

CCpilot XM and CrossCore XM

Technical manual



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1. Introduction

CCpilot XM and CrossCore XM family is a PC-based on-board display computer and controller with a rich set of integrated functions. With its powerful Intel Atom CPU with Windows or Linux it is an open platform that facilitates easy implementation of premium user interaction, reliable controls and integrated fleet management.

This technical manual and reference handbook provides important information regarding the hardware and basic usage. For software and operating system specifics please see additional documentation.

1.1. Product models

This documentation is applicable for both CCpilot XM and CrossCore XM. They offer the same level of hardware and interfaces, with the following difference:

- CCpilot XM is the display version, available in several screen sizes.
- CrossCore XM offers the same features and high performance as CCpilot XM but without the display.

CCpilot XM and CrossCore XM is available in two product models, the standard and the CCpilot All-integrated

- The standard model offers integrated functions and interfaces such as CAN, USB, Ethernet, Audio and Video.
- The All-Integrated model provides, in addition to the standard features, wireless interfaces such as GPRS, WLAN and Bluetooth as well as GPS for positioning.

The platform also enables customization of hardware and software. Described herein are the possibilities which can be obtained using above product models, additional features are described in model specific documentation.

1.2. Conventions and definitions

CCpilot XM and CrossCore XM are in most cases identical in functionality and usage. The following definition is used to separate unit specific details. The observe symbol is also used to highlight such difference.

Defines	Use
CCpilot XM	Information that is specific for CCpilot XM
CrossCore XM	Information that is specific for CrossCore XM
XM device	Information that applies to both CCpilot XM and CrossCore XM



The observe symbol is used to highlight information in this document, such as differences between product CCpilot and CrossCore product models.



The A symbol is used to highlight information specific for CCpilot XM All-Integrated.



The exclamation symbol is used to highlight important information.

Text formats used in this document.

Format	Use
<i>Italics</i>	Paths, filenames, definitions.
Bold	Command names and important information

1.3. Identification

On the side of the XM device there is a label containing version and serial numbers which identify your unique computer. Take note of them. During service and other contact with the supplier it is important to be able to provide these numbers.



1.4. Care

- During welding or other service on the machine, all cables to the XM device shall be disconnected.
- Serviced shall only be made by authorised personnel. If the unit is opened by unauthorised personnel, the guarantee will cease to be valid.
- Scratches, or in the worst case damages, to the display occur easily if it comes in contact with a sharp edge or hard material. In order to increase the longevity of the screen, this is naturally something which should be avoided.
- The Flash memory used for storage is durable; however as with all flash memory types the write cycles are limited. Avoid unnecessary writing to the flash memory.
- If the unit becomes too hot it will operate at a limited speed and can also be damaged. Therefore, do not cover the unit by covering it, for example hanging a jacket or other clothes on it.
- Consider traffic safety when CCpilot XM is installed and whenever it is used. CrossControl does not recommend that CCpilot XM or its accessories be used actively by the driver when a risk of injury to people, or damage to property, is present.
- Be advised that the XM device draws power from the vehicle battery. This can result in the inability of the vehicle to start if the on-board computer has been on for a period of time without the vehicle engine running.

1.5. Environment and Environmental Tolerance

The XM device has been designed to cope with tough environmental demands. Strict tests have been conducted on the unit in order to ensure that it fulfils the expectations of a rugged unit. Much work has been performed to choose and design internal components so that they, under all circumstances and in the best possible way, provide you with a dependable and user-friendly working instrument. Within the chapter Specifications, a list of standards can be found according to which XM device has been tested and approved.

The XM device is preferably placed in a way that prevents exposure to water contact. It is also important that it is mounted securely on a stand or the like to inhibit the unit from moving and thereby becoming damaged, damaging the vehicle and/or people during, for example, a traffic accident.

1.6. Cleaning

To ensure proper and reliable functionality over time, the unit shall be wiped cleaned of dirt and dust. Use a suitable light damp rag to clean the unit.



Never use alkaline, alcoholic or other chemicals for cleaning which can damage the unit.

2. Overview



The XM device is a compact, robust and versatile on-board computer. It is equipped with, a large number of connection alternatives such as CAN, COM, Ethernet and USB. CCpilot XM is also equipped with a pressure-sensitive touch screen.

2.1. Front side

On the front face of CCpilot XM there is a touch screen, buttons for switching the unit on/off as well adjusting the screens brightness level, a buzzer, status indicator and a light sensor.



2.2. Rear side

On the rear side of the XM device there are the external connectors, which are described in more detail in the chapter Connectors. There are also mounting holes for fasteners in accordance with VESA 75 on the rear side.



3. Installation

Install the device in such a way that is considered safe and does not expose any unnecessary stress to the unit. In this section, some recommendations are made regarding installation.

A 3.1. Installing the SIM card

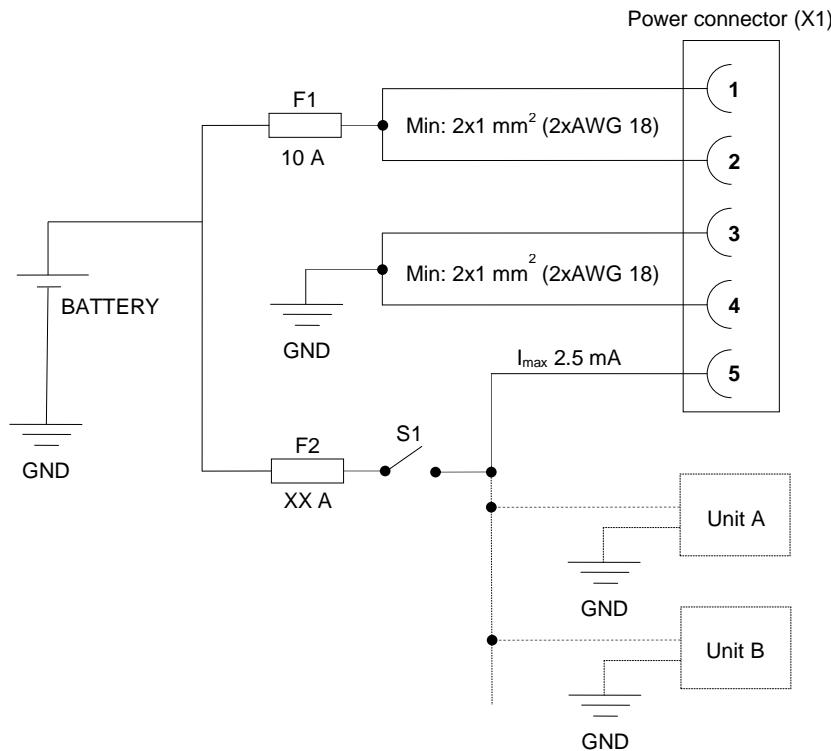
 Installing the SIM card for the GPRS/GSM functionality requires the hatch on the top of the unit to be opened. In such case the following preparations and precautions must be obeyed.

- Make sure all cables are disconnected from the unit's connectors
- Place the unit on a dry, clean and ESD protected area
- Remove the four M3 screws holding the hatch on the top of the unit using a T10 Torx screwdriver.
- Remove the hatch.
- Carefully place the SIM card in the SIM card holder. Make sure it slides all the way in and locks.
- Assembly the unit in reverse order. Tighten the four M3 screws with a torque of 0.9 Nm (0.66 ft-lbs).

3.2. Connecting to power supply

This instruction address vehicle installations but the principle is the same also for other types of installations. See also the description of the pin outs for the Power Supply Connector under the section External interface description.

- Carefully follow the connection instructions below. Make sure that all contacts are angled correctly and that they do not have to be forced, but lock gently and pliant.
- GND (pin 3 and 4) is connected to the vehicle's ground.
- Battery (pin 1 and 2), i.e. the computer's power supply (+24 VDC), should be connected directly to the vehicle's battery through 10 A fuses (F1). Wire gauges shall be dimensioned with respect to cable length, supply voltage etc. Minimum cable area is 2x1 mm² (2xAWG 18).
- The ON/OFF (pin 5), i.e. the computer's on/off signal is connected via the vehicles turnkey signal or an external on/off switch (S1). If the vehicle has a main power switch (S1) the computer shall be connected after it, as in the illustration below. The maximum allowed input current for the on/off signal is 2.5 mA. The fuse F2 fuse rating and wire gauge shall be dimensioned for the total switch current.



By connecting the power supply according to the illustration above, the device will automatically start when the main switch or turnkey is turned on, and shut down when the switch or turnkey is turned off. While the main switch is in the ON position, the computer can also be turned off and on with the On/Off-button.



3.2.1. Precautions

If applicable connect the power supply to the device before any main switch, as per the illustration above. If this is not possible, ensure that the device is turned off using for example the on/off button or turnkey functionality before turning off the main switch or in any other way making the computer powerless.

Sudden power disruptions may cause the device to shut down, potentially causing lost or corrupt data. If for example the power fluctuates when starting the vehicle engine, the device should be started after the vehicle engine is running.

Ensure that any application data is saved before turning off the device.

During welding or other service on the machine, all cables to the XM device shall be disconnected.



3.3. Mounting

CCpilot XM is preferably mounted on a VESA 75 bracket which allows adjustment of the display's position and angle.

To fasten, use the appropriate M6 cap screw of type MC6S (Allen) or MRT (Torx). The enclosure has blind holes, which give a maximum thread depth in the enclosure of 12.5 mm. The maximum torque for 8.8 graded screws is 9.8 Nm. Apply a thread locker in all bolt holes, e.g. Loctite 222.

CrossCore XM is preferably mounted using the mounting lugs on the base plate.



Ensure that CrossCore XM is mounted to a smooth, flat surface. Fastening the unit to an uneven surface may stress the enclosure, damage the outer flange or possibly even flex the circuit board inside, leading to a premature failure.

Ensure the mounting M8 Allen screws are of grade 8.8 or higher, are clean and dry, and apply torque of about 25 Nm (18 ft-lbs). Use lock washers.



3.4. Environmental considerations

- The device shall be placed in a way that prevents the unit from direct exposure to water.
- Use caps on any connectors that do not have attached cables.
- On the back side of the unit is a GORE-TEX® membrane located, seen as a small hole. This membrane must never be faced upwards when the unit is mounted. Be cautious not to insert any object into this hole since it can puncture the GORE-TEX® membrane, leaving the unit unprotected from moisture and dust intrusion. If the membrane is punctured the guarantee is void.
- To enable sufficient cooling, the XM device must be installed so that air is able to circulate around the device, avoid installing the device near hot air vents or the like. There must be at least 50 mm free distance around the unit.
- Loose mounting bolts are the most common reason for excessive vibration. Mounting bolts may become loose due to improper techniques such as missing lock washers, over tightening or under tightening. Proper tightening requires clean dry bolts, and a torque wrench.
- When CCpilot XM or any device is installed in a vehicle environment it is important that the installation is traffic-safe. CrossControl does not recommend that CCpilot XM or its accessories are used actively by the driver or operator when a risk of injury to people, or damage to property, is present.

3.5. Cables

Cables shall be installed in such a way that they don't run any risk of being damaged, pinched or worn.

- Avoid bending and twisting cables
- Strain-relief on cables near the connection to the respective unit
- Properly screw the connectors to give good contact and avoid unnecessary strain.
- Shielded cables is recommended and in some cases necessary to ensure reliable communication and appliance with industrial EMC standards.

Through adapter cables, as supplied by CrossControl, standard connectors can be connected to the unit. The installation of these adapter cables should be placed in a protected, moisture-free space and should be secured as well as strain-relieved.



3.6. Antennas

Antennas must be attached to use the wireless interfaces. For information regarding each antenna type, i.e placement, impedance and max gain, see the chapter Interface overview.

Any antenna or receiver shall not be co-located within 20 cm from any other transmitter or person.

4. Basic operations

This section covers basic operation of the XM device such as start-up and shut-down.



4.1. Starting Up

Start CCpilot XM by pressing and releasing the On/Off button. The status indication LED will start flashing indicating that the unit is starting up

CrossCore XM is started through a signal in the power connector, i.e. a turnkey functionality. For more information see the chapter Connecting to power supply. This way can also be used to start CCpilot XM.

4.1.1. Preheating

An internal temperature control prevents the XM device from starting in to cold or hot temperatures. When starting the unit in extremely low temperatures, by default -25 °C, preheating is activated to warm the unit before continuing the start-up sequence. When the internal temperature reaches -25 °C the preheating is deactivated and the unit continues to start up.



Note that preheating consumes energy from the vehicle's battery. This can result in the vehicle not starting, after prolonged preheating, due to a discharged battery.



4.2. Turning off

There are several ways to turn off the XM device and also alternatives to enter suspend mode instead of completely shutting down the unit.

Suspend is as a faster alternative to shutting down and starting up the unit. In suspend mode the data remains in RAM memory and the device must be connected to power to maintain its state.

The behaviour of the On/Off button and the On/Off signal through the Power connector can be adjusted in the CCpilot XM settings application.

4.2.1. Shutting Down

To ensure that data does not get lost or the flash memory becomes corrupt, it is recommended that all necessary data shall be saved and all programs closed before the unit is shut down.

There are three ways to turn off the XM device:

- By releasing the power connectors On/Off signal, i.e. using the turn key functionality.
- By selecting any of the operating systems shut-down alternatives.
- CCpilot XM can also be turned off by pressing the On/Off button on the display for four seconds and then releasing it. The times for the On/Off button can be adjusted in settings and it can also be disabled so that the unit cannot be shut down using the button, to prevent turning the computer off accidentally.

When performing any of the above, the XM device will shut down. The status LED will flash in yellow to indicate that releasing the On/Off button will result in the unit starting shut down.

4.2.2. Suspend to RAM

Suspend to RAM is initiated by:

- By releasing the power connectors On/Off signal, i.e. using the turn key functionality.
- By selecting any of the operating systems suspend alternatives
- CCpilot XM can also be suspended by a short press on the On/Off button

A user configurable time can be set for how long the unit shall be in suspend mode before the unit is completely shut down.

4.2.3. Forced Shut Down

If the device is not responding, a forced shut down can be performed by pressing and hold the On/Off button until the computer is turned off. The time for the forced shut down is double the normal shut down time, by default eight seconds.



Any information which was not saved will be lost when performing a forced shut down. It is not recommended to use the forced shut down since it immediately shuts down the computer regardless of the operating system state.



4.3. Adjusting the screen brightness

Press the respective brightness button to gradually increase or decrease the CCpilot XM display brightness.

The brightness can also be controlled from software, which also allows for automatic adjustment of the brightness using the light sensor.



4.4. Using the touch screen

The CCpilot XM display is equipped with touch functionality which gives the opportunity to provide a very easy-to-use HMI (Human Machine Interface) for the user.

4.4.1. Double and right click on the touch screen

Double click is performed similar to using an external pointing device. Tap the screen twice in the same place.

Tap and hold the on the touch screen to perform the equivalent to a right click.

4.5. Status LED indicators

The status LED indicator on the XM device indicates different device states using colours and flashing patterns. The LED behaviour can be controlled both by the operating system and by the applications executing on the device.

4.6. Clock back-up battery



Time and date information is stored in a memory sustained by a back-up battery. This battery has a limited life time and must therefore be exchanged at regular intervals. The life time of the battery is approximately 10 years.