and Battery	9000mAh lithium-polymer battery Charging via 5V DC power supply
Operating Temperature	-10℃ ~ 50℃(14 ~122℉)
Storage Temperature	-20℃ ~ 70℃(-4 ~158℉)

1.3.2 VCI Dongle (Only for Passenger Vehicle Configuration)

Item	Description
Working temperature	-10℃ ~ 50℃(14 ~122℉)
Storage temperature	-20℃ ~ 70℃(-4 ~158℉)
Relative humidity	20% ~ 90%

2 Knowledge of Maximus 3.0

There are three main components to the Maximus 3.0 system:

- Maximus 3.0 Tablet -- the central processor and monitor for the system (For details, please refer to Chapter 2.1.)

Fig. 2-1

- Maximus 3.0 Docking Station -- the platform for charging Maximus 3.0 tablet and extending functions (For details, please refer to Chapter 2.2.)

Fig. 2-2

- VCI Device -- the device for accessing vehicle data (For details, please refer to Chapter 2.3.)

Fig. 2-3 (Only for Passenger Vehicle Configuration)

2.1 Maximus 3.0 Tablet

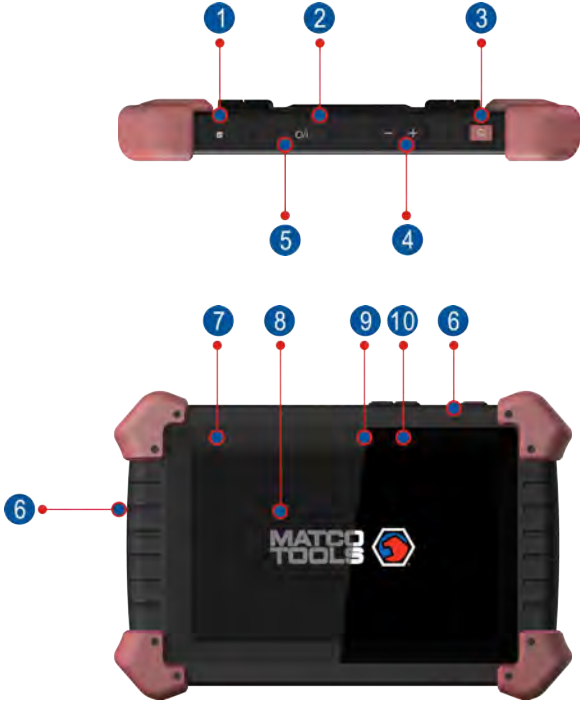


Fig. 2-4 Maximus 3.0 Tablet (front & side view)

Table 2-1 formulates ports and indicators of Maximus 3.0 tablet:

No.	Name & Descriptions
1	**Memory Card Slot** -- To store the memory card for storage expansion.
2	**Type C Charging Port** -- Reserved for charging the Maximus 3.0 tablet.
3	**Power/Screen Lock Button** -- To turn the tablet on/off with long press, or lock the screen with short press.
4	**Volume Buttons** -- To adjust the volume. *Note: Press and hold [POWER] and [VOL -] key to capture the current screenshot.
5	**Data Transmission Port** -- Reserved for add-on modules (such as Batterybox, Scopebox, Sensorbox and Videoscope), and other devices with similar port.
6	**Microphone**
7	**Charging indicator** -- It illuminates red while Maximus 3.0 tablet is charging. Once charging is finished, it will illuminate solid green.
8	**10.1" Capacitive Touch Screen**
9	**Ambient Light Sensor**
10	**Front Camera**

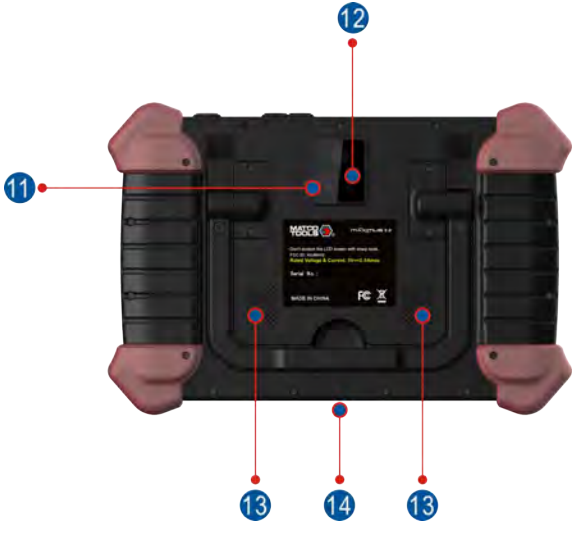


Fig. 2-5 Maximus 3.0 Tablet (rear view)

Table 2-2 formulates parts of Maximus 3.0 tablet (rear):

No.	Name & Descriptions
11	**Rear Camera**
12	**Camera Flash**
13	**Audio Speaker**
14	**Adjustable Kickstand** - Flip out it to any angle and work comfortable at your desk, or hang it on the steering wheel.

2.2 Maximus 3.0 Docking Station

Fig. 2-6 Maximus 3.0 Docking Station

Table 2-3 formulates ports of Maximus 3.0 docking station

No.	Name & Descriptions
1	**Charging Slot** -- To charge the tablet.
2	**OBD16 Socket** -- To store the VCI dongle to avoid loss.
3	**Data Transmission Port** -- Reserved for add-on modules, and other devices with similar port.
4	**Type C Charging Port** -- Use the power adaptor to supply power to the docking station through connection to AC outlet.
5	**Power LED** -- Illuminates solid green when it is powered up.

2.3 VCI Dongle (Only for Passenger Vehicle Configuration)

The VCI dongle works as a vehicle communication interface device, which is used to connect to the vehicle's DLC (Data Link Connector) directly or via OBD II extension cable to read the vehicle data and then send it to the Maximus 3.0 handset via wireless communication.

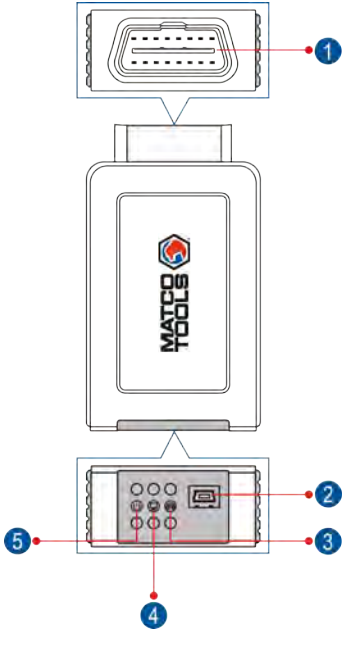


Fig. 2-7 VCI dongle

Table 2-4 formulates ports and indicators of VCI dongle:

No.	Name & Descriptions
1	**OBD II-16 Diagnostic Connector** -- To connect on vehicle's OBDII DLC.
2	**Data Transmission Port** -- To connect to the Maximus 3.0 tablet to perform vehicle diagnosis via data cable.
3	**ECU Communication Indicator** -- It flashes when the dongle is communicating with the vehicle.
4	**BT/USB Communication Indicator** • BLUE indicates that the dongle is working in wireless communication (BT) mode (default mode). • It illuminates red when the dongle is connected to the handset via data cable.
5	**Power LED** -- It lights up while the dongle is plugged into the vehicle's DLC.

2.4 Accessory Checklist

For different product configurations, the included accessories may vary. For detailed items, please consult from the local agency or check the package list supplied with Maximus 3.0 together.

Table 2-5 -- Maximus 3.0 common accessories and descriptions

No.	Name	Qt.	Picture
1	**Maximus 3.0 Tablet**	1	
2	**VCI Dongle**	1	(To connect to vehicle's DLC.)
3	**Docking Station**	1	(To charge the Maximus 3.0 tablet.)
4	**Cigarette Lighter Cable**	1	(To supply power to non-16pin dongle via vehicle's cigarette lighter receptacle.)
5	**Battery Clamps Cable**	1	(To provide power to the non-16 pin dongle through connection to the vehicle's battery.)
6	**Power Adaptor**	1	(To supply power to the tablet through connection to AC outlet.)
7	**OBD II extension cable**	1	(To connect the VCI device for extension purpose.)

8	**OBDI Adaptor**	1	(A adaptor cable for connecting non-16 pin dongle.)
9	**Password Envelope**	1	(A piece of paper bearing Product S/N and Activation Code, which is required for your registration.)
10	**Non-16pin Dongle Kit**		(Optional. For detailed non-16pin dongles, please check the package box.)

3 Preparations

3.1 Charging Maximus 3.0

Choose any of the followings to charge your Maximus 3.0:

A. Use the included 5V power adaptor: Connect one end of the power adaptor to Type C charging port of the Maximus 3.0 handset, and the other end to the AC outlet. Never use other similar adaptors to charge Maximus 3.0.

B. Use the docking station: Follow the steps described as below to charge your Maximus 3.0:

1. Locate the charging slot on the bottom of Maximus 3.0 tablet and the docking station. See Fig. 3-1 & Fig. 3-2.

Fig. 3-1

Fig. 3-2

2. Align the charging slots, and then dock the tablet into the station to ensure that it is firmly seated on the docking station.
3. Insert one end of the included power cord to the charging port of the docking station, then the other end into the AC outlet. The charging LED illuminates solid red while charging.
4. Once it illuminates solid green, it indicates that the battery is fully charged. Disconnect the docking station from the AC outlet.

3.2 On Using Your Battery

- If the battery keeps unused for a long time or battery is completely discharged, it is normal that it can not be turned on while being charged. Please charge it for a period and then turn it on.
- Please use the included power adaptor to recharge your Maximus 3.0. We assume no responsibility for damage or loss resulting from using other similar adaptors other than the specified one.
- The charging time of battery varies with temperature condition and battery consumption status.
- While Maximus 3.0 has low battery, a beep will sound. If it is very low, Maximus 3.0 will be switched off automatically.

3.3 Power On / Power Off Maximus 3.0

3.3.1 Power on

Press the POWER key until it is slightly vibrated to turn on Maximus 3.0.

*Note: If it is the first time you use Maximus 3.0 or Maximus 3.0 keeps idle for a long time, Maximus 3.0 could fail to be turned on. It results from low battery. In this case, please recharge your Maximus 3.0 for a while and try to turn it on.

3.3.2 Power off

1. Press the POWER key for about 3 seconds, an option menu will pop up on the screen.
2. Tap “Power off” to turn off Maximus 3.0.

3.4 Tips On Finger Operations

Actions	Results
Single-tap	To select a item or launch a program.
Double-tap	To zoom in so that the text on a webpage appears in a column that fits your device's screen.
Long press	Press and hold on the current interface or area until a contextual menu pops up on the screen, and then release it.
Slide	To jump to different pages.
Drag	Tap the desktop icon and drop it to other location.
Spread apart / Pinch together	To zoom in manually, place two fingers on the screen and then spread them apart. To zoom out, place two fingers apart on the screen and then pinch them together.

3.5 Lock & unlock the screen

Many screen lock modes are available on Maximus 3.0. Take the preset screen-lock mode as example for demonstration.

3.5.1 Lock the screen

- When Maximus 3.0 is ON, press [POWER] key once to lock the screen;
- The system will lock the screen automatically after Maximus 3.0 remains idle over the preset standby time.

3.5.2 Unlock the screen

Press [POWER] key to activate the screen, and then drag the lock to "Unlock" position.

*Notes:

1. In case you forgot the screen lock, please refer to Appendix - FAQ for details. You are not suggested to use the screen lock.
2. If you use "unlock the pattern", you have to draw the right target pattern to unlock it.

3.6 Locator & Navigation Buttons

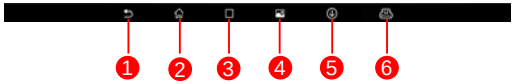


Fig. 3-3

On-screen keys and status bar are as follows:

1	Tap to return to the previous screen or exit the application.
2	Tap to navigate to the Android System's home screen.
3	Tap to display a list of applications that are currently running or recently used. To open an application, tap it. To remove an application, swipe it upwards.
4	Tap to capture the current screen and all captured screenshots are stored in the Screenshots folder.
5	: Once some upgradable diagnostic software are detected, the icon will turn highlighted.

6	: Shows whether the VCI device is properly connected or not.

3.7 Status Bar

For some common indicators, please see the following table.

Icons	Definitions	Icons	Definitions
	Airplane mode		BT is on
	Positioning GPS		Charging
	Battery is fully charged		Low battery
	New mail		Preparing memory card
	Uploading		Downloading

*Note: When the icon appears on the status bar, please charge it immediately.

3.8 Adjust brightness

Maximus 3.0 is equipped with a built-in light intensity sensor. It can adjust the screen brightness according to the ambient light intensity automatically. Alternatively, you can also adjust it manually.

Tips: Reducing the brightness of the screen is helpful to save the power of Maximus 3.0.

1. On the main menu screen, tap **Settings > Display > Brightness**.
2. Drag the slider to adjust it as desired.

3.9 Set standby time

If no activities are made within the defined standby period, the screen will be locked automatically and the system enters sleep mode to save power.

1. On the main menu screen, tap **Settings > Display > Sleep**.
2. Choose the desired sleep time.

3.10 Adjust the volume

This option enables you to adjust the volume of the ringtones, media player, alarm and notice.

1. On the main menu screen, tap **Settings > Sound > Volume**.
2. Drag the slider to adjust it.

*Note: Alternatively, you can also press the volume keys to control the volume of the current application.

3.11 Changing Language

Maximus 3.0 supports multiple languages. To change the language of the tool, please do the following:

1. On the home screen, tap on **Settings** -> **Language & Input** -> **Languages**.
2. Tap on "**Add a language**", and then choose the desired language from the list.
3. Tap and hold the desired language and drag it to the top of the screen and then release it, the system will change into the target language.

3.12 WLAN Setting

*Note: Once WLAN is set as ON, Maximus 3.0 will consume more

power. While it keeps unused, please set it off to save power. While WLAN keeps unused, please turn it off to conserve battery power.

Maximus 3.0 has built-in Wi-Fi that can be used to get online. Once you're online, you can register your tool, update diagnostic software & APK, browse the Internet, get apps and send email on your network.

1. On the main menu screen, tap **Settings > WLAN**.
2. Tap or slide the switch to ON, Maximus 3.0 starts searching for all available wireless LANs.
3. Choose the desired network,
   - If the network you chose is open, you can connect on it directly;
   - If the selected network is encrypted and secured with WPA, you have to input the right access password to connect.

When Maximus 3.0 is in range of the WLAN, it will connect to the previously linked network automatically.

4 Initial Use

4.1 User Registration

Users need to experience an sign-up process before using Maximus 3.0.

*Notes:

- Before registering, please make sure that your handset has a strong and stable Wi-Fi signal.
- While activating device, the Serial number and Verification code can be found in the included password envelope. To obtain Activation code, please contact with your dealer.

Follow the steps below to proceed:

1. Tap “Maximus 3.0” on the home screen to Fig. 4-1.

Fig. 4-1

On-screen Buttons:

REGISTER UNIT: For new user, tap it to go to step 2.

START DEMO/EOBD MODE: Two free programs (DEMO & EOBD) are preset in this App. This option enables you to experience the diagnostic procedures even if you have not activated your device or VCI dongle is not used.

2. Fill in your account information and device information and then tap on “ACTIVATE” to enter Fig. 4-3.

*Note:

Serial number is a 12-digit number starting with 98 -- you can find it on the back of your tool.

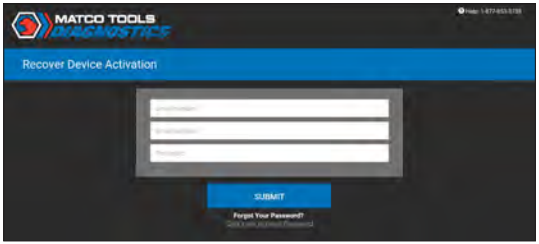
Verification code is a 8-digit number stored in the Private & Confidential sheet.

Activation code is printed on the receipt, or consult your dealer for it.

Fig. 4-2

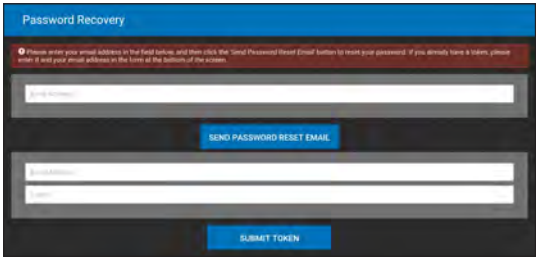
On-screen Buttons:

Recover Current Device Activation: If you have already activated your Maximus 3.0, tap it to navigate to the following screen.



Input Serial number, Email address and Password, and then tap “SUBMIT” to sign in and go to Fig. 4-3.

Click Here to Reset Password: If you forgot the password, tap it to go to the following screen.



Follow the on-screen instructions to reset a new password.

3. Tap “RUN DIAGNOSTICS” to launch diagnostics. See Fig. 4-4.

Fig. 4-3

On-screen Buttons:

Sign Out: Tap it to log out the system.

Update Profile: Tap it to modify personal information.

Update App: If a newer App version is detected, this button will appear on the screen. Tap it to keep synchronized with the latest version.

4. Tap “ ” on the top left-hand corner of the screen (Fig. 4-4) to switch to the Toolbox module. See Fig. 4-5.

Fig. 4-4

Fig. 4-5

*Note: If a red dot appears on upper right corner of the Update logo, it indicates newer software is available.

5. Tap “Update” to enter the update center.

Fig. 4-6

Make sure all brands are selected, tap “Update” to start updating.

*Note: Download and installation will take approximately 10 minutes depending on the internet connection.

Once downloading is complete, the software package will be installed automatically.

Tap the “OK” button on the pop-up message box when update is complete.

4.2 Basic Operations on Diagnostic App

4.2.1 Switch between different function modules

There are 2 function modules available on the Maximus 3.0: **Diagnostics** and **Toolbox**.

Fig. 4-7

Swipe in from the left/right edge of the screen to switch between function modules.

Alternatively, you can also tap on the upper left corner of the screen to toggle between Diagnostics and Toolbox.

4.2.2 How to arrange diagnostic vehicle software icons?

All software icons, by default are organized by the system. Many display rules are available to meet your preference.

To re-organize it, press and hold certain software icon, an option menu pops up on the screen. Choose the display rule and the system will arrange the icon as desired.

If you choose “Pin to the top”, the icon will be displayed on the top of the screen and marked with an orange solid dot.

4.2.3 How to distinguish if the software is locked or not?

If the software is locked, tap it to display the latest software summary. In this case, you need to purchase the software to unlock its content. Once it is unlocked, the software icon will turn into orange.

4.3 Function Modules

There are 2 function modules available on the Maximus 3.0: **Diagnostics** and **Toolbox**.

4.3.1 Diagnostics

It mainly includes the following items:

Automotive	Configures Maximus 3.0 to operate as a diagnostic tool exclusively for passenger cars. Max VIN (VIN Decoding) and Manual Diagnosis are supported.
Maintenance Reset	To perform all kinds of common repair & maintenance items, including electronic throttle position reset, ABS bleeding, oil lamp reset and DPF regeneration etc.
Heavy Duty	Configures Maximus 3.0 to operate as a diagnostic tool exclusively for commercial vehicles. *Note: This function requires an extra VCI module and only applies to the Maximus 3.0 of Commercial Passenger Edition.
Previous Session	When a vehicle diagnosis is performed, Maximus 3.0 records the detailed diagnostic information. This function provides a quick access to the previously tested vehicles. Testing can be resumed from the previous operation without starting from scratch.

4.3.2 Toolbox

It mainly includes the following items:

Saved Report		Includes Health report, Diagnostic feedback, Waveform Playback and Remote report.
Tech-To-Tech		This option aims to help repair shops or technicians launch instant messaging and remote diagnosis, making the repair job getting fixed faster even from thousands of miles away.
Feedback		This item allows you to feedback your diagnostic problems to us for analysis and troubleshooting.
Applications	**Videoscope** (Optional)	To check unseen or unreachable parts or components.
	Oscilloscope (Optional)	To determine vehicle electrical equipment and circuit trouble.
	Sensor (Optional)	To diagnose/simulate vehicle ECU sensor trouble.
	Multimeter (Optional)	To measure physical parameters such as voltage, resistance, frequency etc.
	Battery (Optional)	To test whether vehicle's battery is good or not.

Update	To update vehicle diagnostic software and APK.
Settings	To make some system settings, including Printer connection, Icon size, Color theme and Logout etc.
Help	Includes FAQ, Vehicle Coverage, Quick Start Guide, User Manual and Function Notes.

4.4 Diagnostics toolbar

The diagnostics toolbar contains a number of buttons that enables various procedures. It is hidden under ••• at the top of the vehicle diagnostic screens throughout the diagnostic session. Refer to the table below for a brief description of the functions of the diagnostics toolbar buttons.

Print	Tap to print the current screen. To perform printing, you need to purchase an extra Wi-Fi printer separately.
Exit Session	Tap to exit the current diagnostic session.

5 Start Diagnostics

5.1 Connections

5.1.1 Preparation

Normal testing conditions

- Turn on the vehicle power supply.
- Vehicle battery voltage range should be 9-14V and working voltage of Maximus 3.0 is 5V.
- Throttle should be closed at its close position.

5.1.2 DLC Location

1. For Passenger Cars,

The DLC (Data Link Connector or Diagnostic Link Connector) is the standardized 16-cavity connector where diagnostic code readers interface with the vehicle's on-board computer. The DLC is usually located 12 inches from the center of the instrument panel (dash), under or around the driver's side for most vehicles. If Data Link Connector is not located under dashboard, a label should be there telling location. For some Asian and European vehicles, the DLC is located behind the ashtray and the ashtray must be removed to access the connector. If the DLC cannot be found, refer to the vehicle's service manual for the location.

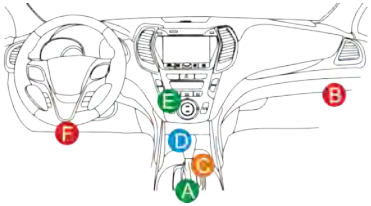


Fig. 5-1

2. For Commercial Vehicles,

The DLC is generally located in driver's cab.

5.1.3 Vehicle Connection (For Passenger Vehicle Version)

The method used to connect the VCI device to a vehicle's DLC depends on the vehicle's configuration as follows:

- A vehicle equipped with an OBD II management system supplies both communication and 12V power through a standardized DLC.
- A vehicle not equipped with an OBD II management system supplies communication through a DLC connection, and in some cases supplies 12V power through the cigarette lighter receptacle or a connection to the vehicle battery.

Follow the steps mentioned below to connect OBD II vehicle:

1. Locate vehicle's DLC socket.
2. Plug the VCI device into the vehicle's DLC socket (It is suggested to use the OBD II extension cable to connect the VCI device and DLC socket.).
3. Choose one of the two ways to obtain power from:
   A. Power adaptor: Connect one end of the included power adaptor to Power interface of Maximus 3.0 tablet, and the other end to AC outlet.
   B. Internal battery pack: For details on how to recharge Maximus 3.0, see "**Chapter 3.1 Charging Maximus 3.0**".

For non-OBDII vehicle, proceed as follows:

1. Locate vehicle's DLC socket.
2. Select the corresponding non-16pin dongle.
3. Plug the non-16pin end of the dongle into the DLC socket, then connect the other end to the OBD I adaptor, and then tighten the captive screws.
4. Connect the other end of the adaptor to the included VCI device.

5. To supply power to OBD I adaptor from:

   A. Cigaretter Lighter Cable: Connect one end of the cigarette lighter cable to vehicle's cigarette lighter receptacle, and the other end to the power jack of OBDI adaptor.

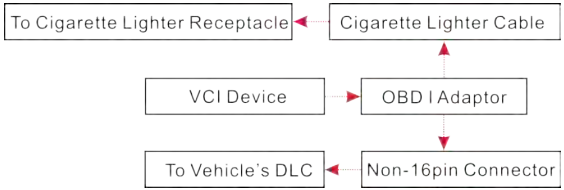


Fig. 5-2

   B. Battery Clamps Cable: Connect one end of the battery clamps cable to vehicle's battery, and the other end to the power jack of OBDI adaptor.

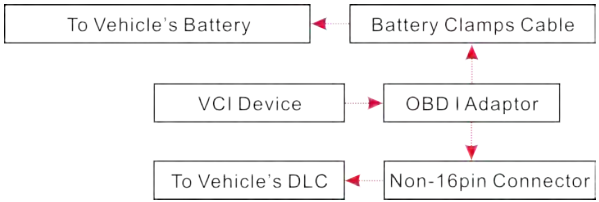


Fig. 5-3

5.2 Communication Setting

There are 2 ways available for Maximus 3.0 to communicate with the VCI device: BT(wireless) communication and USB cable connection. User can choose either of the following ways to establish communication.

5.2.1 Pairing up via Wireless (BT) communication

Refer to Chapter 5.1.3 Vehicle Connection to connect the Maximus 3.0 and VCI device.

1. Enter Bluetooth setting screen ("Settings" -> "BLUETOOTH"), slide the switch to ON and Maximus 3.0 will start searching for all available devices.
2. Tap the desired one from the result list to pair and match. By default, the Bluetooth ID of the VCI dongle starts with 98********00 (where ******** stands for 8 digits).
3. If the pair request pops up on the screen, enter the request pin code (default code: 0000 or 1234).
4. Once pairing is successfully done, the VCI dongle will be shown on the top of the "Paired devices" list and the VCI icon on the lower right corner of the screen will light up.

*Notes:

- If you logged in the account on another diagnostic tool and the VCI dongle has ever been paired up with that tool, you need to cancel pairing first before using a different tool to proceed new diagnostic session. Tap "Setting" -> "Bluetooth" -> the icon next to the device name, and then tap "FORGET" on the pop-up dialog box to unpair it.
- In case no Bluetooth setting is done before diagnostic software is launched, you can also configure it while using the App. For details, please refer to "Chapter 5.3 Start diagnostics".

5.2.2 USB cable connection

1. Connect one end of the USB cable (optional) to the Data I/O port of the VCI device.
2. Connect the other end to the USB port of the Maximus 3.0 handset. The power indicator of the VCI device lights up.

*Note: The USB connection provides the most stable and fastest communication. When all the communication methods are applied at the same time, the Maximus 3.0 system will use the USB communication as the default priority.

5.3 Start Diagnostics

On the Diagnostics page, tap “Automotive/Heavy Duty” to enter the vehicle selection page.

2 approaches are provided for you to access the vehicle diagnostic software.

5.3.1 Max VIN (VIN Decoding)

Through simple wireless (BT) communication between the Maximus 3.0 handset and VCI, you can easily get the VIN (Vehicle Identification Number) information of the currently identified vehicle. Once the VIN is successfully identified, the system will retrieve it from the remote server and then guide you to vehicle information page without the necessity of step-by-step manual menu selection (Early model may need manual selection).

The vehicle information page lists all historical diagnostic records of the vehicle, which lets the technician have a total command of the vehicle faults. In addition, a quick dial to local diagnosis and diagnostic function are also available on this page for reducing the roundabout time and increasing productivity.

*Notes:

- Before using this function, please make sure the VCI is properly connected to the vehicle’s DLC. For detailed connection, see Chapter 5.1.3 “Vehicle Connection”.
- A stable network connection is required for this function.

Follow the steps below to proceed.

1. Tap “Max VIN” to enter Fig. 5-4.

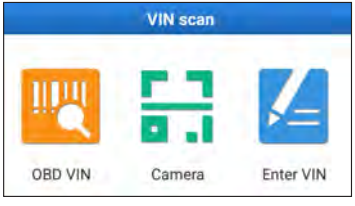


Fig. 5-4

In this case, automatic scan (OBD VIN), camera and manual input (INPUT VIN) are available.

a). OBD VIN: In this mode, the VCI device should be plugged into the vehicle’s DLC first, and then a wireless (BT) communication should be established between Maximus 3.0 and the VCI dongle.

Tap “OBD VIN”, the system starts decoding the VIN to enter general information about the vehicle (year, make, model etc.). When the process is complete, Fig. 5-10 appears.

* Note: If the VCI is not paired up with the Maximus 3.0 handset before doing this step, an advisory message prompting Bluetooth connection failure appears on the screen.

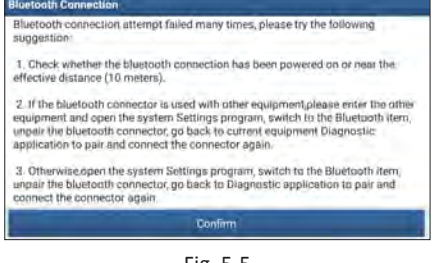


Fig. 5-5

Check all the possible reasons carefully, and then tap “Confirm” to enter the following screen.

Fig. 5-6

If the VCI was once used with other devices, you need to cancel the pairing of the VCI first via either one of the following ways:

- On the Android’s home screen, tap “Settings” -> “Bluetooth” -> Choose the desired VCI from the Paired list. Tap “⚙”, and then tap “FORGET” to unpair it.
- Go to “Toolbox“, tap “Settings” -> “VCI Management” -> “Deactivate matching”.

In Fig. 5-6, tap “Scan” to start searching for the VCI and pairing up with it.

b).Camera: In this mode, you need to place the VIN inside the viewfinder rectangle to scan it.

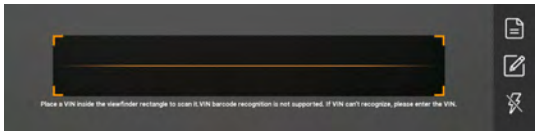


Fig. 5-7

- If the ambient light is too weak, please turn the camera flash on.
- If you have scanned the VIN of the vehicle, tap VIN record icon to select it from the record list.
- In case the handset failed to identify it, tap to enter it manually.

*Note: In general, vehicle identification numbers are standardized - all contain 17 characters. VIN characters may be capital letters A through Z and numbers 1 through 0; however, the letters I, O and Q are never used in order to avoid mistakes of misreading. No signs or spaces are allowed in the VIN.

After scanning, the screen automatically displays the result.

Fig. 5-8

- If the VIN scanned is incorrect, tap the result field to modify it and then tap “OK”. If the VIN exists on the remote server, the system will enter the vehicle information screen. See Fig. 5-10.
- To scan it again, tap “REPEAT”.

c). Enter VIN: In this mode, you need to input the VIN manually.

The most recognizable location for this number is in the top left corner on the vehicle’s dashboard. Other locations include the driver’s door or post, and the firewall under the hood.

Tap “Enter VIN” and a screen similar to Fig. 5-9 will appear:

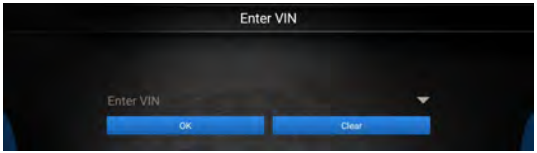


Fig. 5-9

Input the VIN, and tap “OK” to start decoding the vehicle VIN.

1. If the VIN can be found from the server database, a screen similar to Fig. 5-10 displays:

Fig. 5-10

- Tap “Diagnostic” to start a new diagnostic session.
- Tap “Maintenance record” to view its historical repair record. If there are records available, it will be listed on the screen in sequence of date. If no records exist, the screen will show “No Record”.

Fig. 5-11

- Tap “View record” to view the details of the current diagnostic report.
- To perform other functions, tap “Quick access” to directly go to the function selection screen. Choose the desired one to start a new diagnostic session.

2. If the handset failed to access the VIN information, the screen will display as below:

Fig. 5-12

- Tap “Diagnostic” to launch the Local Diagnosis module and start a new diagnostic session. Refer to Chapter 5.3.2 for detailed diagnostic operations.
- Tap “Scan VIN”, a screen similar to the following appears:

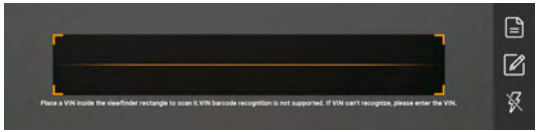


Fig. 5-13

Place the VIN inside the viewfinder rectangle to scan it. The most recognizable location for this number is in the top left corner on the vehicle’s dashboard. Other locations include the driver’s door or post, and the firewall under the hood.

- If the ambient light is too weak, please turn the camera flash on.
- If you have scanned the VIN of the vehicle, tap VIN record icon to select it from the record list.
- In case the handset failed to identify it, tap to enter it manually.

After scanning, the screen automatically displays the result.

- If the VIN scanned is incorrect, tap the result field to modify it and then tap “OK”. If the VIN exists on the remote server, the system will enter the vehicle information screen.
- To scan it again, tap “REPEAT”.

5.3.2 Manual Diagnosis

Take Demo as an example to demonstrate how to diagnose a vehicle.

1). Select diagnostic software version: Tap the “DEMO” to go to Step 2. (*Note: If more than one version is available on this handset, it will be listed on the screen.)

Fig. 5-14

On-screen Buttons:

Testable models: Tap to view the vehicle models that the current diagnostic software covers.

What’s new: Tap to view the optimized items and enhancements.

Introduction: Tap to check the software function list.

Note: Tap to read some precautions on using the current diagnostic software.

Search Bluetooth (BT): Tap to search for the available VCI dongle.

*Notes:

- Bluetooth connection is not required to run the DEMO program.
- If a vehicle is tested and no Bluetooth connection is made before diagnosis, tap “Search Bluetooth”, a dialog box similar to the following appears:

Fig. 5-15

Tap “Scan” to start searching for the VCI. Once it is found, tap it to start pairing.

If the Maximus 3.0 handset has paired with the VCI, it will enter Step 2 directly.

OK: Tap it to go to next step.

2). Select test item: Select the desired test item to proceed.

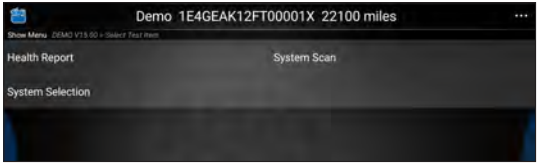


Fig. 5-16

5.3.2.1 Health Report (Quick Test)

This function varies from vehicle to vehicle. It enables you to quickly access all the electronic control units of the vehicle and generate a detailed report about vehicle health.

Tap “Health Report” to scan the vehicle control modules. When scanning is complete, the following screen appears.

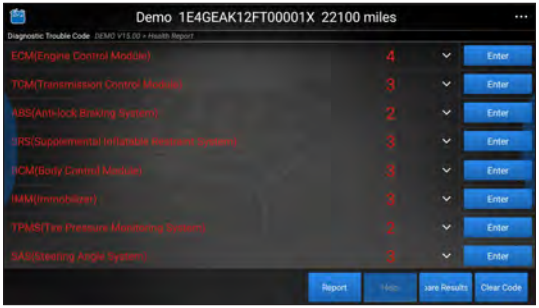


Fig. 5-17

In Fig. 5-17, systems with fault code are displayed in red and systems functioning normally are displayed in white.

On-screen Buttons:

: Tap to view detailed Diagnostic Trouble Codes (DTCs) information. Tap to hide it.

*Note: Diagnostic Trouble Codes or Fault Codes can be used to identify which engine systems or components that are malfunctioning. Never replace a part based only on the DTC definition. Retrieving and using DTCs for troubleshooting vehicle operation is only one part of an overall diagnostic strategy. Follow testing procedures (in vehicle’s service manual), instructions and flowcharts to confirm the locations of the problem.

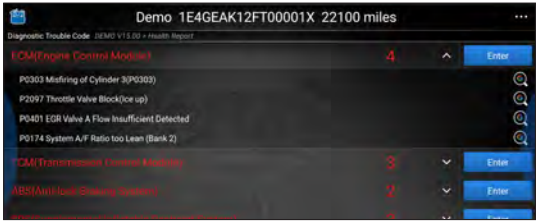


Fig. 5-18

Highlight a DTC, and tap to search online for detailed information about the selected DTC.

Enter: Tap to select other test functions.

Fig. 5-19

Report: Tap to save it as a report of the current data in text format.

*Note: Diagnostic report is classified into two categories: Pre-Repair report and Post-Repair report.

To facilitate the comparison of the pre-repair and post-repair reports and get accurate test result, please make sure you saved the right type of the diagnostic report.

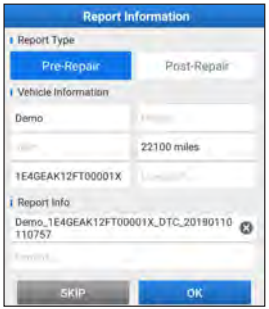


Fig. 5-20

Choose the report type and input the required information, and then tap “OK”.

Fig. 5-21

Input the technician (*If you have entered the technician name before, tap ▼ directly to select it from the pull-down list) and customer name and then tap “OK” to confirm and navigate to the report details page.

For workshop information, tap “Modify” to revise it, then tap “Save”.

To skip the workshop information, tap “Skip” to go to the report details page.

*Note: Workshop information can also be revised from the “Print Information” in “Toolbox” -> “Settings”.

Once you configured the information, it will be automatically generated every time the diagnostic report is saved. All vehicle and workshop information will be appended as tags on the diagnostic report, which allows you to easily retrieve the desired report while performing “Filter” function of Diagnostic Report.

On the report details page, tap “Save” to save it. All diagnostic reports can be accessed from “Toolbox” -> “Saved Reports” -> “Health Report”.

Help: Tap to view the help information of the selected DTC item.

Compare Results: After you have made some repairs based on the pre-repair diagnostic report and re-diagnose the vehicle, tap “Compare Result” to select the pre-repair report to compare. By comparison of the pre- and post- repair reports, you can easily identify which DTCs are cleared and which remain unfixed.

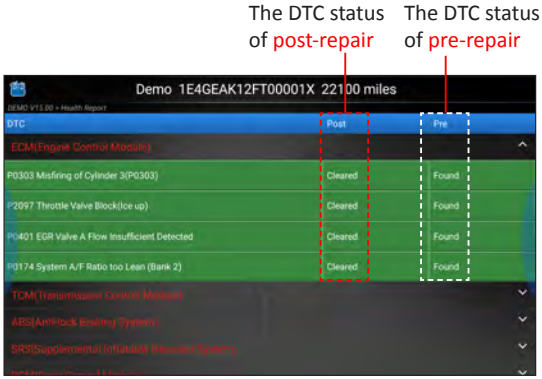


Fig. 5-22

*Note: Before performing this function, please make sure that:

- You have saved a pre-repair report of the currently tested vehicle, and
- You have already made some repairs and service and cleared the DTCs after the pre-repair reported is generated. Otherwise, no differences exist between the pre- and post- repair reports.

Clear DTC: Tap to clear the existing diagnostic trouble codes.

*Note: Clearing DTCs does not fix the problem(s) that caused the code(s) to be set. If proper repairs to correct the problem that caused the code(s) to be set are not made, the code(s) will appear again and the check engine light will illuminate as soon as the problem that cause the DTC to set manifests itself.

5.3.2.2 System Scan

Use this option to quickly scan and identify which systems are installed on the vehicle.

In Fig. 5-16, tap “System Scan” to scan the vehicle control modules. When scanning is complete, the following screen appears.

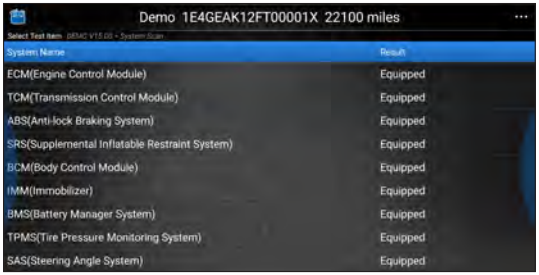


Fig. 5-23

Tap the desired system to navigate to the test function selection

screen. For detailed operations on test function, please refer to Chapter 5.3.2.3.

5.3.2.3 System Selection

This option allows you manually select the test system and function step by step.

In Fig. 5-16, tap “System Selection”, the screen displays as follows:

Fig. 5-24

Swipe the screen from the bottom to view the vehicle system on the next page.

Tap the desired system (take “ECM” for example) to jump to the test function page.

Fig. 5-25

*Note: Different vehicle has different diagnostic menus.

A. Version Information

This function is used to read the version information of system mode, vehicle VIN, software and ECU.

In Fig. 5-25, tap “Version Information”, the screen displays as follows:

Fig. 5-26

Tap “OK” to confirm and exit.

B. Read Fault Code

This function displays the detailed information of DTC records retrieved from the vehicle’s control system.

In Fig. 5-25, tap “Read Fault Code”, the screen will display the diagnostic result.

Fig. 5-27

*Note: Retrieving and using DTCs for troubleshooting vehicle operation is only one part of an overall diagnostic strategy. Never replace a part based only on the DTC definition. Each DTC has a set of testing procedures, instructions and flow charts that must be followed to confirm the location of the problem. This information can be found in the vehicle's service manual.

On-screen Buttons:

Freeze Frame: When an emission-related fault occurs, certain vehicle conditions are recorded by the on-board computer. This information is referred to as freeze frame data. Freeze frame data includes a snapshot of critical parameter values at the time the DTC is set. If it is illuminated, tap it to view the freeze frame data.

Help: Tap to view the help information.

Code Search: Tap it to search for more information about the current DTC online.

Report: To save the current data in text format. All diagnostic reports can be accessed from "Toolbox" -> "Saved Reports" -> "Health Report".

C. Clear Fault Memory

After reading the retrieved codes from the vehicle and certain repairs have been carried out, you can use this function to erase the codes from the vehicle. Before performing this function, please be sure the vehicle's ignition key is in the ON position with the engine off.

Clearing DTCs does not fix the problem(s) that caused the code(s) to be set. If proper repairs to correct the problem that caused the code(s) to be set are not made, the code(s) will appear again and the check engine light will illuminate as soon as the problem that cause the DTC to set manifests itself.

In Fig. 5-25, tap "Clear Fault Memory", a confirmation dialog box pops up on the screen. Tap "Yes" and the system will automatically delete the currently existing trouble code.

*Note: After clearing, you should retrieve trouble codes once more or turn ignition on and retrieve codes again. If there are still some trouble codes in the system, please troubleshoot the code using a factory diagnosis guide, then clear the code and recheck.

D. Read Data Stream

This option lets you view and capture (record) real-time Live Data. This data including current operating status for parameters and/or sensor information can provide insight on overall vehicle performance. It can also be used to guide vehicle repair.

*Note: If you must drive the vehicle in order to perform a troubleshooting procedure, ALWAYS have a second person help you. Trying to drive and operate the diagnostic tool at the same time is dangerous, and could cause a serious traffic accident.

In Fig. 5-25, tap "Read Data Stream", the system will display data stream items.

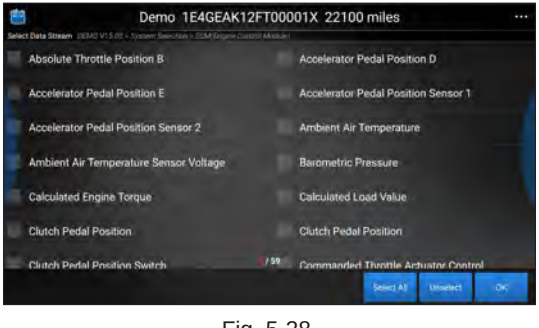


Fig. 5-28

On-screen Buttons:

Select All: Tap it to select all items of the current page. To select certain data stream item, just check the box before the item name.

Unselect: Tap it to deselect all data stream items.

OK: Tap it to confirm and jump to the next step.

After selecting the desired items, tap “OK” to enter the data stream reading page.

Fig. 5-29

*Notes:

1. If the value of the data stream item is out of the range of the standard (reference) value, the whole line will display in red. If it complies with the reference value, it displays in blue (normal mode).
2. The indicator 1/X shown on the bottom of the screen stands for the current page/total page number. Swipe the screen from the right/left to advance/return to the next/previous page.

There are 3 types of display modes available for data viewing, allowing you to view various types of parameters in the most suitable way.

- Value – this is the default mode which displays the parameters in texts and shows in list format.
- Graph – displays the parameters in waveform graphs.
- Combine – this option is mostly used in graph merge status for data comparison. In this case, different items are marked in different colors.

On-screen Buttons:

: Tap it to view the waveform graph of the current data stream item.

Fig. 5-30

- Min/Max: Tap “Min/Max” to define the maximum/minimum value. Once the value goes beyond the specified value, the system will alarm.
- Customize: If desired, you can customize to show only those PIDs you are interested in viewing. Tap “Customize” to add/change other data stream items.

*Note: The real time (Live Data) vehicle operating information (values/status) that the on-board computer supplies to the tool for each sensor, actuator, switch, etc. is called Parameter Identification Data (IPD).

Graph: Tap it to view the waveform.

Fig. 5-31

- Combine: This option is mostly used in graph merge status for data comparison.

Fig. 5-32

- Value: Tap to display the parameters in texts.
- Customize: This option allows you to select only the PIDs that you wish to display. Tap it, a pull-down list of the data stream items appears on the screen. Select (Up to 8 data stream items can be selected)/deselect the desired items and then screen will display/remove the corresponding waveforms immediately.

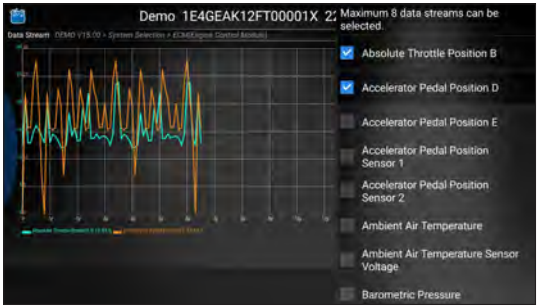


Fig. 5-33

Select Sample DS: Tap it to select the sample DS file, the values you customized and saved in process of DS sampling will be imported into the “Standard Range”(See below) column for your comparison.

*Note: Before executing this function, you have to sample the values of data stream items and save it as an sample DS file.

Fig. 5-34

Report: To save the current data as a diagnostic report. All diagnostic reports can be accessed from “Toolbox” -> “Saved Reports” -> “Health Report”.

Record: Tap to start recording diagnostic data. Recorded live data can serve as valuable information to help you in troubleshooting of vehicle problems. All diagnostic records can be replayed from “Toolbox” -> “Saved reports” -> “Playback”.

*Note: The saved file follows the naming rule: It begins with vehicle type, and then the record starting time and ends with .x431 (To differentiate between files, please configure the accurate system time).

Help: Tap to view the help information.

Sample DS: This item enables you to customize the standard range of live data stream items and save it as DS sample file. Each time you run the data stream items, you can call out the corresponding sample data to overwrite the current standard range.

Tap it to start recording the sample data (*Only data stream items with units will be recorded), and the screen displays as below:

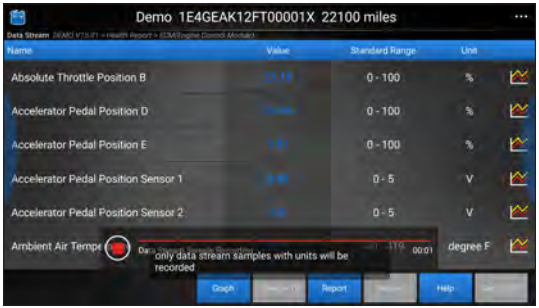


Fig. 5-35

Once recording is complete, tap ■ to stop it and navigate to the data revision screen.

Fig. 5-36

Tap the Min./Max. value to change it. After modifying all desired items, tap “Save” to save it as an sample DS file. All DS files are stored under the “Data Stream Sample” file of “Settings” in “Toolbox”.

E. Actuation Test

This option is used to access vehicle-specific subsystem and component tests. Available test vary by vehicle manufacturer, year, and model. During the actuation test, the Maximus 3.0 handset outputs commands to the ECU in order to drive the actuators, and then determines the integrity of the system or parts by reading the ECU data, or by monitoring the operation of the actuators, such as switching a injector between two operating states.

In Fig. 5-25, tap “Actuation Test”, the system will display as follows:

Fig. 5-37

Simply follow the on-screen instructions and make appropriate selections to complete the test. Each time when an operation is successfully executed, “Completed” displays.

5.4 Maintenance Reset

In addition to amazing & powerful diagnostic function, Maximus 3.0 also features various service functions. The most commonly performed service functions contain:

- Oil Reset Service
- Electronic Parking Brake Reset
- Steering Angle Calibration
- ABS Bleeding
- TPMS (Tire Pressure Monitor System) Reset
- Gear Learning
- IMMO Service
- Injector Coding
- Battery Maintenance System
- Diesel Particulate Filter (DPF) Regeneration
- Electronic Throttle Position Reset

There are two methods to reset service lamp: Manual reset or Auto reset. Auto reset follows the principle of sending command from the tool to vehicle’s ECU to do resetting. While using manual reset, users just follow the on-screen instructions to select appropriate execution options, enter correct data or values, and perform necessary actions, the system will guide you through the complete performance for various service operations.

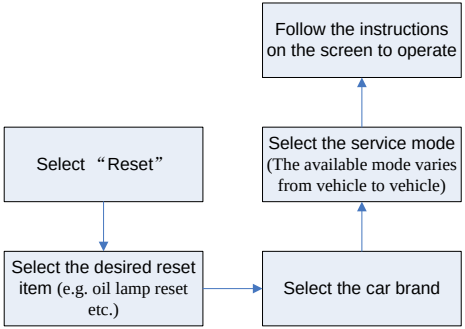


Figure 5-38

5.4.1 Oil Reset Service

This function allows you to perform reset for the engine oil life system, which calculates an optimal oil life change interval depending on the vehicle driving conditions and climate.

This function can be performed in the following cases:

1. If the service lamp is on, you must provide service for the car. After service, you need to reset the driving mileage or driving time so that the service lamp turns off and the system enables the new service

cycle.

2. After changing engine oil or electric appliances that monitor oil life, you need to reset the service lamp.

5.4.2 Electronic Parking Brake Reset

1. If the brake pad wears the brake pad sense line, the brake pad sense line sends a signal sense line to the on-board computer to replace the brake pad. After replacing the brake pad, you must reset the brake pad. Otherwise, the car alarms.
2. Reset must be performed in the following cases:

   a) The brake pad and brake pad wear sensor are replaced.

   b) The brake pad indicator lamp is on.

   c) The brake pad sensor circuit is short, which is recovered.

   d) The servo motor is replaced.

5.4.3 Steering Angle Calibration

To reset the steering angle, first find the relative zero point position for the car to drive in straight line. Taking this position as reference, the ECU can calculate the accurate angle for left and right steering.

After replacing the steering angle position sensor, replacing steering mechanical parts (such as steering gearbox, steering column, end tie rod, steering knuckle), performing four-wheel alignment, or recovering car body, you must reset the steering angle.

5.4.4 ABS Bleeding

This function allows you to perform various bi-directional tests to check the operating conditions of Anti-lock Braking System (ABS).

1. When the ABS contains air, the ABS bleeding function must be performed to bleed the brake system to restore ABS brake sensitivity.
2. If the ABS computer, ABS pump, brake master cylinder, brake cylinder, brake line, or brake fluid is replaced, the ABS bleeding function must be performed to bleed the ABS.

5.4.5 Tire Pressure Monitor System Reset

This function allows you to quickly look up the tire sensor IDs from the vehicle's ECU, as well as to perform TPMS replacement and sensor test.

1. After the tire pressure MIL turns on and maintenance is performed, the tire pressure resetting function must be performed to reset tire pressure and turn off the tire pressure MIL.
2. Tire pressure resetting must be performed after maintenance is performed in the following cases: tire pressure is too low, tire leaks, tire pressure monitoring device is replaced or installed, tire is replaced, tire pressure sensor is damaged, and tire is replaced for the car with tire pressure monitoring function.

5.4.6 Gear Learning

The crankshaft position sensor learns crankshaft tooth machining tolerance and saves to the computer to more accurately diagnose engine misfires. If tooth learning is not performed for a car equipped with Delphi engine, the MIL turns on after the engine is started. The diagnostic device detects the DTC P1336 'tooth not learned'. In this case, you must use the diagnostic device to perform tooth learning for the car. After tooth learning is successful, the MIL turns off.

After the engine ECU, crankshaft position sensor, or crankshaft flywheel is replaced, or the DTC 'tooth not learned' is present, tooth learning must be performed.

5.4.7 IMMO Service

An immobilizer is an anti-theft mechanism that prevents a vehicle's

engine from starting unless the correct ignition key or other device is present. Most new vehicles have an immobilizer as standard equipment. An important advantage of this system is that it doesn't require the car owner to activate it since it operates automatically. An immobilizer is considered as providing much more effective anti-theft protection than an audible alarm alone.

As an anti-theft device, an immobilizer disables one of the systems needed to start a car's engine, usually the ignition or the fuel supply. This is accomplished by radio frequency identification between a transponder in the ignition key and a device called a radio frequency reader in the steering column. When the key is placed in the ignition, the transponder sends a signal with a unique identification code to the reader, which relays it to a receiver in the vehicle's computer control module. If the code is correct, the computer allows the fuel supply and ignition systems to operate and start the car. If the code is incorrect or absent, the computer disables the system, and the car will be unable to start until the correct key is placed in the ignition.

To prevent the car being used by unauthorized keys, the anti-theft key matching function must be performed so that the immobilizer control system on the car identifies and authorizes remote control keys to normally use the car.

When the ignition switch key, ignition switch, combined instrument panel, ECU, BCM, or remote control battery is replaced, anti-theft key matching must be performed.

5.4.8 Injector Coding

Write injector actual code or rewrite code in the ECU to the injector code of the corresponding cylinder so as to more accurately control or correct cylinder injection quantity.

After the ECU or injector is replaced, injector code of each cylinder must be confirmed or re-coded so that the cylinder can better identify injectors to accurately control fuel injection.

5.4.9 Battery Maintenance System Reset

This function enables you to perform a resetting operation on the monitoring unit of vehicle battery, in which the original low battery fault information will be cleared and battery matching will be done.

Battery matching must be performed in the following cases:

a) Main battery is replaced. Battery matching must be performed to clear original low battery information and prevent the related control module from detecting false information. If the related control module detects false information, it will invalidate some electric auxiliary functions, such as automatic start & stop function, sunroof without one-key trigger function, power window without automatic function.

b) Battery monitoring sensor. Battery matching is performed to re-match the control module and motoring sensor to detect battery power usage more accurately, which can avoid an error message displaying on the instrument panel.

5.4.10 Diesel Particulate Filter (DPF) Regeneration

DPF regeneration is used to clear PM (Particulate Matter) from the DPF filter through continuous combustion oxidation mode (such as high temperature heating combustion, fuel additive or catalyst reduce PM ignition combustion) to stabilize the filter performance.

DPF regeneration may be performed in the following cases:

a) The exhaust back pressure sensor is replaced.

b) The PM trap is removed or replaced.

c) The fuel additive nozzle is removed or replaced.

d) The catalytic oxidizer is removed or replaced.

e) The DPF regeneration MIL is on and maintenance is performed.

f) The DPF regeneration control module is replaced.

5.4.11 Electronic Throttle Position Reset

This function enables you to make initial settings to throttle actuators and returns the “learned” values stored on ECU to the default state. Doing so can accurately control the actions of regulating throttle (or idle engine) to adjust the amount of air intake.

5.4.12 Gearbox Matching

1. This function can complete the gearbox self-learning to improve gear shifting quality.
2. When the gearbox is disassembled or repaired (after some of the car battery is powered off), it will lead to shift delay or impact problem. In this case, this function needs to be done so that the gearbox can automatically compensate according to the driving conditions so as to achieve more comfortable and better shift quality.

5.4.13 AFS (Adaptive Front-lighting System) Reset

This feature is used to initialize the adaptive headlamp system. According to the ambient light intensity, the adaptive headlamp system may decide whether to automatically turn on the headlamps, and timely adjust the headlamp lighting angle while monitoring the vehicle speed and body posture.

5.4.14 Sunroof Initialization

This function can set the sunroof lock off, closed when it rains, sliding / tilting sunroof memory function, temperature threshold outside the car etc.

5.4.15 Suspension Calibration

1. This function can adjust the height of the body.
2. When replacing the body height sensor in the air suspension system, or control module or when the vehicle level is incorrect, you need to perform this function to adjust the body height sensor for level calibration.

5.5 Diagnostic History (Previous Session)

Generally once a vehicle diagnosis is performed, Maximus 3.0 will record the every details of diagnostic process. The History function provides a quick access to the tested vehicles and users can resume from the last operation, without the necessity of starting from scratch.

Tap “Previous Session”, all diagnostic records will be listed on the screen in date sequence.

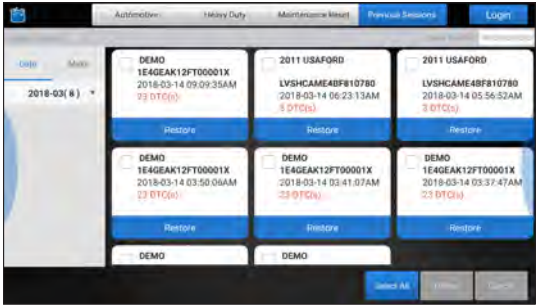


Fig. 5-39

- Tap certain vehicle model to view the details of the last diagnostic report.
- To delete certain diagnostic history, select it and then tap “Delete”. To delete all historical records, tap “Select All” and then tap “Delete”.
- Tap “Restore” to directly navigate to the function selection page of last diagnostic operation. Choose the desired option to proceed.

5.6 I/M Readiness

An important part of a vehicle's OBD II system is the Readiness Monitors, which are indicators used to find out if all of the emissions components have been evaluated by the OBD II system. They are running periodic tests on specific systems and components to ensure that they are performing within allowable limits.

Currently, there are eleven OBD II Readiness Monitors (or I/M Monitors) defined by the U.S. Environmental Protection Agency (EPA). Not all monitors are supported in every vehicles and the exact number of monitors in any vehicle depends on the motor vehicle manufacturer's emissions control strategy.

Continuous Monitors -- Some of the vehicle components or systems are continuously tested by the vehicle's OBD II system, while others are tested only under specific vehicle operating conditions. The continuously monitored components listed below are always ready:

1. Misfire
2. Fuel System
3. Comprehensive Components (CCM)

Once the vehicle is running, the OBD II system is continuously checking the above components, monitoring key engine sensors, watching for engine misfire, and monitoring fuel demands.

Non-Continuous Monitors -- Unlike the continuous monitors, many emissions and engine system components require the vehicle to be operated under specific conditions before the monitor is ready. These monitors are termed non-continuous monitors and are listed below:

1) EGR System
2) O2 Sensors
3) Catalyst
4) Evaporative System
5) O2 Sensor Heater
6) Secondary air Injection
7) Heated Catalyst
8) A/C system

I/M refers to Inspection and Maintenance that is legislated by the Government to meet federal clean-air standards. I/M Readiness indicates whether or not the various emissions-related systems on the vehicle are operating properly and are ready for Inspection and Maintenance testing.

The purpose of the I/M Readiness Monitor Status is to indicate which of the vehicle's Monitors have run and completed their diagnosis and testing, and which ones have not yet run and completed testing and diagnosis of their designated sections of the vehicle's emissions system.

The I/M Readiness Monitor Status function also can be used (after repair of a fault has been performed) to confirm that the repair has been performed correctly, and/or to check for Monitor Run Status.

Tap [I/M Readiness] on the Diagnostics main menu screen to start checking. After checking all I/M readiness status, the screen will output the result.

*Note: means not available on this vehicle, means incomplete or not ready, means Completed or Monitor Ok.

6 Toolbox

6.1 Saved Reports

Tap “Saved Reports”, a screen similar to the following appears.

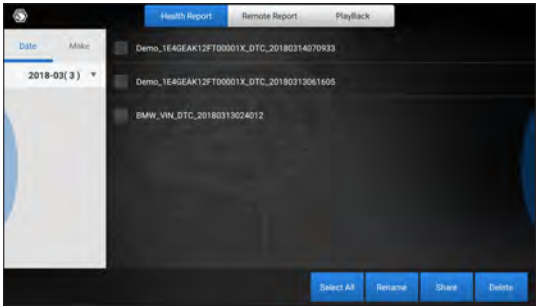


Fig. 6-1

6.1.1 Health Report

This module stores all diagnostic reports generated in process of vehicle diagnosis.

All the diagnostic reports are sorted by Date and Make. Tap the desired type to re-arrange and filter it.

- To select certain report, check the box before the report. To select all reports, tap “Select All”. To deselect all, tap “Unselect”.
- To revise the filename of the report, select the desired one and tap “Rename”.
- To share the report with others, select the desired one and then tap “Share”.
- Select the desired report and then tap “Delete” to delete it.

6.1.2 Remote Report

This option lists all diagnostic reports generated in process of remote diagnostics.

6.1.3 Playback

If user records the running parameters or waveform graphs while reading data stream, it will be saved as diagnostic records and appear under this tab. You can use this option to view recorded live data. Frame playback and auto playback are supported.

Tap “Playback”, and select certain diagnostic record to enter:

Fig. 6-2

Select the desired data stream items and tap “OK” to jump to the playback page:

*Note: While viewing recorded live data, carefully look for any irregularities in any of the PID values/signal information (TEMP, RPM, etc). If any PIDs go beyond the standard range value, or irregularities are detected, follow the procedures in the vehicle’s service manual to perform additional troubleshooting and repair.

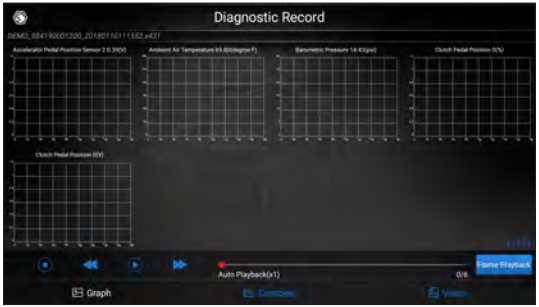


Fig. 6-3

On-screen Buttons:

Graph – Displays the parameters in waveform graphs.

Combine – This option is mostly used in graph merge status for data comparison. In this case, different items are marked in different colors.

Value – This is the default mode which displays the parameters in texts and shows in list format.

Frame Playback – Plays back the recorded data stream items frame by frame. Tap ▶ to start playing. Tap ■ to stop it. Tap ▶▶ to fast forward to next frame. Tap ◀◀ to reverse to previous frame. Once it is in frame playback mode, this button changes into “Auto Playback”.

6.2 Tech-To-Tech

This option aims to help repair shops or technicians launch instant messaging and remote diagnosis, making the vehicle (even thousands of miles away) repair job getting fixed faster.

6.2.1 Interface Layout

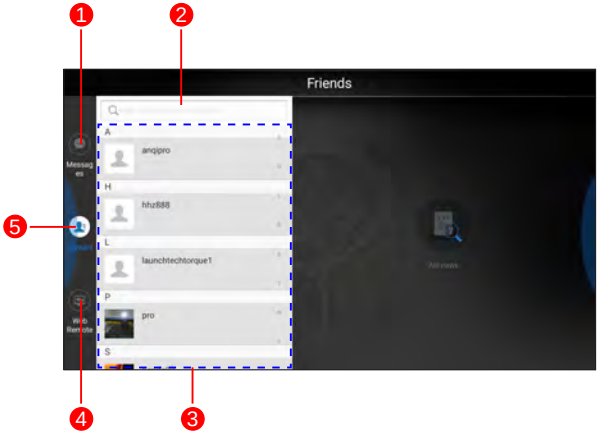


Fig. 6-4

1	Message tab	Once an incoming message reaches, a red dot will appear on the upper right corner of the tab.
2	Search bar	Directly input the username of the Maximus 3.0 to start searching, and then tap the desired one to add it into your friend list.
3	Friends List	By default, the screen appears blank.
4	WEB Remote switch	Tap to slide the switch to ON, the Maximus 3.0 keeps online and becomes visible on the web client. In this case, inform the technician of your product S/N, and he/she will control your Maximus 3.0 remotely.

5	Contact tab	Tap to enter the friend list.

6.2.2 Add Friends

Tap “Contact” to enter the contact page. By default it appears blank.

In the search bar, input the partner’s username and tap “Search” button next to the search bar to starts searching from Launch’s golo business database.

*Note: The partner must be the users who have registered their Launch’s diagnostic tools. They may be the following:

- Workshop
- Technician
- golo users

Once the result matches the keyword, a screen similar to the following will appear:

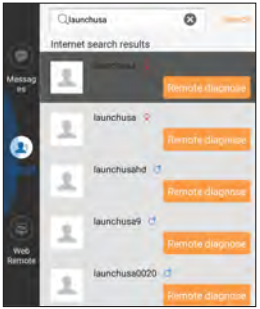


Fig. 6-5

Tap “Remote Diagnose”, a dialog box pops up:

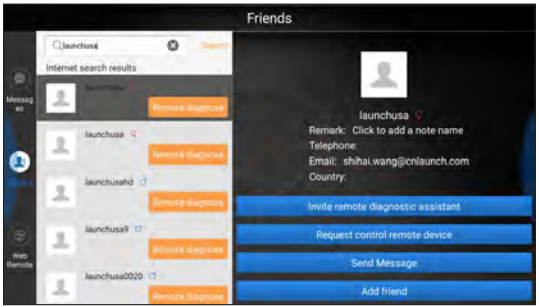


Fig. 6-6

Tap “Add friend” to send your request.

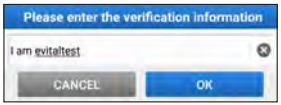


Fig. 6-7

Once the partner receives the request, a beep will sound. Tap the “Message” tab:

- Once the partner agreed your request, he/she will automatically be listed in the Contact tab.
- If a counterpart sent you a friend request, you can tap “Agree” to confirm and his/her name will appear in the friend list (Contact). Or tap “Ignore” to ignore this request.

6.2.3 Start Instant Messaging

*Note: The I/M (Instant Messaging) function is open to all users who had Launch’s diagnostic tool equipped with this module.

After adding your friends, tap the desired fellow technician’s photo to

enter a screen similar to the following:

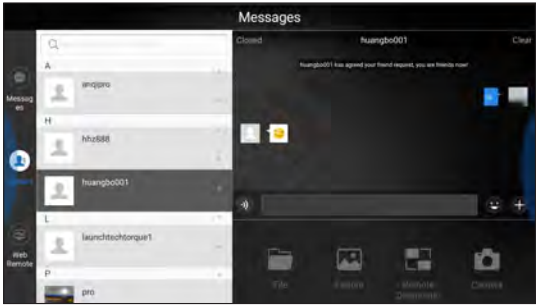


Fig. 6-8

Tap the input field and use the on-screen keyboard to enter the text message, and then tap “Send” to send it.

- Tap to send the voice message.
- Tap to send the emoj.
- Tap to call out more function options.
- Tap “Clear” to delete all the partner’s dialog logs.
- Tap “Close” to close the current dialog.

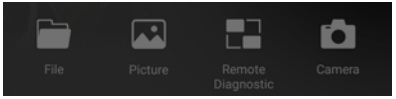


Fig. 6-9

File: Choose diagnostic reports or local files to send.

Picture: Choose screenshots or pictures to send.

Remote Diagnostic: To start a remote diagnostic session. For details, refer to Chapter 6.2.4.

Camera: Open camera to take pictures.

6.2.4 Launch Remote Diagnosis (Device-To-Device)

The Maximus 3.0 handset is allowed to initiate remote diagnosis with other diagnostic tools (including but not limited to the Maximus 3.0) of Launch family, which are equipped with this module.

* Notes: Before performing this operation, please make sure the following conditions are met no matter which side sends the remote request:

- Turn on the vehicle power supply.
- Throttle should be in a closed position.
- The Maximus 3.0 should be properly connected to the vehicle’s DLC and a successful communication is required.

In Fig. 6-9, tap “Remote Diagnostic”, a pull-down menu including the following options appears:

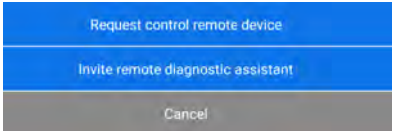


Fig. 6-10

These options are defined as follows:

Actions	Results
Request control remote device	Request to control the partner's device remotely to help him diagnose the vehicle. *Notes: • Remote diagnosis has the same diagnostic steps as manual diagnosis. • In process of remote diagnosis, tap the button to send a voice message. • Once vehicle diagnosis is complete, a report will be created. Input your comments on this report, and then tap "Send Report" to send it to the partner. • If you have a local vehicle diagnosis in process, please exit it first before starting remote diagnosis. Tap "Request control remote device" ↓ Wait for partner's confirmation ↓ Start connecting after request confirmed ↓ Start Diagnosis ↓ Generate diagnostic report

Invite remote diagnostic assistant	If you need support, just use this option to invite a technician to perform a remote control on your tool. *Notes: • Remote diagnosis has the same diagnostic steps as manual diagnosis. • In process of remote diagnosis, tap the button to send voice message. • Once you received the report from the partner, tap "View Report" to view details. All diagnostic reports are saved "Toolbox" -> "Saved Reports" -> "Remote Reports". Tap "Invite remote diagnostic assistant" ↓ Choose the desired diagnostic software ↓ Wait for partner's confirmation ↓ Start connecting after request confirmed ↓ Start Diagnosis ↓ Generate diagnostic report

Cancel	To cancel this operation.

6.2.5 Launch Remote Diagnosis (Device-To-PC)

Except that the remote diagnosis can be done between different diagnostic tools that come loaded with the module, user also can ask for remote control from PC client technician.

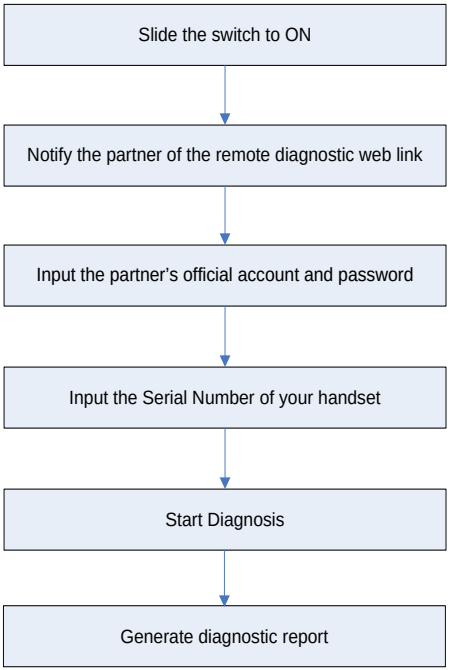


Fig. 6-11

Tap the "Web Remote" tab, the screen displays as follows:

Fig. 6-12

1. Slide the switch "Allow device to be connected to the WEB client remote diagnostic device" to ON so that the partner can find and connect to this device while using the PC.
2. Notify the partner of the PC client website http://remote.x431.com. When the partner accesses the link, the PC displays as below:

*Note: Before processing remote diagnosis, please make sure the Maximus 3.0 handset is properly connected to the vehicle.

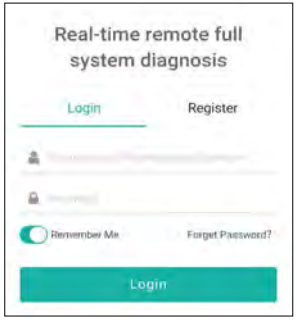


Fig. 6-13

3. Tell the partner to input his own official technician account and password, and then tap “Login” to navigate to the following figure.

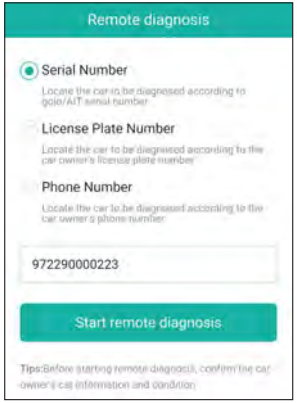


Fig. 6-14

4. Tell the partner to check the box “Serial number” and enter the Serial Number provided by you, and then tap “Start remote diagnosis” to control your device remotely.

   In process of remote diagnosis, please note the following things:

   1) You are not suggested to execute any action.
   2) The partner is not allowed to save any diagnostic reports or records on your handset.

The operations in remote diagnosis are same as those in local diagnosis. Once the session is complete, a remote diagnostic report will be automatically generated.

6.3 Feedback

This item allows you to feedback your diagnostic problems to us for analysis and troubleshooting.

Tap “Feedback”, the following 3 options will be displayed on the left column of the screen.

A. Feedback

Tap a tested vehicle model to enter the feedback screen.

1) Tap “Choose File” to open the target folder and choose the desired diagnostic logs.
2) Choose the failure type and fill in the detailed failure description in the blank text box and telephone or email address. After inputting, tap “Submit Result” to send it to us.

B. History

Tap it to view all diagnostic feedback records. Different process states are marked with different colors.

C. Offline list

Tap it to display all diagnostic feedback logs which have not been submitted successfully due to network failure. Once the handset gets a stable network signal, it will be uploaded to the remote server automatically.

6.4 Update

This module allows you to update the diagnostic software & App, and renew the software subscription.

If you did not download the software in process of product registration or a pop-up message prompting you that some new software can be updated, you may use this option to download it or keep it synchronized with the latest version.

Tap “Update” to enter the update center.

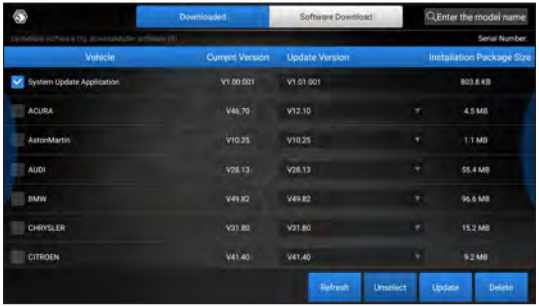


Fig. 6-15

This page includes two options: **Downloaded** and **Software Downloaded**.

6.4.1 Update Diagnostic Software & APP

By default, the system enters the “**Downloaded**” page and all diagnostic software to be updated is selected.

- To deselect certain software, tap “Unselect”, and then check the box next to vehicle model.
- To refresh the downloaded list, tap “Refresh”.
- To free up more storage space or you have downloaded several versions of diagnostic software, you can use “Delete” to clear the old versions and only retain the latest versions.

Tap “Update” to start downloading. It may take several minutes to finish it, please be patient to wait.

To pause downloading, tap “Stop”. To resume it, tap “Continue”. If network connection failure occurs, tap “Retry” to try again.

Once download is finished, the software packages will be installed automatically.

6.4.2 Download software

If some software has not been downloaded yet or removed, you can use the “Software Download” option to download it.

- To deselect certain software, tap “Unselect”, and then check the box next to vehicle model.
- To refresh the downloaded list, tap “Refresh”.
- Tap “Update” to start downloading. It may take several minutes to finish it, please be patient to wait.

6.4.3 Renew software subscription

If the software subscription is due or expires, the system will prompt you to renew your subscription and a “Renewal” button will appear on the bottom of the update page.

There are two ways available for you to make payment: PayPal and Subscription Renewal Card (*need to buy it from the local dealer where you purchased the Maximus 3.0).

A. Using PayPal

1. Tap “Renewal” on the update page to navigate to the renewal type selection screen.
2. Select “PayPal”, and then follow the on-screen instructions to finish the transaction.
3. After payment, go to update center to update the diagnostic software.

B. Using Subscription Renewal Card

1. Tap “Renewal” to navigate to the renewal type selection screen.
2. Select “Subscription Renewal Card”.
3. Input the 24-digit pin code of Subscription Renewal Card and then tap “Submit” to finish the renewal.
4. Go to update center to update the diagnostic software.

6.5 Settings

This module allows you to manage diagnostic reports, VCI devices, configure wireless printer and print information and add favorite website etc.

6.5.1 General

6.5.1.1 Units of Measurement

It is designed to set the measurement unit. Metric System and English System are available.

6.5.1.2 Expiration Reminder

All pre-installed diagnostic software is free to use for 30 days. Once it expires, it will be locked automatically and the system will prompt you to activate your VCI if the expiration reminder is ON.

6.5.1.3 Identifix Settings

This option is used to set whether the free 30-day trial Identifix shows or not.

6.5.1.4 Auto Update

This option is used to set whether automatic update function is ON.

6.5.2 VCI

This option allows you to manage all activated VCI dongles.

If several VCI dongles are activated on this tool, a list of VCI dongles will be displayed on the screen. If your tool extends to support heavy-duty trucks, you need to switch to the corresponding VCI dongle before diagnosing it.

Once you choose the dongle that belongs to other account, you have to log out, and then input the right account to continue.

6.5.3 VCI Management

If you use the current account to test a vehicle with another Maximus 3.0, please use this item to unpair the VCI device with the previously paired Maximus 3.0.

* Note: please be sure to keep the VCI device powered on while performing the operation.

6.5.4 Activate VCI

This item lets you to activate a new VCI device.

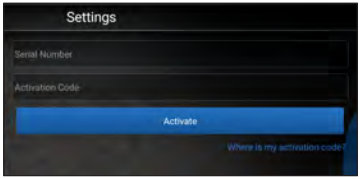


Fig. 6-16

Input the Serial Number and Activation Code, and then tap “Activate” to activate it.

6.5.5 Firmware Fix

Use this item to upgrade and fix diagnostic firmware. During fixing, please do not cut power or switch to other interfaces.

6.5.6 Icon Size

This feature allows you to set the size of the diagnostic software icon according to your preference.

Drag the slider to different size and the system will display the corresponding effect.

6.5.7 Color Theme

This item enables you to set the color theme of the App.

Once you changed it, you have to reboot the system for the change to take effect.

6.5.8 MD Printer Connection

This option is used to establish a wireless connection between Maximus 3.0 and the printer (sold separately) while performing printing operations.

The App is compatible with the “Wi-Fi Printer” (sold separately) and “System” (external printer).

Follow the steps below to connect the Wi-Fi printer.

1. Tap “MD Printer Connection”.

Below describes how to configure the Wi-Fi Printer.

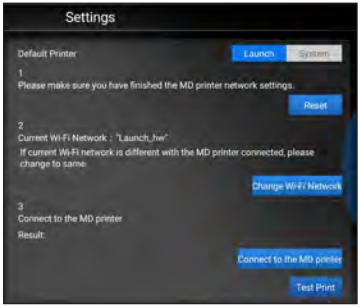


Fig. 6-17

A. If it is the first time you have operated this printer, please proceed the following:

2. For initial use, you are suggested to reset the printer: Press and

hold [MODE] & [FEED] for 8 seconds, the following resetting command will be printed out:

at + default = 1

ok

at + reboot = 1

rebooting...

3. Tap “Reset” to configure Wi-Fi printer.

   Step 1: Connect the printer:

   Tap “Scan” to select the desired printer hotspot named with X-431PRINTER-XXXX (XXXX stands for 4 characters), and then tap “Connect” to enter Step 2.

   Step 2: Join the printer into LAN:

   Tap “Scan” to select the desired local Wi-Fi network from the list, and type in the security password (If it is an open network, password is not required), and then tap “Confirm”.

Fig. 6-18

4. Once the Wi-Fi network of the printer is connected and the printer is found, tap “Test Print” to test the printing.

   Now you can use the Wi-Fi printer to print!

   If the printer is not found, please reset the printer to default factory settings (refer to Step 2 for details) and check whether the current device and the printer are on the same LAN.

B. If you have configured the Wi-Fi printer to the LAN:

2. Tap “Connect to Printer”:

   a). If the local network remains as it is, tap “Test Print” directly to test the printing.

   b). If the local network changes, you have to reboot and reconfigure the Wi-Fi printer.

6.5.9 Print Information

This option lets you define your print information. It mainly includes Workshop, Address, Zip Code, Telephone, Email etc.

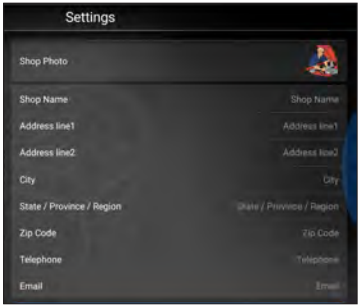


Fig. 6-19

After inputting, tap “Save”.

Once you saved the print information, it will be loaded automatically in the “More Information” box every time you save the diagnostic report.

6.5.10 Data Stream Sample

This feature allows you to manage the recorded data stream sample files.

6.5.11 Vehicle Voltage

This item is used to detect the voltage of the currently tested vehicle when the VCI is plugged into the vehicle's DLC.

6.5.12 Favorites

This feature provides you quick accesses to some renowned and popular repair and maintenance website links. These may include general information about a component or system, diagnostic and troubleshooting procedures and/or repair instructions. Moreover you can also add more repair websites into Favorites so that you can quickly open them in future.

Fig. 6-20

Tap the desired website to visit it.

To add certain website into favorites, scroll the screen to until it reaches to the bottom, tap "+", a dialog box similar to the following appears.

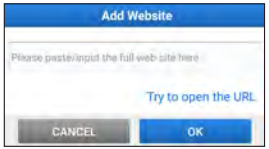


Fig. 6-21

Type in the full web site in the blank, and tap "OK", it will be listed in the Favorites.

6.5.13 Diagnostic Software Clear

This item allows you to hide/clear the diagnostic software that is not frequently used.

Tap "Software Clear", the screen displays as follows:

Fig. 6-22

Under the "Hide Software" tab, select the desired software logo (a "Checkmark" will show in the checkbox located at the lower right corner) and tap "Hide", it will become invisible. Tap "Unhide" to undo the hide operation.

Under the “Remove Software” tab, select the desired software logo and tap “Delete”, it will disappear from the screen.

*Note: Removing software may completely delete the software from the handset. If some software keeps unattended and the handset runs out of space, you can use this feature to remove it. To re-download it, go to “Update” -> “Software Download”.

6.5.14 Backup/Restore

This option lets you backup/restore the important data to/from external storage device.

A. Backup

1). Insert the U disk into the Data Transmission Port of the handset.
2). Tap “Backup” to select the data folder to be backed up.
3). Tap “Backup” on the bottom of the screen to copy it to the U disk.
4). Unplug the U disk from the handset.

B. Restore

1). Insert the U disk into the Data Transmission Port of the handset.
2). Tap “Restore” to select the data folder to be restored.
3). Tap “Restore” on the bottom of the screen to copy it to the handset.
4). Unplug the U disk from the handset.

6.5.15 Login/Exit from current account

To logout the current user ID, tap “Exit from current account”.

To login the system again, tap “Login”.

6.6 Help

FAQ, Vehicle Coverage, Quick Start Guide and User Manual are included.

7 Applications

7.1 Sensorbox & Multimeter (Optional)

7.1.1 Product summary

Maximus 3.0 provides an optional function of automotive sensor simulation test. “Sensor” function is specially designed to diagnose and simulate vehicle sensor faults quickly and conveniently, including “DC voltage simulation”, “Fixed frequency simulation”, “Predefined waveform simulation” and “Hand-painted waveform simulation”.

Vehicle sensors are the signal input devices for electrical control systems, which can transform all kinds of running parameters, such as vehicle speed, coolant temperature, engine RPM, air flow, throttle opening, etc., into the electronic signal for the vehicle computer who can optimize the engine running status per the above-mentioned parameters to keep the engine working in a prime status.

Meanwhile, it integrates the functions of automobile multimeter, which enables users to perform voltage, resistance and frequency test. (The function utilizes the same hardware device as the sensor module)

It features automotive sensor simulation test and multimeter test function.

Sensorbox

Parameters	Scope
Precision	±5%
Voltage range	-5V~+5V
Max output current	70mA
Predefined frequency range	0~150Hz
Square-wave signal pulse frequency	0~15KHz
Square-wave signal duty ratio	10%~90%

Multimeter

Parameters		Scope
Precision		±5%
Voltage test	Testing range	DC-400V~+400V
	Input impedance	10Mohm
Resistance test	Testing range	0~40Mohm
Frequency test	Testing range	0~25KHz
	Input impedance	1000Gohm
	Input voltage	1~12V

7.1.2 Structure and Accessories

7.1.2.1 Sensorbox structure

Fig. 7-1 Structural diagram of Sensorbox

Below shows the ports and indicators for Maximus 3.0 sensorbox

No.	Name	Description
1	Data receiving indicator	Indicator (green) for receiving data from main unit.
2	Data sending indicator	Indicator (green) for sending data to main unit.
3	Power indicator	It keeps steady on (red) after Sensorbox is powered on.
4	B-shaped data port	Connect to main unit with USB cable when it is applied as separated USB device.
5	Power connector	Connect to power supply through the power adaptor.
6	COM	Common terminal of multimeter
7	VΩHz	Testing terminal of multimeter

7.1.2.2 Sensorbox accessories

Maximus 3.0 sensorbox accessories include sensor test cable, probe etc. For detailed items, please see the packing list.

Below formulates the accessories of Maximus 3.0 sensorbox

No.	Name	Picture
1	Sensor test cable	
2	Sensor probe	
3	Multimeter probe	
4	Electronic control converting cable 1	
5	Electronic control converting cable 2	
6	Electronic control converting cable 3	
7	Electronic control converting cable 4	

7.1.3 Sensor Simulation

7.1.3.1 Connections

1. Firstly, power on the Maximus 3.0 handset.
1. Connect the B-shaped terminal of data cable to the B-shaped port of the Sensorbox, and the other end to the Data transmission port of the Maximus 3.0 handset.
2. Plug one end of the sensor test cable (black) into the “COM” interface of the sensorbox, then connect the other end to the test probe or electronic control converting cable.
3. Connect one end of the sensor test cable (red) into the “VΩHz” interface of the sensorbox, and then connect the other end to the test probe or electronic control converting cable.

*Note: Choose corresponding cables and test probes according to different terminals.

7.1.3.2 Simulation test

Simulation test enables users to exactly judge if the sensor is good or not to avoid replacing components blindly. For example, the trouble code indicates the fault is in water temperature sensor itself. But we need to confirm whether the fault results from water temperature sensor or the connections between ECU and sensors, or ECU itself. In this case, we can make full use of simulation test to input the signal of simulating water temperature sensor, instead of water temperature sensor, to the microcomputer. If the engine works better and the fault vanishes, the fault is in the water temperature sensor. If the fault still occurs, input the signal to the corresponding terminals of ECU. Consequently, if the fault disappears, the fault lies in the connection between water temperature sensor and ECU, otherwise, the fault exists in ECU.

After all connections are properly made, power on your Maximus 3.0, launch Maximus 3.0 application and enter the function menu interface, then tap “Sensor” to enter the test selection screen.

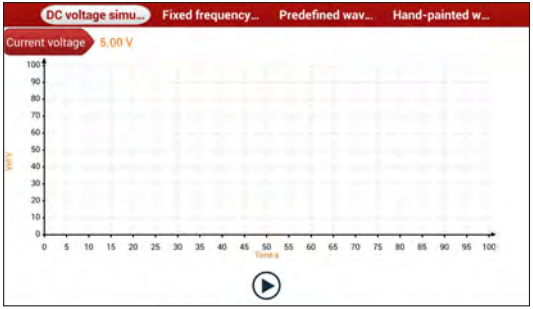


Fig. 7-2

1. DC voltage simulation

In Fig. 7-2, tap [Current voltage], then tap “+” or “-” to adjust the output voltage value. Alternatively, user can also tap edit box, then use the on-screen keyboard to input the desired value directly. After selecting or inputting the desired voltage based on the working characteristics of sensor, tap the ▶ button, then the Maximus 3.0 will begin to output the simulation voltages. Please note the red probe is the output terminal of simulation voltage.

2. Fixed frequency simulation

This option enables you to simulate the square wave signal of pulse frequency of 0.1 ~ 15 kHz, amplitude range of -5V ~ +5 V and duty cycle 10% ~ 90%.

In Fig. 7-2, tap “Fixed frequency simulation” to enter a screen similar to the following figure.

Fig. 7-3

Tap the setting option tab, then tap “+” or “-” to adjust the output,After setting, tap ▶ to perform the test.

3. Predefined waveform simulation

Maximus 3.0 provides some common sensor waveforms which have been predefined to facilitate users to simulate sensor signals. As long as you call out the predefined waveform, then tap ▶ to start simulating output of corresponding sensor waveform and no more parameter settings of simulation waveform are required.

In Fig. 7-2, tap “Predefined waveform simulation” to enter the following screen.

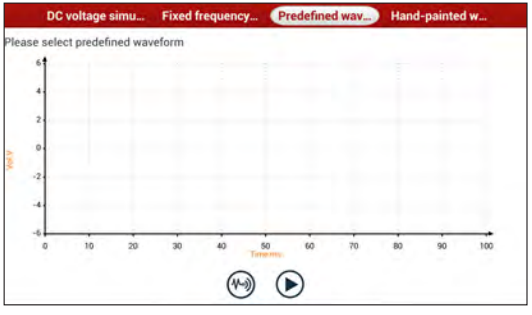


Fig. 7-4

Here, tap button, a screen similar to the following figure will appear.

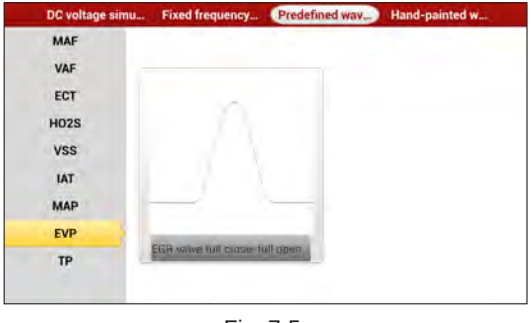


Fig. 7-5

In above figure, the left setting column stands for sensor types and the right area displays waveform. The sensor types are explained as below:

ECT: Coolant Temperature Sensor

EVP: EGR Valve Position Sensor

HO2S: Heated Oxygen Sensor
IAT: Intake Air Temperature Sensor
MAF: Mass Air Flow Sensor
MAP: Manifold Absolute Pressure Sensor
TP: Throttle Position Sensor
VAF: Volume Air Flow Sensor
VSS: Vehicle Speed Sensor

For example, tap “ECT” – “Warm (NTC Thermistor)”, the right screen will display the waveform of the sensor.

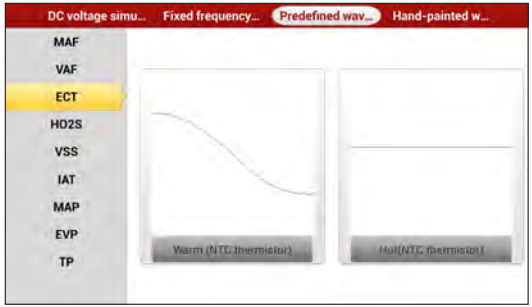


Fig. 7-6

Tap the waveform, then the pre-defined waveform has been set.

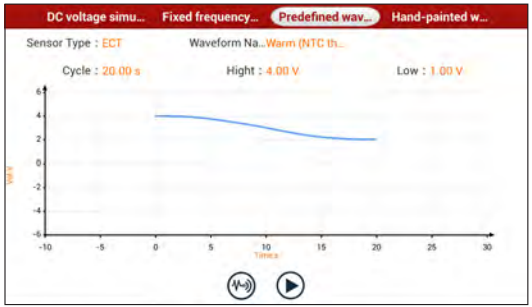


Fig. 7-7

Tap ▶ button to perform simulation test.

4. Hand-painted waveform simulation

This option offers great convenience for users to simulate special waveform or fault wave. Users only draw the shape of waveform which needs to be simulated in central drawing area, and then configure some parameters on the top, namely high level, low level, and cycle of waveform, then tap ▶, Maximus 3.0 will output a waveform as desired.

⚠Warning: Just draw a complete periodic waveform (when it is outputted, the system will regard the waveform in the drawing area as a periodic one). Users should draw as large as wave in drawing zone so that the system can sample more points to reduce tolerance. While drawing, just pay attention to the shape of waveform, high level, low level and period can be ignored, which can be set in the Configure option.

In Fig. 7-2, tap “Hand-painted waveform simulation”, a screen similar to the following figure will appear.

Fig. 7-8

Button descriptions:

[]: Save the current waveform.

[]: Loads the previously saved hand-drawn waveform.

[]: Clear all hand-drawn waveform.

[]: Tap to call out the predefined waveform for reference.

[]: Continues the following operation.

7.1.3.3 Precautions on checking vehicle sensor

- Hold the connector when plugging or unplugging it. Do not pull the cable for unplugging.
- At first check the fuse, fusible line and terminals. Then check others after eliminating these faults.
- When measuring voltage, the ignition switch should be on and the battery voltage should not be less than 11V.
- When measuring voltage, please shake the lead lightly in the vertical and horizontal direction for more precision.
- When checking whether there is open in the line, disconnect the CEU and the relevant sensor at first, then measure the resistance among the ports of sensor in order to determine whether open-circuit / contact fault exists or not.
- When checking if there is a short in the line, please disconnect the CEU and the relevant sensor, then measure the resistance value of the ports between the connected port and the vehicle body. If the resistance value is more than 1MΩ, no fault occurs.
- Before disassembling the engine electrical control system cable, cut off the power supply, that is, turn the ignition switch OFF and disconnect the cables on the battery poles.
- Contact the test probe and the two terminals/ the two leads to be measured when measuring the voltage between the two terminals or the two leads.
- Contact the red test probe to the terminal/ the cable to be measured, and the black probe to the ground when measuring voltage of one terminal/ one cable.
- When checking the continuity of the terminals, contacts and leads, the method for measuring their resistances can be used.
- Check the faults in the terminals of the CEU to sensors, relays, etc.
- There are two test probes in the testing wire. The black one is the common signal terminal (signal GND); the red one is the input terminal for voltage, resistance, and frequency test and output terminal for simulation voltage, simulation frequency and oxygen sensor. Please choose the correct probes to match the different terminals.

7.1.4 Multimeter

7.1.4.1 Operations

Make sure Maximus 3.0 main unit and the sensorbox are properly connected, power on Maximus 3.0 and enter the Applications menu interface, tap “Multimeter” to display the test menu.

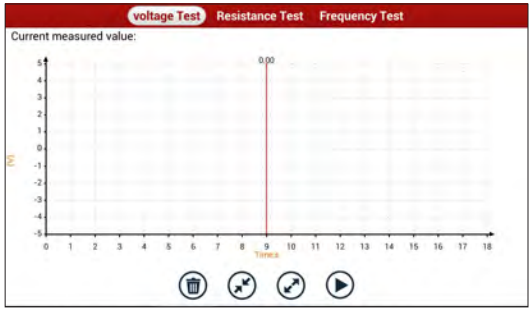


Fig. 7-9

Click the desired test as shown above to perform related test.

The operation method on **Resistance test** and **Frequency test** is identical to that of Voltage test. Here just take Voltage test as an example for demonstration.

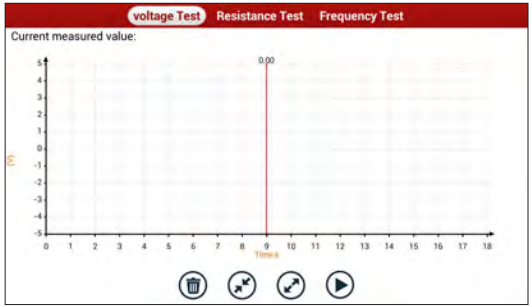


Fig. 7-10

The following operations can be done:

[🗑]: Erases the currently displayed waveform and display it starting from the left.

[⤡]: Reduces the range and zoom in the waveform.

[⤢]: Increase the range and zoom out the waveform.

[▶]: Starts or stops the testing process.

7.1.4.2 Test sample

Knock sensor testing

(1) Resistance test for knock sensor

Switch ignition “OFF”, unplug the wire connector of knock sensor, test the resistance between the wire terminal and the case of knock sensor with “Resistance test” function, it shall be ∞(disconnected), and if it is 0Ω(conductive), which means the knock sensor shall be replaced. For the magnetostriction knock sensor, it can also test the resistance by the “Resistance measurement” function; the resistance shall be compliant with the specified value (see specific service manual for the detailed data), otherwise, the knock sensor shall be replaced.

(2) Checking for the output signal of knock sensor

Unplug the wire connector of knock sensor, check voltage between knock sensor connector terminal and ground wire of knock, it should be output pulse voltage; otherwise, the knock sensor shall be replaced.

Coolant temperature sensor testing

(1) Resistance test for coolant temperature sensor

On vehicle testing:

Switch ignition “OFF” and unplug the wire connector of coolant temperature sensor, then use the “Resistance measurement” to test the Resistance between two terminals of sensor. The relationship between the resistance and the temperature is in inversely proportion (negative temperature coefficient), which shall be less than 1kΩ during warming up.

Independent testing:

Unplug the wire connector of coolant temperature sensor, then remove the sensor from the engine; place the sensor into a breaker with water and heat the water, then use the “Resistance measurement” to test the Resistance between two terminals of coolant temperature sensor at different water temperature. Compared the measured value with the standard value, if the Resistance is not compliant with the standard, then the coolant temperature sensor shall be replaced.

(2) Output signal voltage testing for coolant temperature sensor

After installing the coolant temperature sensor, plug the wire connector of sensor, and then switch ignition ON, test the output signal voltage between the two terminals of wire connector. The tested voltage shall be in inverse proportional with the coolant temperature. When the harness of coolant temperature sensor is disconnected, the voltage shall be about 5V if the ignition switch is ON.

7.2 Batterybox (Optional)

7.2.1 Product Summary

Maximus 3.0 provides an optional function of automotive battery test, which adopts the latest state-of-the-art conductance testing technology in the world and can test vehicle’s battery status. Two testing environments (Inside the Vehicle and Outside the Vehicle) are available and applicable to battery test. In addition to battery test, charging system and actuation system test can be done while Inside the Vehicle is selected.

It supports various battery standards and specifications, including CCA, DIN, IEC, EN, JIS, SAE and GB etc. It is specifically designed to help car owner, repair workshop, battery factory use battery test instrument properly and determine whether the battery is normal or not.

Battery test aims to check starting plumbic acid storage batteries for vehicles, ship, boats and aviations, etc. It can test all kinds of batteries complying with CCA, DIN, JIS, EN, GB and SA standards. For detailed test standards, see the following table.

Standards	Standard (Full name)	Test capacity range
CCA	Battery Council International	100～1700
DIN	Deutsche Industry Normen	100～1200
JIS	Japanese Industry Standard	26A17～245H52
EN	Europe Norm	100～1700
IEC	National Electrical Commission	100～1200
GB	Chinese National Standard	100～1200

SAE	Society of Automotive Engineers	100～1700

7.2.2 Test Environment

7.2.2.1 Test environment

Inside the vehicle test indicates that the battery connects to loading devices, such as engine, etc. After doing battery test, it can perform charging system and actuation system test, which is proceeded as a whole simultaneously. Charging system and actuation system test is not required but must not be performed before battery test. Because it is difficult for vehicle technicians to judge where is faulty exactly if they have the faintest idea of battery's status itself.

Outside the vehicle test indicates that the battery is disconnected from all loading devices on vehicles. Therefore, only battery test is supported in this condition.

7.2.2.2 Battery status and description

There are mainly 5 states as follows:

No.	States	Descriptions
1	Good battery	Indicates battery is normal.
2	Replace battery	Indicates that battery is aged or becomes rejected, or battery life cycle approaches to be exhausted. In this case, battery voltage appears to be normal, but battery itself is not well, i.e. battery polarity board has been completely vulcanized or aged. Please replace battery immediately.
3	Good-recharge	Stands for low battery. The battery is good itself.
4	Charge-retest	It is better for a few batteries to be fully charged before testing in order to avoid judging in error under special conditions.
5	Bad cell	Indicates one of the battery cells is bad and can not work normally, but for which one is bad, it can't be verified. In this case, battery voltage is generally lower than 11V, mainly resulting from internal circuitry damage, such as short circuit, open circuit, dummy weld etc.

7.2.3 Batterybox Structure and Test Accessories

7.2.3.1 Batterybox structure

Fig.7-11 Batterybox structure diagram

1. Battery connector: Connect to battery for battery test.
2. Type B terminal: Connect to the Maximus 3.0 tablet with data cable.

7.2.3.2 Test accessories

Fig. 7-12 Kelvin clip

Fig. 7-13 A/B cable

7.2.4 Connections & Operations

7.2.4.1 Connection

Connect one end of the A/B cable to the Type B terminal of the batterybox, and then connect the other end to the Data transmission port of Maximus 3.0 tablet. This connection applies to outside the vehicle test and inside the vehicle.

*Notes:

1. Wait about 10s and begin to communicate since the batterybox needs to initialize after connection is complete, otherwise, communication may fail.
2. Red lamp on the batterybox means it has been successfully powered up. If the green light is always on, it indicates the clip is well connected; while the green light blinks, it indicates that the clip has poor contact. Do not perform any test until the clip and A/B cable are properly connected.

7.2.4.2 Inside the vehicle test

Battery test and charging system & actuation system test can be done in this mode.

1. Battery test

Enter the battery test main menu screen, and select a desired test environment.

Fig. 7-14

*Note: The sequences of inside the vehicle and outside the vehicle test are almost the same, but under inside the vehicle condition, all loads in vehicles must be powered off for getting an exact test value.

1. Firstly, the system detects whether floating electricity exists or not before testing. If yes, turn on the headlamp to remove it. Otherwise, the system starts test program directly.
2. Tap [Inside the vehicle], the system starts detecting floating electricity automatically. If floating electricity is detected, it will prompt you to turn on the headlamp.
3. Follow the on-screen instructions to turn on headlamp, the system starts removing floating electricity.
4. Once the floating electricity is removed, a prompt message box “The floating electricity has been removed, please turn off the headlamp to continue the testing” will appear on the screen.
5. Follow the on-screen instructions to turn off the headlamp and

tap [OK], the system will continue the testing. Tap ⊖, it will enter testing standard selection screen.

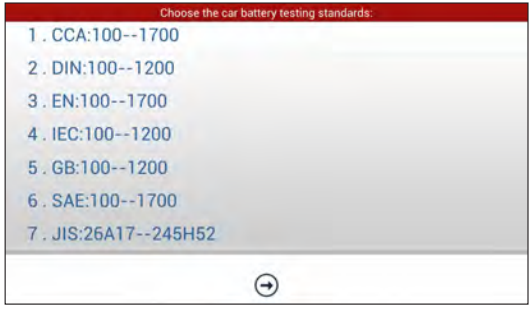


Fig. 7-15

6. Select a testing standard except for JIS and tap ⊖ to enter the following figure. Users can adjust capacity size by tapping on < or > or by dragging the slider on the bar.

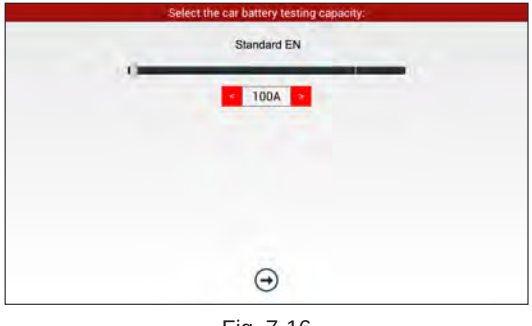


Fig. 7-16

<u>If JIS is selected</u>, tap ⊖, the system will enter Select testing capacity screen. Users can select corresponding standard capacity value according to battery model marked on battery.

7. Tap ⊖ and the testing result will appear on the following screen.

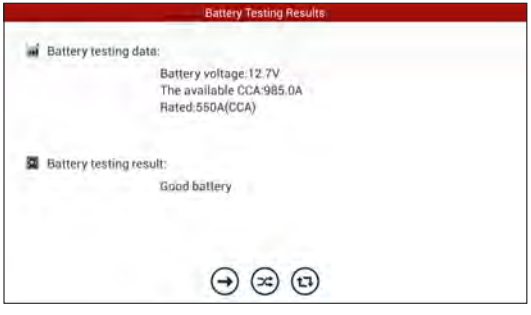


Fig. 7-17

[⊖]: Tap it to perform the charging system and starting system test.

[⊗]: Tap to test it again.

[⊡]: Tap it to reset the test.

<u>2. Charging system and starting system test</u>

While performing this test, the battery's charging voltage value and starting voltage can be obtained in case of engine starting and accelerating. Based on the data, the system will judge whether battery's charging and actuation status is normal or not.

Tap ⊖ in Fig. 7-17, a dialog box will pop up.

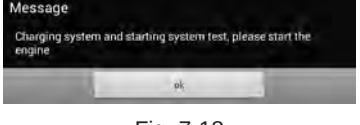


Fig. 7-18

After detecting engine starting, follow the instructions on the screen to increase the speed.

The system begins to receive test data information after acceleration was detected.

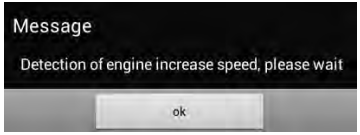


Fig. 7-19

Tap [OK], test data will be shown on the screen.

*Note: It is unnecessary to perform charging system and start system test after finishing battery test, but battery test must be done before undergoing charging system and starting system test.

7.2.4.3 Outside the vehicle test

It only applies to battery test and detecting floating electricity will be ignored while performing battery test.

In Fig. 7-14, tap [Outside the vehicle] to select battery test standard. The following operation steps are identical to Steps 6 ~ 7 in Chapter 7.2.4.2 Battery test. Please refer to it for details.

7.2.5 Precautions on battery test

For the purpose of getting accurate test results, unless otherwise special required, all loads need to be power off such as headlamp, engine etc. before testing battery.

The operating time required for charging system and actuation system test varies from person to person. If the engine does not start or accelerate within 30 seconds, the system will prompt you “receiving timeout” and return to the initial status.

Whether Engine is off or not has no influence on charging and actuation test result after increased speed is detected, but other loads need to be powered off.

The accuracy of battery voltage, charging voltage, start voltage is 0.01V in test results; CCA (Cold Cranking Amps) precision is 5CCA.

Generally, charging voltage value is greater than starting voltage.

Charging voltage range is as follows: 13.8--14.5V for domestic vehicle; 13.3--15.5V for imported vehicles. The voltage varies with different car models, so you have to judge based on related vehicle models. In general, the DC voltage is stable, but it also varies with different revolution speed.

Starting voltage range: The value higher than 9.6V is regular, otherwise it is too low. Due to different situations, whether the starting voltage is higher or not does not mean the vehicles or batteries are faulty. For detailed faults, other special equipments are needed. To validate the accuracy of the value, the best method is to collect the signals of starting and charging voltage and observe it on an oscillometer.

Generally, the voltage is lower than 11V for the bad cell battery, but it is possible that the battery is completely exhausted or has a serious low capacity. In this case, just recharge your battery. Bad cell always happens when the loads on a stopping vehicle are turned on for a long time.

Please note that it is normal for quick detecting of “Increase speed” because it follows the theory of detecting “Increase speed”: If the detected voltage is higher than the previous battery test voltage, the system will prompt you a message of “Engine has been speeded”

It has no influence on test result in the event that engine’s output voltage or engine revolution is not very stable. No matter whether the vehicle is accelerated or not, the output voltage only differs within 0.2V.

While doing inside the vehicle test, Kelvin clip is always found to be in poor contact. To remain it in good contact, please shake it several

times before testing. Take down the battery connector, and test it again, the value probably varies. The deviation may arise from battery connector.

Pay more attention to connect the clip. The battery poles connect with conductor, which makes the clip has a poor connection when testing battery. A tolerance of dozens of CCA occurs if the clip is out of position, or oil, dust attaches on the pole. The gear and main body of clip should be fully matched with battery poles.

*Notes:

1. Battery poles inside the vehicle are enveloped by connectors, which may produce some errors for test results. The tolerance results from the resistance of connectors. The greater the resistance value is, the greater the tolerance becomes. But generally, the tolerance does not affect the test conclusion.
2. Testing the battery separately generates an exact test result. The battery box is a very useful auxiliary tool for quick test. If any problems were found, test it separately for getting an exact test result.

7.3 Oscilloscope (Optional)

7.3.1 Introduction

The Scopebox is an optional add-on module of Maximus 3.0, including automotive oscilloscope and automotive ignition waveform.

Automotive oscilloscope can make the auto repair technician quickly judge the faults on automotive electronic equipment and wiring, and the oscilloscope sweep speed is far greater than the signal frequency of such vehicles, usually 5-10 times of the measured signal. The automotive oscilloscope not only can quickly acquire the circuit signal, but also can slowly display the waveform to observe and analyze. It can also record and store the tested signal waveform which can be recalled to observe for the fast signal, having great convenience to failure analysis. Either high-speed signal (e.g.: Injection nozzle, intermittent fault signal) or the slow-speed signal (e.g. the throttle position change and the oxygen sensor signal) can be observed through automotive oscilloscope in an appropriate waveform.

The electronic signal can be compared and judged via measuring five parameters indexes. The five parameters are the amplitude (the maximum voltage of signal), the frequency (the cycle time of signal), the shape (the appearance of signal), the pulse width (the duty cycle or the time range of signal), and the array (the repetition characteristic of signal), which can be tested, displayed, saved by the automotive oscilloscope. Via the waveform analysis can further detect the circuit fault on sensors, actuators, circuits, and electronic control units, etc.

7.3.2 Structure & Accessories

7.3.2.1 Scopebox structure

Fig. 7-20 Scopebox Structure Diagram

Below describes the ports and indicators for the Scopebox.

No.	Name	Descriptions
1	Fixed signal generator	Generate a square signal with fixed 1K frequency.
2	CH1	Channel 1
3	CH3	Channel 2
4	CH3	Channel 3
5	CH4	Channel 4
6	External trigger	External trigger signal
7	B-shaped USB interface	Connect main unit via USB cable as a separate individual USB devices.
8	Power interface	Connect to power supply via the power adapter.
9	Communication indicator	It blinks in process of data communication.
10	Running indicator	It remains steady green after the Scopebox is running.
11	Power indicator	It keeps steady red after the Scopebox is powered on.

7.3.2.2 Scopebox accessories

The Scopebox includes the secondary pickup cable for 4-channel oscilloscope, crocodile clips for 4-channel oscilloscope, etc. See the packing list attached to the product for the detailed accessories.

No.	Name	Picture
1	Secondary ignition pickup for 4-channel oscilloscope	
2	Crocodile clips for 4-channel oscilloscope	

3	Direct ignition extension cable	
4	6-way universal guide line for 4-channel oscilloscope	
5	BNC to 4mm connector test cable	
6	Pin connector suite for 4-channel oscilloscope	

7.3.3 Connection & Initial Use

7.3.3.1 Connection

The Scopebox should work with the Maximus 3.0 tablet.

1. Firstly, power on the Maximus 3.0 handset.
2. Connect one end of the data cable to the B-shaped terminal of the Scopebox, and then connect the other end to the Data transmission port of Maximus 3.0 handset.
3. Then plug one end of ground cable of the Scopebox into external trigger channel (GND), and the other end should be grounded.
4. Connect one end of probe cable to the CH1, CH2, CH3, or CH4 on the Scopebox, and the other end to related signal terminal.

Warning: Please use the specific capacitance probe when diagnosing the ignition high voltage line. Never connect the Scopebox to the ignition secondary circuit directly.

7.3.3.2 Initial interface introduction

Below displays the initial interface of the Scopebox.

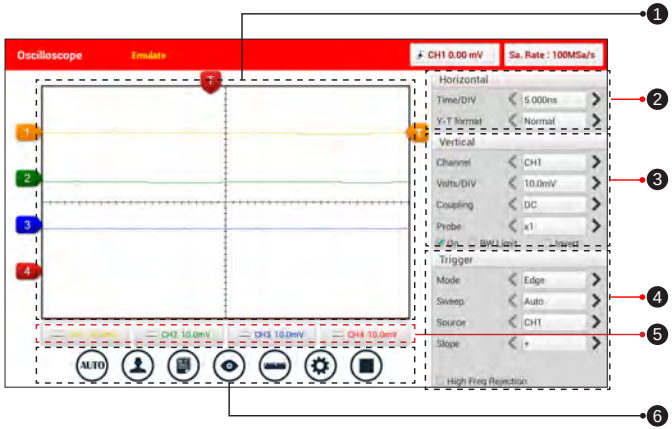


Fig. 7-21

1	Signal display area
2	Horizontal Settings: Controls the time base.
3	Vertical Settings: Controls the amplitude of the displayed signal.
4	Trigger Settings: Controls the start event of the sweep.
5	Channel Selection Button

6	Function Menu [Auto]: It indicates auto trigger setting. [Ref]: There are expert reference and base reference available. Expert reference enables you to recall your customized expert database, whereas base reference provides automatic pre-setting function of specialized sensors. [File]: Provides save snapshot, snapshot manager, waveform record and waveform replay. [View]: Calibration and display settings are available. [Measure]: Includes signal source measurement, horizontal measurement, vertical measurement and clear measurement. [Settings]: Shows/hides the parameter settings area including horizontal settings, vertical settings and trigger settings. / [Start/Stop]: Starts/stops collecting waveforms.

7.3.4 Operations

7.3.4.1 Channel selection and attributes setting

<1> Channel selection

There are two ways available for channel selection:

A. Select from the channel tab shown at the bottom of the waveform display area

B. Select from Vertical settings

*Note: For better comparison and identification, each channel and waveform are marked in different colors.

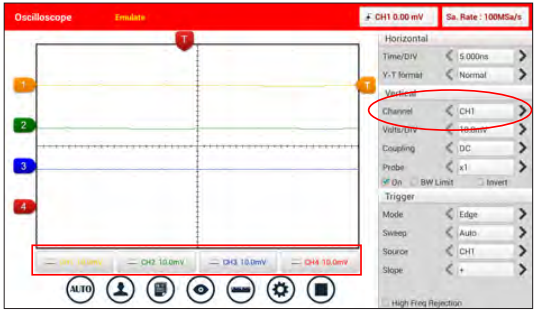


Fig. 7-22

<2> Channel attributes & trigger setting

Channel attributes can be set via horizontal settings and vertical settings.

Horizontal Settings

User can make some settings directly by tapping < or > next to options.

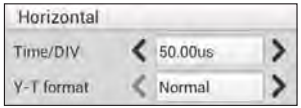


Fig. 7-23

Time/DIV: Horizontal scale. If the waveform acquisition is stopped (using the / button), the Time/DIV selector expands or compresses the waveform.

Y-T format: The conventional oscilloscope display format. It shows the voltage of a waveform record (on the vertical axis) as it varies over time (on the horizontal axis).

Vertical Settings

The trigger determines when the Scopebox starts to acquire data and display a waveform. When a trigger is set up properly, it can convert unstable displays or blank screens into meaningful waveforms.

When the Scopebox starts to acquire a waveform, it collects enough data so that it can draw the waveform to the left of the trigger point. The Scopebox continues to acquire data while waiting for the trigger condition to occur. After it detects a trigger, the Scopebox continues to acquire enough data so that it can draw the waveform to the right of the trigger point.

User can make some settings directly by tapping < or > next to options.

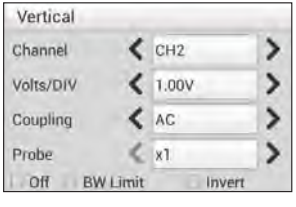


Fig. 7-24

Channel: To select the channel source.

Volts/DIV: It is defined as “Volts/Division” and mainly used to change the resolution.

Coupling: Trigger coupling determines what part of the signal passes to the trigger circuit. AC, DC and Ground are included:

- AC: Blocks the DC component of the input signal.
- DC: Passes both AC and DC components of the input signal.
- Ground: Disconnects the input signal.

Probe: When using a probe, the Scopebox allows you to select the attenuation factor for the probe. The attenuation factor changes the vertical scaling of the Scopebox so that the measurement results reflect the actual voltage levels at the probe tip.

BW Limit

- ON: Limits the channel bandwidth to 20MHz to reduce display noise.
- OFF: Get full bandwidth.

Invert

- ON: Turn on the invert function.
- OFF: Restore to the original display of the waveform.

Trigger setting

Trigger indicates that when certain waveform meets the conditions that are predefined according to the requirements, the Scopebox acquires the waveform and its adjacent section, and then presents it on the screen.

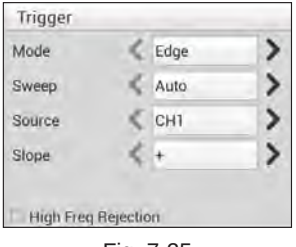


Fig. 7-25

1) If **Edge** trigger is selected (An edge trigger determines whether the Scopebox finds the trigger point on the rising or the falling edge of a signal.):

Sweep: The sweep mode determines how the Scopebox behaves in the absence of a trigger event. The Scopebox provides three trigger modes: Auto, Normal, and Single.

- Auto: It allows the Scopebox to acquire waveforms even when it does not detect a trigger condition. If no trigger condition occurs while the Scopebox is waiting for a specific period, it will force itself to trigger.

  When forcing invalid triggers, the Scopebox can not synchronize the waveform, and then waveform seems to roll across the display. If valid triggers occur, the display becomes stable on the screen.
- Normal: This mode allows the Scopebox to acquire a waveform only when it is triggered. If no trigger occurs, the Scopebox keeps waiting, and the previous waveform, if any, will remain on the display.
- Single: In this mode, it only acquires the waveform that generates for the first time the trigger conditions are met, and then stops after finishing capture.

Source: Select which channel as trigger signal.

Slope:

- + : Trigger on rising edge
- - : Trigger on falling edge

High Freq Rejection: Reject high frequency signals when selected.

2) If **Pulse Width** trigger is selected (Pulse trigger occurs according to the width of pulse. The abnormal signals can be detected through setting up the pulse width condition):

Sweep: The sweep mode determines how the Scopebox behaves in the absence of a trigger event. The Scopebox provides three trigger modes: Auto, Normal, and Single.

- Auto: It allows the Scopebox to acquire waveforms even when it does not detect a trigger condition. If no trigger condition occurs while the Scopebox is waiting for a specific period, it will force itself to trigger.

  When forcing invalid triggers, the Scopebox can not synchronize the waveform, and then waveform seems to roll across the display. If valid triggers occur, the display becomes stable on the screen.
- Normal: This mode allows the Scopebox to acquire a waveform only when it is triggered. If no trigger occurs, the Scopebox keeps waiting, and the previous waveform, if any, will remain on the display.
- Single: In this mode, it only acquires the waveform that generates for the first time the trigger conditions are met, and then stops after finishing capture.

Source: Select which channel as trigger signal.

Condition: To select pulse condition.

Pulse Width: Set required pulse width.

High Freq Rejection: Reject high frequency signals when selected.

7.3.4.2 Auto

The Scopebox has an Auto feature that sets up the Scopebox automatically to display the input signal in a best fit.

Tap AUTO, the Scopebox may change the current settings to display the signal. It automatically adjusts the vertical and horizontal scaling, as well as the trigger coupling, position, slope, level and mode settings.

7.3.4.3 View Settings

<1> Calibration

This option adjusts the Scopebox's internal circuitry to get the best accuracy. Use this function to calibrate the Scopebox's vertical and horizontal systems.

Tap and then tap [Calibration], a dialog box similar to Fig. 7-26 will appear.

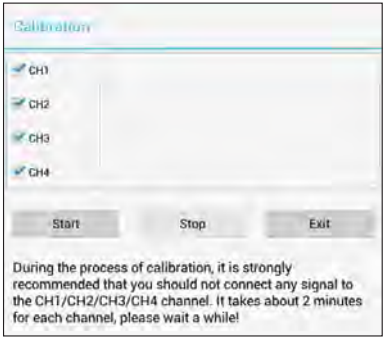


Fig. 7-26

Check the box before the channel to select it. To deselect it, just uncheck it. After choosing the desired channel(s), tap [Start] to start calibration and [Start] button will be temporarily invalid during calibrating. Tap [Stop] to stop calibrating. Once it becomes active, it indicates calibration has completed.

*Note: In process of calibration, make sure CH1/CH2/CH3/CH4 has no signal input. Moreover, calibration may take several minutes and please be patient to wait.

<2> REF settings

Reference waveforms are saved waveforms to be selected for display. The reference function will be available after saving the selected waveform to non-volatile memory.

Tap and then [REF] to enter the REF setting screen.

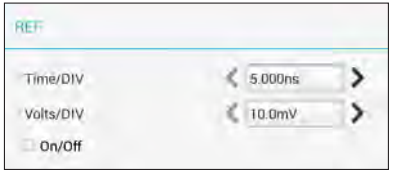


Fig. 7-27

Tap < or > to select the desired reference value for time/DIV and volts/DIV. To show or hide the REF, just check/uncheck the box before On/Off.

<3> Display settings

Tap and then [Display settings] to enter the setting screen.

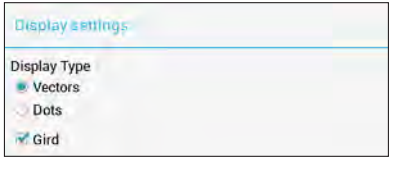


Fig. 7-28

Select “Vectors” or “Dots” to display waveforms as vectors or dots. Check / uncheck the box before Grid to turn on/off grid display.

7.3.4.4 Measure

<1> Channel source

Tap and then [Source], a screen similar to the following will appear.

Fig. 7-29

<2> Horizontal / Vertical measure

Horizontal Measure / Vertical Measure are used to measure voltage parameter and time parameter respectively. Drag A line upwards or downwards to control voltage. Move A line left or right to fine-tune timebase. A line is a solid line and B line is a dotted line.

Tap and then [Horizontal Measure], a screen similar to the following will appear.

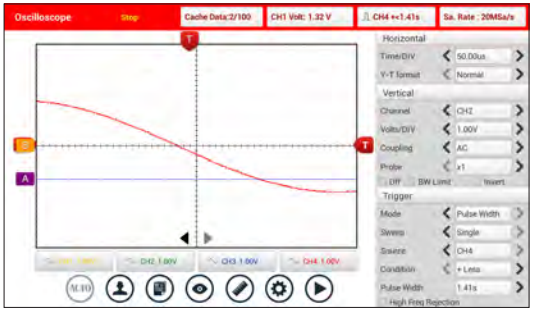


Fig. 7-30

* Note: If no desired channel is selected, the system will take the current source as the default channel.

<3> Clear measure

Tap and then [Clear Measure], the system will clear the measurement result on screen.

7.3.4.5 File management

<1> Save snapshot

While viewing sampling data, tap and then [Save Snapshot] to store the current screen.

<2> Snapshot manager

While viewing sampling data, tap and then [Snapshot Manager] to enter. View, delete and edit operations are supported.

<3> Record waveform

This function is used to record input waveforms that are acquired by the Scopebox at a specific period, and save it as waveform file which can be recalled in future.

It can be performed only when the Scopebox is collecting data in Normal mode.

Tap , then select [Record] from the pop-up menu to start recording.

Fig. 7-31

Tap [Start] to start recording with a minimum record length of 10 frames, and [Stop] to stop recording. While recording, the recorded pages will be shown on the screen.

<4> Load waveform for playback

The Import function enables you to import the stored waveform file for playback and review. During replaying, the Scopebox stops collecting data automatically.

Tap , then select [Waveform replay] from the pop-up menu to enter:

Fig. 7-32

Select the file first, and then tap to open the waveform file. Tap to starting the playback and tap to stop it.

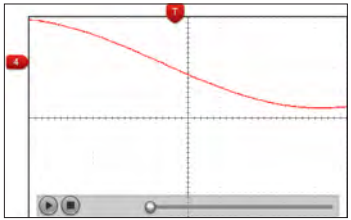


Fig. 7-33

To delete the waveform file, tap .

Tap to return to the previous screen.

7.3.4.6 Expert reference

<1> Expert Reference

By default, it appears blank. As a matter of fact, Expert reference database is generated by doing the following:

1. Open and edit a snapshot;
2. Select “Joint the expert database” (refer to the following illustration), and then tap to save the waveform being displayed on the screen as REF.

Fig. 7-34

Tap and then [Expert Reference] to enter, the following operation can be done:

: To load and recall the selected file.

: To delete the selected file.

: To edit the selected file.

<2> Base Reference

Preset waveforms of some sensors are available for your reference.

Fig. 7-35

7.4 Ignition (Optional)

The ignition system is the system which has greatest impact on the performances of gasoline engine, as the statistical data shows that nearly half of the failures are caused by poor work of electrical system. And the performance tests of engine often start from the ignition system. Nowadays ignition system includes distributor and distributorless. Distributorless includes independent ignition and simultaneous ignition.

1. Distributor ignition system i.e. contact breaker with contact-controlled ignition system (commonly known as the platinum) and contact breaker with noncontact-controlled ignition system combined with magnet, hall components or infrared.
2. Independent ignition system: crankshaft sensor send out the ignition timing signal and cylinder identification signal so that the ignition system can send out ignition signal to specified cylinder in specified time, each cylinder has its independent ignition coil.
3. Simultaneous ignition system: two cylinders share one ignition coil, when two cylinder pistons reach top dead center at the same time (one is compression, another is the exhaust), two spark plugs will be ignited at the same time, at this time, the ignition for the former cylinder is in high-pressure low temperature gas mixture, the ignition is valid, while for the latter one is in low-pressure high temperature exhaust gas, the ignition is invalid.

Maximus 3.0 can test and analyze the secondary signal for various engine ignition systems.

The Ignition module utilizes the same hardware device as the Scope module.

7.4.1 Secondary-distributor ignition analysis

Connections: Plug the BNC end of secondary ignition pickup into CH1/

CH2/CH3/CH4 channel of Scopebox, then connect the high-voltage clip to high-voltage line, and crocodile clips to ground.

*Tips: Common ignition sequence (the specific sequence is subject to the actual engine ignition sequence)

Four-stroke in-line four-cylinder: 1-2-4-3, or 1-3-4-2

Four-stroke in-line six-cylinder: 1-5-3-6-2-4, or 1-4-2-6-3-5

Four-stroke in-line eight-cylinder: 1-8-4-3-6-5-7-2

Five-cylinder: 1-2-4-5-3

V 6 engine: generally speaking, based on the person sitting on the driver cab, if the right side cylinder numbers on the right side, from the front to the back are as follows: 1, 3, 5; and the cylinder numbers on the left side, from the front to the back are as follows: 2, 4, 6; then the ignition sequence is: 1-4-5-2-3-6. If the cylinder numbers on the right side, from the front to the back are as follows: 2, 4, 6; and cylinder numbers on the left side, from the front to the back are as follows: 1, 3, 5; then the ignition sequence is: 1-6-5-4-3-2.

Figure 7-36 below shows the normal ignition waveform of distributor ignition system, the upper one is the secondary waveform, and the lower one is the primary waveform.

The secondary waveform

A section is contact open period; B section is make contact period, which is the magnetizing field of ignition coil.

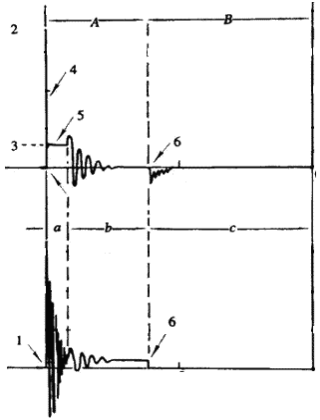


Fig. 7-36

1) Contact break point: the primary circuit of ignition coil cut off, the secondary voltage was sensed and increased sharply
2) Ignition voltage: secondary coil voltage overcome the damper of high voltage line, the contact breaker gap and the spark plug gap to release magnetizing energy, 1-2 section is the breakdown voltage
3) Spark voltage: For the capacitor discharge voltage
4) Ignition voltage pulse: For the charge and discharge sections
5) Spark line: The inductance discharge process, i.e. the mutual inductance voltage of ignition coil maintains the conduction of secondary circuit.
6) Contact point close the current flow into primary coil, the primary coil oscillates due to the mutual inductance.

Primary ignition waveform

Section a shows the voltage oscillation on the primary circuit due to

the magnetic induction of spark in the duration;

Section b shows the damped oscillation generated by remaining magnetic field energy after the spark;

Section c shows the make contact magneting period of primary coil.

Seen from the waveform, the amplitudes of breaker contact closed angle, break angle and breakdown voltage and spark voltage are very clear, besides, the spark delay period and two oscillations can also be tested. For the ignition system without faults, compared with the whole cycle, the contact closed angle just 45%-50% (four-cylinder), 63%-70% (six-cylinder), or 64%-71% (eight-cyliner); the breakdown voltage is over 15kv; the spark voltage is about 9kV, the spark period is greater than 0.8ms. If these values or waveform are abnormal, it means there is fault or the system needs to be adjusted.

7.4.2 Secondary-simultaneous ignition analysis

Connections: Plug the BNC end of secondary ignition pickup into CH1/CH2/CH3/CH4 channel of Scopebox, then connect the high-voltage clip to high-voltage line, and crocodile clips to ground.

Connection as shown in figure 7-37:

Fig. 7-37

Fig. 7-38 below shows the valid and invalid ignition waveforms. Under the working status of valid ignition, the breakdown voltage and spark voltage are higher because the cylinder is filled with fresh combustible mixture gas, which has a lower ionization level and vice versa.

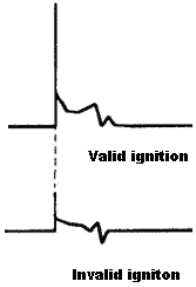


Fig. 7-38

7.4.3 Secondary-direct ignition analysis

Connection:

1) When the high-voltage wire is exposed, plug the BNC end of secondary ignition pickup into CH1/CH2/CH3/CH4 channel of Scopebox, then connect the high-voltage clip to high-voltage line, and crocodile clips to ground.
2) If no high-voltage wire exposes, dismantle ignition coil of tested cylinder and use direct ignition extension cord. Connect one end to ignition coil which should be grounded via direct ignition grounding wire, and insert the other end into cylinder to joint with spark plug. Then plug the BNC end of secondary ignition pickup into CH1/CH2/CH3/CH4 channel of Scopebox, then connect the high-voltage clip to high-voltage line, and crocodile clips to ground.

Connections are shown in Fig. 7-39:

Fig. 7-39

Fig. 7-40 shows the normal secondary (the upper one) and (the lower one) primary ignition waveform of direct ignition system. Beause the on/off of primary circuit is not opening/closing of mechanical contact, but the conduction of transistor. The primary voltage has no obvious oscillations within the duration, but the voltage increases during the magnetization process due to current limiting, and this change can cause corresponding fluctuations of secondary voltage line as a result of induction of ignition coil.

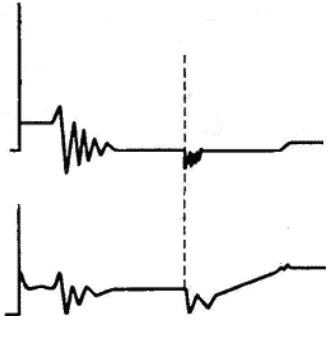


Fig. 7-40

7.4.4 Waveform analysis mode

The ignition secondary single-cylinder waveform test is mainly used to:

a. Analyze the ignition dwell angle of single cylinder.(ignition coil charging time)
b. Analyze the capability of ignition coil and secondary high tension circuit (from ignition line to ignition voltage line).
c. Find the improper mixture A/F ratio of single cylinder (from combustion line).
d. Analyze the capability of capacitance (platinum or ignition system).
e. Find the spark plug that causes misfire of the cylinder (from combustion line).

This test can provide very meaningful information about the combustion quality for each cylinder. If necessary, this test can also be performed during driving. Since the secondary ignition waveform is significantly affected by different engines, fuel systems and ignition conditions, it is useful for detecting the faults of engine mechanical parts, fuel system components, and ignition system components. Different parts of the waveform can specify that some components and systems on the specific cylinder have faults. Refer to the instructions for various parts of waveform for the related component working status of specific waveform section.

Test methods and conditions:

Start the engine or drive the vehicle accroding to the driving performance fault or poor ignition, etc. Confirm the consistence of judgement standard (the amplitude, frequency, shape and pulse width, etc., for each cylinder), check the fault of the waveform for corresponding components.

Waveform results: observe the ignition coil at the beginning of charging, the relative consistent falling edge represents the dwell angle and ignition timing of each cylinder are precise.

Ignition line:

Observe the height consistence of flashover voltage. Too high flashover voltage (even out of the oscilloscope screen) represents a high resistance existed in the ignition secondary circuit (for example, open circuit, or damaged spark plug or high voltage line, or too large time gap on spark plug), while the too short sparking voltage represents the resistance of ignition secondary circuit is lower than normal value (due to pollutant and broken spark plug or the high voltage line of spark plug has electrical leakage, etc.).

Spark or combustion voltage:

Observe the consistence of spark or combustion voltage, as it represents the consistence of spark plug and the air-fuel ratio of each cylinder. In case that the mixing ratio is too lean, the combustion voltage will be lower than normal value.

Combustion line:

Observe the spark or the combustion line which shall be clean with few clutter, as lots of clutter indicates the cylinder has poor ignition due to ignite too early, damaged nozzle, pollutant spark plug, or other reasons. The duration of combustion line indicates the mixing ratio of the cylinder is abnormal lean or rich. Too long combustion line (usually greater than 2ms) represents the mixing ratio is rich, whereas too short of combustion line (usually less than 0.75ms) represents the mixing ratio is lean.

Ignition coil oscillation:

Observe at least two oscillation waveforms after the combustion line, which will be better if more than three oscillation waveforms, as it represents the ignition coil and capacitor (on Platinum or ignition system) are normal.

Primary voltage analysis

According to the faulty primary voltage waveform collected by the ignition analysis, the related components and mechanical equipment status of ignition system electrical circuit can be analyzed, which provides a reliable basis for the adjustment and maintenance of power circuit to avoid the blind demolition.

The waveform shown on Fig. 7-41, appears a lot of clutter on the contact break point, which is obviously caused by the serious erosion on contact break point. It can be verified via burnishing the contact or changing the circuit breaker.

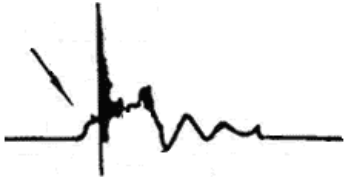


Fig. 7-41

For the primary voltage waveform shown on Fig. 7-42, the damped attenuation cycles obviously reduced on the spark period, the amplitude became lower, which is evidently caused by capacitor leakage.

Fig. 7-42

The waveform on Fig. 7-43 shows the accidental pumping during contact closing period. The irregular beating is caused by insufficient spring force.

Fig. 7-43

The curve on Fig. 7-44 shows the contact angle is too small during the magnetizing period, which is caused by too large contact gap.

Fig. 7-44

A lot of clutter will be displayed on the horizontal section of primary waveform if contact has poor grounding, as shown below figure 7-45.

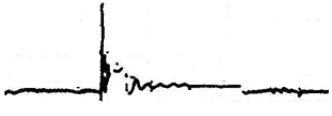
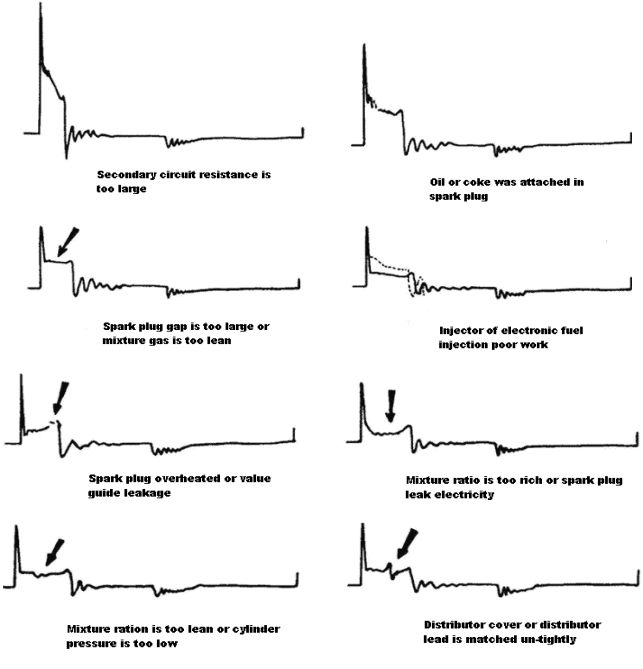


Fig. 7-45

Fig. 7-46 shows the fault of low-voltage waveform in electronic ignition system. The voltage does not rise during magnetizing, which indicates that the effect of limitation of the circuit failed and no components on distributorless ignition system can be adjusted. When this waveform is abnormal, you can only replace the ignition coils, igniter, ignition signal generator and cam position sensor, etc., one by one, to find out the faulty component or module.

Fig. 7-46

The secondary waveform is also affected by the spark plug, the combustion process, mixture gas composition, the engine thermal state of the ignition coil, etc., which is more complicated. The following lists a large number of measured secondary faulty waveform for reference. Since various factors lead to the failures, Fig. 7-47 just shows the major possible factors for the failures.



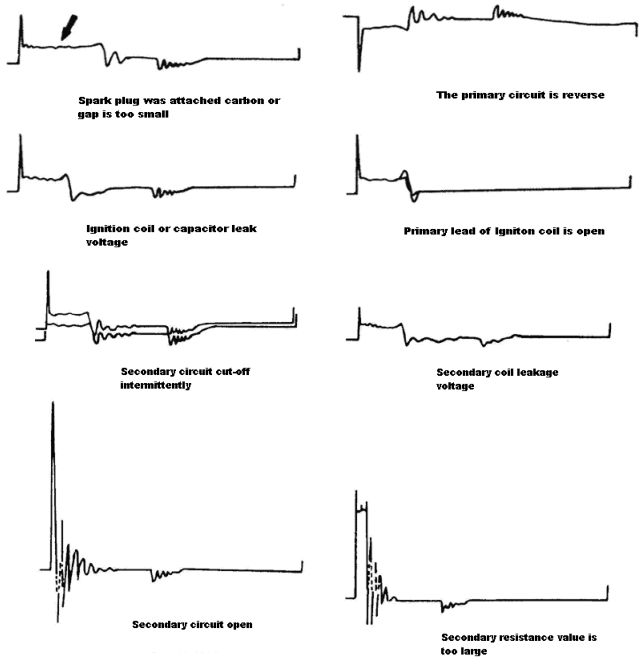


Fig 7-47

7.5 Videoscope (Optional)

7.5.1 Introduction

Automotive videoscope is mainly applied to those unseen parts of engine, fuel tank, braking system.

While testing a vehicle system, engine is one of the main parts to be checked. To check if the internal of a engine is qualified or not or whether internal carbon deposit and damage exists in the engine or not, we can make full use of a videoscope to solve these quesitons.

Maximus 3.0 provides an optional function of videoscope.

The videoscope is mainly composed of an inspection camera, flexible tube and USB cable. The water-resistant camera lens with adjustable LED lights enables you to observe the parts that can not be seen in wet, dark, fluid soaked places. The included flexible tube is convenient for easy inspection and allows for access to hard-to-reach areas.

In addition, the captured pictures and videos also provide you intuitive data for easy analysis.

7.5.2 About Videoscope

Fig. 7-48

1	**Snapshot button:** To take a snapshot of the current view and save it to your LAUNCH diagnostic tool as an image.
2	**Flexible tube:** You can bend the neck to get in to hard-to-reach places and even if it is not straight, it can still give you pictures of what the camera is looking at. (*Note: Do NOT force it too hard while bending the neck into strange shapes.)
3	**Dial for LED light brightness:** There are 4 LED lights in the lens that act like a torch to illuminate dark spots where the camera can not see well. This dial allows you to adjust the light brightness.
4	**Handle**
5	**Camera with 4 adjustable LED lights:** The camera head is water-resistant and is where you can attach the useful optional accessories (magnet, mirror, hook) add-on.
6	**Data cable:** Connect it to the diagnostic tool for viewing what the camera captures.

7.5.3 Technical Parameters

Resolution	640 x 800 pixel (VGA)
Frame Rate	30fps (pictures/sec)
Image Sensor	1/12" CMOS
White Balance	Automatic
Exposure	Automatic
Light Source	4 adjustable LEDs
Power Supply	5V
Ambient temperature	0 to +65°C
Data Cable Length	Approx. 2000mm
Probe & Camera Length	1030mm
Probe Cable Length	830mm
Min. Bending Radius	50mm
Lens Diameter	7.0mm
Probe Tube Diameter	6.0mm
Viewable Angle	60°
Lens Focal Length	More than 50mm

Net Weight	Approx. 270g

7.5.4 Connections & Operations

1. Locate the data transmission port of the Maximus 3.0 handset.
2. Insert the data cable into the data transmission port of port of the Maximus 3.0 handset.
3. Bend the neck of the flexible tube as desired and extend the camera with adjustable LED lights to some unseen or unreachable parts of engine, hydraulic system, nozzles etc.
4. After connections are properly made, press the [**POWER**] button on the Maximus 3.0 handset to turn it on. Wait until the system enters Job menu. Switch to the "Toolbox" module, tap "Applications" -> "Videoscope" to run it, then the screen will display the scene captured from the videoscope camera.
5. Adjust it until the lens stops in the desired place, then use the **dial for LED light brightness** to adjust the brightness.
6. Press the **Snapshot** button on the videoscope to take a photo. Alternatively, you can also press the **Snapshot** button on the Maximus 3.0 handset to take photos.

   To record a video, switch from Camera mode to Video mode and tap **Record** button on the screen to start recording.

Images are captured in .jpg format and videos are recorded in .avi or .mp4 format. All photographings and videos are saved in DCIM folder where users can browse and replay it.

Appendix - FAQ

1. Whether can I use other similar adaptors to charge Maximus 3.0?.

No. Please use the included 5V power adaptor to recharge your Maximus 3.0. We assume no responsibility for damage or loss resulting from using other similar adaptors other than the specified one.

2. How to save power?

- Please turn off the screen while Maximus 3.0 keeps idle.
- Set a shorter standby time.
- Decrease the brightness of the screen.
- If Wi-Fi connection is not required, please turn it off.
- Disable GPS function if GPS service is not in use.

3. What should I do in case I forgot the screen lock?

You can set screen lock as pattern or password. If you forgot the password, please consult your device provider or reset your device.

In light that you often use Maximus 3.0 to diagnose vehicles and it may take you several minutes to do resetting, you are not recommended to define screen lock.

For detailed information on how to restore Maximus 3.0 to factory settings, please refer to Item 4 “How to reset Maximus 3.0 tablet?” described as below.

4. How to reset Maximus 3.0 tablet?

Do the followings to reset Maximus 3.0:

1. Ensure Maximus 3.0 is in OFF mode;
2. Hold and press VOLUME - key and POWER key until Maximus 3.0 enters system recovery mode;
3. Use the VOLUME + / VOLUME - key to move the highlight bar on “**wipe data / factory reset**” and press POWER key to confirm;
4. Press VOLUME + / VOLUME - to select “**yes**” and press POWER key to confirm;
5. Select “**reboot system now**” and press POWER key to restart the system;
6. After resetting is complete, follow the on-screen instructions to finish the system settings.

⚠ Warning: Resetting may cause data loss. Before doing so, please make sure important data has been backed up.

5. How to do if the system runs slowly?

In this case, please do the followings:

> Check all running applications (“Settings” > “Apps” > Swipe the screen from right to left until “RUNNING” tab appears) and stop the unused applications (Tap the desired application, and then tap “Stop”).

> Check all installed applications and remove the unnecessary applications.

If all steps mentioned above are finished and the system still works slowly. Please try to close the system and reboot your Maximus 3.0.

6. How to arrange diagnostic vehicle software icons?

All software icons, by default are organized by the system. Many display rules are available to meet your preference.

To re-organize it, press and hold certain software icon, a option menu pops up on the screen. Choose the display rule and the system will arrange the icon as desired.

If you choose “Pin to the top”, the icon will be displayed on the top of the screen and marked with an orange solid dot.

7. How to distinguish if the software is locked or not?

If the software is locked, tap it to display the latest software summary. In this case, you need to purchase the software to unlock its content.

Once it is unlocked, the software icon will turn into orange. In this case, you need to renew your software subscription.

If you have any questions on the operation of the unit, please contact Matco customer service number: 877-853-3738

Statement:

LAUNCH reserves the rights to make any change to product designs and specifications without notice. The actual object may differ a little from the descriptions in the manual in physical appearance, color and configuration. We have tried our best to make the descriptions and illustrations in the manual as accurate as possible, and defects are inevitable, if you have any question, please contact local dealer or after-sale service center of LAUNCH, LAUNCH does not bear any responsibility arising from misunderstandings.

FCC Statement

15.19

1. This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference.

(2) This device must accept any interference received, including interference that may cause undesired operation.

15.21

Note: The grantee is not responsible for any changes or modifications not expressly approved by the party responsible for compliance. Such modifications could void the user's authority to operate the equipment.

15.105(b)

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help

RF Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance of 20 cm between the radiator and your body.