TOPCON

Precision Agriculture

X20 Console Reference Manual

Part Number W106
Rev. 1.5

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October, 2007

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Preface

This manual has been developed to provide you with information necessary to operate and maintain this Topcon Precision Agriculture (TPA) product. Proper service and use is important for the safe and reliable operation of the product. The sections provided in this manual include information necessary for the safe and correct operation, care, and troubleshooting of this product. The benefits this product provides can be greatly influenced by your knowledge of the products described in this manual.

NOTICE *NOTICE*

Please read these Terms and Conditions carefully.

Terms and Conditions

General

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IMPORTANT: SAFETY - Improper use of the product can lead to death or injury to persons, damage to property and/or malfunction of the product. The product should only be repaired by authorized TPA service centres. You should closely review the safety warnings and directions as to the proper use of the product in this manual and at all times comply with the same.

Limited Warranty

ELECTRONIC and MECHANICAL COMPONENTS -TPA warrants that the electronic components manufactured by TPA shall be free of defects in materials and workmanship for a period of one year from the original date of shipment to the dealer. TPA warrants that all valves, hoses, cables and mechanical parts manufactured by TPA shall be free of defects in materials and workmanship for a period of 12 months from the date of sale.

RETURN and REPAIR - During the respective warranty periods, any of the above items found defective may be shipped to TPA for repair. TPA will promptly repair the defective item at no charge, and ship it back to you. You must pay the shipping and

handling charges in respect of the same. Calibration or components, labour and travel expenses incurred for in-field removal and replacement of components are not covered in this warranty policy. Damage to components due to negligence, abuse or improper use, maintenance, modification or repair is NOT covered under this warranty.

WARRANTY DISCLAIMER - Other than for the above warranties or warranties in an appendix or a warranty card accompanying the product, this manual and the product are provided 'as is'. There are no other warranties and to the extent allowed by law TPA excludes all implied terms, conditions and warranties in respect of the manual and the product (including any implied warranty or merchantability or fitness for any particular use or purpose).

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In any event, TPA's liability to you or any other person for any claim, loss or damage (in contract, tort or on any other basis) will be limited (in TPA's option) to either (a) the replacement or repair of the product, or (b) payment of the cost of replacing or repairing the product. You indemnify and hold TPA harmless against any claim, action, damage, loss, liability or cost (including legal fees) which TPA incurs arising from (a) your operation, use and/or maintenance of the product other that in accordance with the

terms set out in this manual, or (b) your negligence or wrongful act or omission in respect of the product.

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These Terms and Conditions may be amended, modified, super-seded or cancelled, at any time by TPA. These Terms and Conditions will be governed by, and construed in accordance with:

- the laws of South Australia if the product is sold and supplied to you in Australia (in which case the courts of South Australia or the Federal Court of Australia (Adelaide Registry) have exclusive jurisdiction in respect of any claim or dispute); or

- the laws of the State of California if the product is sold and supplied to you outside of Australia.

All information, illustrations, and applications contained herein are based on the latest available information at the time of publication. TPA reserves the right to make product changes at any time without notice.

If any part of these Terms and Conditions would be unenforceable, the provision must be read down to the extent necessary to avoid that result, and if the provision cannot be read down to that extent, it must be severed without affecting the validity and enforceability of the remainder of these Terms and Conditions.

Comments, suggestions, and questions about TPA products are welcomed. Contact your local TPA representative or a representative at our corporate facility.

Topcon Precision Agriculture
14 Park Way
Mawson Lakes, South Australia 5095.
Phone: +61 8 8203 3300
Fax: +61 8 8203 3399

Service Information

Service assistance can be provided by contacting your local TPA Authorised Dealer or by calling the Topcon Precision Agriculture Service Centre.

Phone: +61 8 8203 3300
Fax: +61 8 8203 3399

8.30am to 5pm (Adelaide Local Time), Monday through Friday.

Communications Regulation Information

FCC Compliance Statement (USA)

This equipment has been tested and found to comply with the limits for a Class 'A' digital device, pursuant to Part 15 of the FCC Rules. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at their own expense.

FCC Compliance Statement (Canada)

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulation.

CE EMC Statement (European Community)

Warning: This is a class 'A' product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

'C' Tick EMC Statement (Australia & New Zealand)

Certification No. N12317. This product meets the applicable requirements of the Australia and New Zealand EMC Framework.

Radio & Television Interference
This computer equipment generates, uses, and can radiate radio-frequency energy. If it is not installed and used correctly – that is, in strict accordance with TOPCON Precision Agriculture instructions – it may cause interference with radio communication.

You can determine whether your computer system is causing interference by turning it off. If the interference stops, it was probably caused by the computer or one of the peripheral electronic devices.

If your computer system does cause interference to a radio or other electronic device, try to correct the interference by using one or more of the following measures:

- Turn the radio antenna until the interference stops.
- Move the computer to either side of the radio or other electronic device.
- Move the computer farther away from the radio or other electronic device.
- Connect the computer to a different circuit to the radio or other electronic device.

If necessary contact your nearest TOPCON Precision Agriculture dealer for assistance.

Important: Changes or modifications to this product not authorized by TOPCON Precision Agriculture could void the EMC compliance and negate your authority to operate the product.

This product was tested for EMC compliance under conditions that included the use of TOPCON Precision Agriculture peripheral devices & TOPCON Precision Agriculture shielded cables and connectors between system components.

It is important that you use TOPCON Precision Agriculture peripheral devices between system components to reduce the possibility of causing interference to radios and other electronic devices.

Manual Conventions

This Manual uses the following conventions:

File>Exit ~ Click/tap/press the **File** menu, then click/tap/press **Exit**.

Enter ~ Click/tap/press the button or key labelled **Enter**.

Supplementary information that can help you configure, maintain, or set up a system.

Supplementary information that can have an effect on system operation, system performance, measurements & personal safety.

Notification that an action has the potential to adversely effect system operation, system performance, data integrity, or personal health.

Notification that an action *will* result in systems damage, loss of data, loss of warranty, or personal injury.

UNDER NO CIRCUMSTANCES SHOULD THIS ACTION BE PERFORMED.

Introduction

The X20 console is a powerful computer which can be adapted into a number of mobile applications from agriculture, mining and construction.

In today's changing world the need for advanced application technologies and efficiency of in-cab control with multiple functions as well as ease of use is important.

The X20 console from Topcon Precision Agriculture is a powerful solution to meet the most demanding situations.

X20 Console Features

- Windows® XP PRO SP2 is the X20's operating system

- Built in protection against vehicles start up

- Intelligent Power Management supply. Status LED's displays status of the External Supply and Internal Battery, see Chapter 5

- ATX power ON/OFF – Power Button needs to be pressed for 2-3 seconds to power up

  When shutting down the console, the console automatically powers down and switches the console OFF

- Processor speed 1Ghz

- 2GB Industrial Flashcard

- 512 MB RAM

- Faster performance when running multiple applications (Improved SVGA)

- The X20 console logo activates the X20 Manager to allow the operator to adjust the screen brightness, adjust the audio volume, displays the internal battery and external supply status, see Chapter 8.

Screen

When the X20 console is running, and the X20 logo is pressed for 5 seconds the *X20 Manager* window is displayed. This allows the operator to adjust the brightness of the screen, adjust the volume control and check the battery status, see Chapter 7 and 8.

8.4" LCD high contrast TFT, Backlit, 800x600 resolution. This screen has a very high contrast allowing clear visibility outdoors. Yet it can be dimmed for night work.

The screen has a touch panel fitted with a glass backing, which will break if impacted heavily. The touch panel is very durable and should be wiped clean regularly when the X20 console is off.

The calibration of the touch panel should never change, in normal operating temperatures. However, if the X20 console is operated in extreme temperatures, this calibration may change. Adjust calibration using calibration software and stylus, see Chapter 9.

Audio

The X20 console has a speaker built in for audible and voice alarms. The operating volume of the X20 is adjusted using a volume control. To adjust the volume see page 8-4.

An audio plug (Figure 2-3 on page 2-7) is supplied at the rear of the console for the fitment of the external speaker which is supplied with the X20 console kit.

Keyboard & Mouse

A USB mouse and keyboard are supplied. The USB mouse and keyboard can plug into one of four USB ports on the X20 console.

Pen Stylus

A pen stylus is supplied to select objects and areas on the touch screen, instead of using your finger.

The pen stylus comes with a holder with double sided tape to mount in the vehicle or on the housing of the X20 console.

Console Overview: Front

Figure 2-1. Front of the X20 Console

Touch Screen

The touch screen (Figure 2-1) is an 8.4" TFT Active Matrix color screen. The screen is Super Bright SVGA LCD display with brightness control. The software allows full range of digital dimming to suit all light conditions.

Operating System

The operating system (Figure 2-1 on page 2-4) running on the X20 console is Microsoft Windows® XP PRO SP2 (Service Pack 2). This allows for full software compatibility.

Status LED's

The Status LED's (Figure 2-1 on page 2-4) display the status of the internal battery and external power supply. By displaying red, orange or green colored LED's.

- Left Status LED- Indicates the status of the external power supply

- Right Status LED- Indicates the status of the internal battery.

X20 Logo

When the X20 logo (Figure 2-1 on page 2-4) is pressed for 5 seconds, while the X20 console is running, the *X20 Manager* window will be displayed. Your X20 logo may be different. This will allow the operator to:

- Adjust the screen brightness

- Adjust the volume control of internal or external speakers

- Check the status of the external power supply

- Check the status of the internal battery

- Change the auto-shutdown delay and enable auto-shutdown

- Check the status of the Topcon logo and test the audio volume

- Allow the X20 console to be shutdown from this window.

Console Overview: Side

Figure 2-2. Side of the X20 Console

X20 Console Housing

The X20 console housing (Figure 2-2) is made of exceptional impact strength and has high heat resistance.

The X20 console is splash proof.

The X20 console uses a powerful yet low power consumption processor for fanless operation.

USB Ports

On the left side of the X20 console there are 2 USB 2.0 ports (Figure 2-2 on page 2-6). These may be used to connect USB devices such as USB Thumbdrives, USB Mouse, USB Keyboard or USB Printers.

Console Overview: Rear

The X20 console has a number of ports on the back available for connection to different equipment (Figure 2-3).

Adjustable ball type RAM® Mount

Heat Sink Fins to remove heat from the console

3 Pin Bayonet Style Power Connector

Power Button

Internal speaker for Audio Commands and Alarms

Reset Button
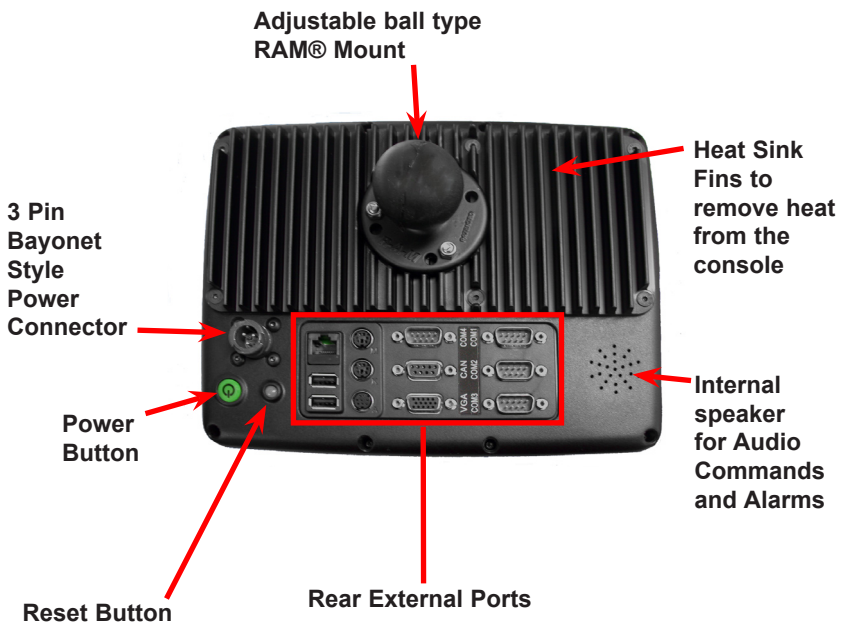
Rear External Ports

Figure 2-3. Rear of the X20 Console

Power Button

The **Power** button (Figure 2-3 on page 2-7) has to be pressed for 3 seconds to start the X20 console up.

The X20 will not start unless there is a satisfactory external power supply and the internal battery has sufficient charge, see Chapter 5.

Reset Button

⚠ **WARNING**

Pressing the Reset button should be avoided, as no data is saved and Windows® does not do an orderly shutdown when 'Reset' is performed.

The **Reset** button (Figure 2-3 on page 2-7) allows the X20 to be reset in the event the X20 console could not be shutdown normally.

Power Connector

The Bayonet Power Connector (Figure 2-3 on page 2-7) is where the X20 Power Harness connects to the X20 console providing 10.8-18.0 Volt supply.

RAM® Mount

The RAM® Mount (Figure 2-3 on page 2-7) provides an adjustable ball type, which allows for optimum positioning.

Heat Sink Fins

The external Heat Sink Fins (Figure 2-3 on page 2-7) exchange the heat from inside the console to the outside environment, therefore keeping the console within operating temperature, without the use of fans.

Internal speaker

The X20 console has an internal speaker (Figure 2-3 on page 2-7) built for audible and voice alarms.

Rear External Ports
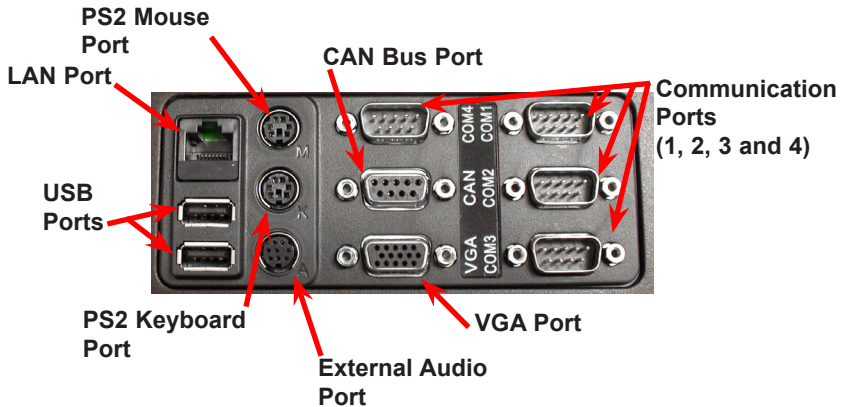
Figure 2-4. Rear External Ports

Communications Ports (Com Port)

There are 4 Communication Ports (COM1, COM2, COM3 and COM4) (Figure 2-4). These are used to connect various serial devices to the X20 console, such as DGPS receivers.

The COM (1 to 4) Ports are configured for RS232 communications; COM 2 can be configured for either RS232 or RS485 communications. To be configured for RS485 the X20 console would have to be returned to Topcon Precision Agriculture.

USB Ports

On the rear of the X20 console there are 2 USB 2.0 ports (Figure 2-4 on page 2-9). These may be used to connect USB devices such as USB Thumbdrives, USB Mouse, USB Keyboard or USB Printers.

CAN Bus Port

CAN Bus (Figure 2-4 on page 2-9) is a communications protocol similar to RS232 and RS485.

CAN Bus is rapidly becoming a world standard in the automotive and agricultural industries.

PS2 Mouse Port

The PS2 Mouse Port (Figure 2-4 on page 2-9) allows a PS2 style mouse to be connected to this port.

PS2 Keyboard Port

The PS2 Keyboard Port (Figure 2-4 on page 2-9) allows a PS2 style keyboard to be connected to this port.

Audio Port

The Audio Port (Figure 2-4 on page 2-9) allows the connection of an external speaker (supplied). This allows the external speaker to be located near the operator when the X20 console is placed in noisy environments.

The audio volume for the external speaker can be controlled, using the X20 Manager software, see page 8-4.

LAN Port

The LAN Port (Figure 2-4 on page 2-9) has a 10/100 Base T Ethernet port for external communication lines.

VGA Port

The VGA Port (Figure 2-4 on page 2-9) connects to an optional external monitor or screen for any external screen requirements.

TIP

The VGA device should be connected to this VGA Port before the X20 console is switched on.

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Unpacking the X20 Box

Contents of the X20 Kit

Below is a list of the commonly supplied parts in an X20 console kit. Depending on the X20 console kit you received, some of the items listed below may not be included in your kit.

Part Number	Description
A2010	X20 Console
A1705	Stylus Kit
A2638	X20 Office PC CD
A947	Windows XP Pro
B103	RAM Mount Arm
B105	RAM Mount Base
B112	RAM Mount Rail Adaptor
H1173	X20 Speaker Out Audio Harness
K080	USB Thumbdrive
W065	Warranty Forms
W106	X20 Console manual
A2680	X20 Guidance Manual

Part Number	Description
A2665	USB Keyboard
A1224	USB Mouse

Mounting Kit Supplied for the X20 Console

1 x Large RAM® Mount (approx. 14 cm in length)

2 x 1.5" RAM® Base.
Please note: One 1.5" RAM® Base is already fitted to the X20 console.

1 x RAM® Rail Mount Kit (to suit 3/4" to 1" rail).
Please note: The picture illustrates the RAM® Rail Mount Kit fitted to the 1.5" RAM® Base.

TIP

You should use a combination of this equipment, in order to best suit your vehicle.

Installing the X20 Console

1.5" RAM® Base
Attached to X20
console

Large RAM® Mount
(shown) OR
Small RAM® Mount
could be used.

1.5" RAM® Base
Attached the RAM® Base to a metal base
OR RAM® Rail Mount Kit.
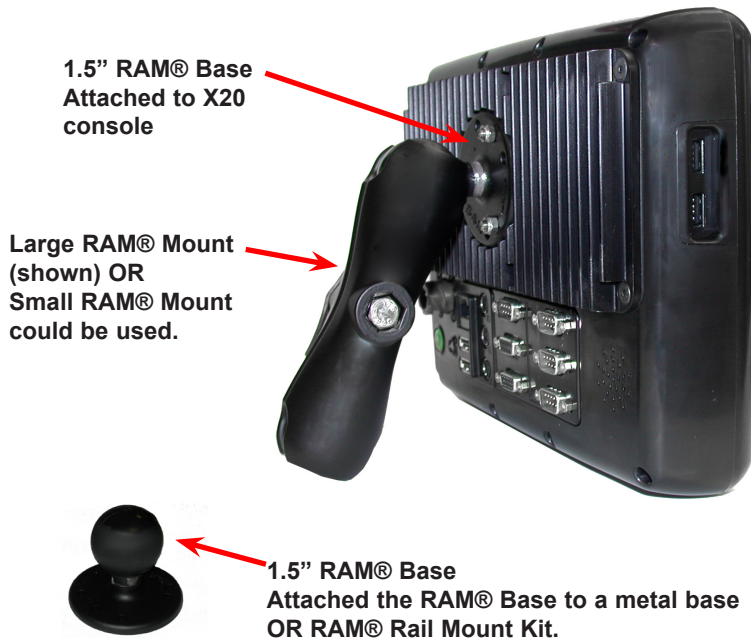
Figure 4-1. RAM® Bases/Mount

Please note: The X20 console comes supplied with the 1.5" RAM®
Base already fitted to the the X20 console.

Positioning the X20 Console

1. The X20 console should be mounted in a position where minimal direct sunlight is directed onto the screen, generally elevated in the cab and tilting down

2. The X20 console should be mounted so the heat sink is not exposed to direct sunlight

3. The X20 console should be mounted as far from the window as possible; the X20 console requires adequate ventilation around the console, this allows sufficient air-flow over the heat sink

4. Allow a clearance of at least 25mm (1") around the X20 console

5. Fit the supplied RAM® mounting bracket securely to any metal base, preferably in your vision whilst the vehicle is moving

Options for Mounting the X20 Console

Option 1: Mounting the X20 console using the 1.5" RAM® Base

1. Securely screw the 1.5" RAM® Base to a flat metal surface.

Please note: The screws to mount the RAM® Base are not provided in the kit.

Option 2: Mounting the X20 Console Using the RAM® Rail Mount

• The RAM® Rail Mount provided fits rails between 3/4" to 1" in diameter.

1. Wrap the correct length of rubber strip around the rail where the base will be attached

2. Assemble the 1.5" RAM® Base with the RAM® Rail Mount using the 3 screws and nuts provided.

TIP

It may be necessary to drill a 5/32" hole through the RAM® Rail Mount Kit and rail using the screw provided in the kit.
This will prevent the the RAM® Base from slipping.

How to Use the RAM® Mounts

1. The RAM® Mounts are loosened by unscrewing the knob in an anti-clockwise direction.

2. Once loosened, place the RAM® mount onto the RAM® Base on the X20 console, then place the other end of the RAM® Mount on the RAM® Base attached to the vehicle

3. Once the RAM® Mount is on both RAM® Bases then loosely turn the knob in a clockwise direction

4. Tighten the knob just enough so the X20 console can be positioned and angled correctly to suit the operator

5. Once the X20 console is in the desired position then tighten the knob up so the X20 console is held in position securely.

Schematic Layout of the X20 Power Harness

Figure 4-2. Layout of the X20 Power Harness

Fitting the X20 Power Harness

WARNING

The X20 Power Harness (Part No. A2400) (Figure 4-2) should be connected directly to the battery or the warranty will be void.

CAUTION

Cigarette lighter connections are not recommended.

1. Check the voltage of the battery to which the X20 Power Harness is being connected to

TIP

The battery must be between 11-18 volts. If in doubt, check voltage with a multi-meter.
The multi-meter required will need to measure DC voltage between 1-24 volts.

2. Connect the red wire of the X20 Power Harness to the positive (+)12V terminal on the battery

3. Connect the black wire of the X20 Power Harness to the negative (-)12V terminal on the battery

4. Connect the 'Additional Earth' connection (Figure 4-3 on page 4-6), which is located near the Bayonet Plug; and connect to one of the screws holding the 1.5" RAM® Base to a metal base on the vehicle.

2 Pin Weatherpack Plug

The '2 Pin Weatherpack' plug on the X20 Power Harness, provides switched 12 Volt battery power as an additional power outlet. This may be used to power devices such as a DGPS system which is connected to the X20 console.

The maximum current the device can draw is 3 Amps when connected to the '2 Pin Weatherpack' plug.

Switched Power means there is only battery Volts at the '2 Pin Weatherpack' when the X20 console is switched on.

Connecting the Power Connector

Once the X20 console has been installed in the vehicle and the X20 Power Harness has been fitted to the battery terminals:

1. Connect the Power Connector to the Bayonet Power plug on the back of the X20 console (Figure 4-3 on page 4-6)

2. Line up the 'notch' (Figure 4-3 on page 4-6) on the Power Connector (on the X20 Power Harness) with the notch which is situated at twelve o'clock on the Bayonet Power plug (Figure 4-3 on page 4-6) on the X20 console

3. Push the Power Connector ON holding the outer sleeve (Figure 4-3 on page 4-6)

4. Once fully home, turn the outer sleeve clockwise until a 'click' is felt.

   The Power Connector is now connected.

Notch

Outer Sleeve

Power Connector
on A2400 'X20 Power Harness'

Bayonet Connector
on back of X20 Console

Figure 4-3. Connecting the Power Connector

X20 Power Management System

Understanding the X20 Power Management System

The X20 console has an intelligent Power Management system. The purpose of the system is to protect the integrity of the Compact Flash carrying the Windows® XP operating system, application programs loaded, and customer data. The Power Management system monitors the external supply voltage and also the internal battery voltage and then makes decisions about startup and shutdown of the X20 console.

There are two Status LED's embedded in the lower right front of the case (Figure 5-1) which indicate the status of the Power Management system. These LED's are multi-colored and indicate a range of conditions.

External Supply Status LED

Internal Battery Status LED

Figure 5-1. LED's Indicating Power Status

Status LED's

Left LED

The left LED (Figure 5-1 on page 5-1) is for external (vehicle) supply information.

- RED indicates less than 10.8 Volts

- ORANGE indicates 10.8V - 11.9 Volts

- GREEN indicates above 12.0 Volts.

Right LED

The right LED (Figure 5-1 on page 5-1) is for internal battery information.

- RED indicates less than 9.0 Volts

- ORANGE indicates 9.0V–10.0 Volts

- GREEN indicates above 10.1 Volts.

Conditions in which the X20 Console WILL Start

The X20 console will startup with two ORANGE or two GREEN LED's, or a combinations of these (e.g. one GREEN and one ORANGE LED).

Conditions in which the X20 Console Will NOT Start

If the X20 **Power** button is pressed for 3 seconds, and the X20 console will not startup the two Status LED's will flash for 10 seconds.

If either one of the Status LED's is displaying a RED color; the X20 Power Management system will not allow the X20 console to startup.

If one of the Status LED's is displaying a RED color, the two LED's will flash for 10 seconds.

TIP

The Power button only requires light contact to instruct the Power Management system to start the X20 console. It needs to be held for 3 seconds to enable the start sequence.
The Power button is not a power switch.

Understanding the RED Colored LED

External Supply Status

If the external supply status is displaying a RED colored Status LED this indicates:

1. The X20 console is not connected to a good power source

     • Check the Power Connector (Figure 4-3 on page 4-6) at the back of the X20 console is connected securely

     • Check the X20 Power Harness (Figure 4-2 on page 4-4) is correctly and securely connected to the battery terminals

     • Check that the fuse (Figure 4-2 on page 4-4) on the X20 Power Harness is not missing or blown.

2. The vehicle battery supplying power to the X20 voltage is below 10.8 Volts. Rectify the problem so that the external supply is above 10.8 Volts.

Internal Battery Status

If the internal battery status is displaying a RED colored Status LED this indicates:

1. The internal battery inside the X20 console is below 9.0 Volts, and needs charging from an external supply source

TIP

The external supply Status LED must be displaying an ORANGE or GREEN color before the internal battery will start charging.

- If connected to an external supply source and the X20 console's ambient temperature is between 0°Celsius(C) and 50°C (32°F and 122°F) then the X20's Power Management system will allow Fast Charging of the X20's internal battery; when in Fast Charging mode it will take approximately 15 minutes to charge the internal battery sufficiently to allow startup of the X20, and therefore change the internal battery Status LED from RED to ORANGE

    The Power Button on the X20 console can then be pressed and the X20 will startup

- If connected to an external supply source and the X20 console's ambient temperature is below 0°C (32°F) OR above 50°C (122°F) then the X20's Power Management System will NOT allow Fast Charging of the X20's internal battery. Instead the X20's Power Management will only allow Trickle Charge to the internal battery. While in Trickle Charge mode it can take approximately 3 hours to charge the internal battery sufficiently, to allow startup of the X20, and change the internal Status LED's from RED to ORANGE

If at any time during the charging process the X20 console's ambient temperature falls between 0°Celsius (C) and 50°C (32°F and 122°F) then the X20's Power Management system will automatically change to Fast Charging of the X20's internal battery, thus reducing the charging time dramatically.

LED's and Charging the Battery

- While the X20 console is charging (either in Fast Charge or Trickle Charge) mode then the internal battery status (right LED) will flash once every 5 seconds

- Once the internal battery Status LED changes from RED to ORANGE (and the external supply Status LED is still ORANGE or GREEN) then the X20 Power button can be pressed for 3 seconds and the X20 console will startup

- While the X20 console is in charge mode the internal battery Status LED will still flash every 5 seconds. The LED will flash either ORANGE or GREEN depending on the voltage of the internal battery.

Internal Battery Charging Restrictions

Fast charge is allowed between 0°C and 50°C (32°F and 122°F). Trickle charging is allowed below 0°C (32°F) and above 50°C (122°F). This is a restriction and requirement of the Nickel Metal Hydride (NiMH) battery chemistry technology.

X20 Power Management Status LED's

Figure 5-2 on page 5-8 shows the various states of the Status LED's, as displayed on the bottom right hand-side of the X20 console.

The Status LED's will be displayed after the **Power** button is pressed for 3 seconds or while the X20 console is running.

If the **Power** button is pressed and does not switch ON, then the Status LED's will flash for 10 seconds, the different reasons for this are explained adjacent to Figure 5-2 on page 5-8.

Note: 'EXT' means external supply and 'BAT' means internal battery

EXT	BAT	
🟢	🟢	Power status is normal. External supply is equal to or above 12.0 Volts. Internal Battery is equal to or above 10.8 Volts. The X20 console will start.
🟡	🟢	External supply is low but acceptable. External supply voltage is between 10.8 and 12.0 Volts. The X20 console will start.
🟢	🟡	Internal battery is low but acceptable. Internal battery voltage is between 9.0 and 10.8 Volts. The X20 console will start.
🔴	🟢	The X20 console will not start. External supply is below 10.8 Volts. The LED's will 'flash' for 10 seconds before turning OFF.
🟢	🔴	The X20 console will not start. The Internal battery is below 9.0 Volts. The LED's will flash for 10 seconds before turning OFF. The Internal battery LED will 'flash' every 5 seconds to show charging is in progress.
🟢	🟢	The X20 console will not start. External supply and battery are good, main computer is not responding correctly. Both LED's are green but flashing alternately for 10 seconds. *Return to base for repair.*
⚪	⚪	The X20 console will not start. The Power Management system is not operating. The LED's remain blank after pressing the Power button (for 3 seconds). *Return to base for repair.*

Figure 5-2. States of the Status LED's

Monitoring the X20 Console, when Switched OFF

The X20's Power Management system continuously monitors internal battery voltage, while the X20 console is switched OFF, and will switch to Charge Mode if the internal battery voltage drops below 9.0 Volts and the external supply voltage is above 10.8 Volts.

While the X20 console is in Charge Mode the internal battery Status LED will flash once every 5 seconds.

Monitoring the X20 Console, when Switched ON

If the X20 console is switched ON and the external supply drops below 10.8 Volts for more than 60 seconds (Default) an ATX shutdown will be initiated. A software shutdown can be started before this, by the X20 Manager software (which can be cancelled). By default, the X20 Manager software shutdown is set at 15 seconds. Therefore as long as the X20 Manager software is running in the background and the external supply drops below 10.8 Volts then after 15 seconds the X20 Power Manager will perform an ATX shutdown and Windows® will be shutdown properly and all data will be saved.

If the operator overrides the X20 Manager software shutdown or the X20 Manager is not running, then after 60 seconds if the external supply voltage is still below 10.8 Volts then the X20's Power Management will commence a hardware ATX shutdown; the hardware ATX shutdown cannot be cancelled and is designed to protect customers data from unstable supply conditions. This shutdown is indicated by both Status LED's flashing.

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Switching the X20 Console ON

Turning the Power ON

WARNING

The X20 console is a powerful computer system designed for in-vehicle use and is designed to operate at temperatures between 0°C-50°C (32°F-122°F. The X20 console should not be switched ON until the console is within these temperature ranges.
You should switch the air-conditioning on in the vehicle, to bring the X20 console within the operating temperature ranges.

WARNING

When starting the vehicle make sure the X20 console is switched OFF.

TIP

The Power button only requires light contact to instruct the Power Management system to start the X20 console. It needs to be held for 3 seconds to enable the start sequence.
The Power button is not a power switch.

1. Press and hold the **Power** button (Figure 2-3 on page 2-7) located on the back of the X20 console; for 3 seconds.

The X20 console will now startup and start loading the Windows® XP operating system.

After the startup sequence has concluded:

- The *Windows® desktop* will be displayed

OR

- If Topcon Precision Agriculture application software has been preloaded from the Topcon Precision Agriculture factory, then the Topcon Precision Agriculture Application software will be automatically loaded and displayed.

 TIP

For further information on the Topcon Precision Agriculture Application software read the relevant manuals which come with the respective Topcon Precision Agriculture Application software.

If the X20 Console Will NOT Startup

If the X20 console did not startup, then one or both of the Status LED's are possibly RED; the 2 Status LED's will flash for 10 seconds, indicating whether the external supply (left LED) or the internal battery (right LED) is causing the X20 console not to startup.

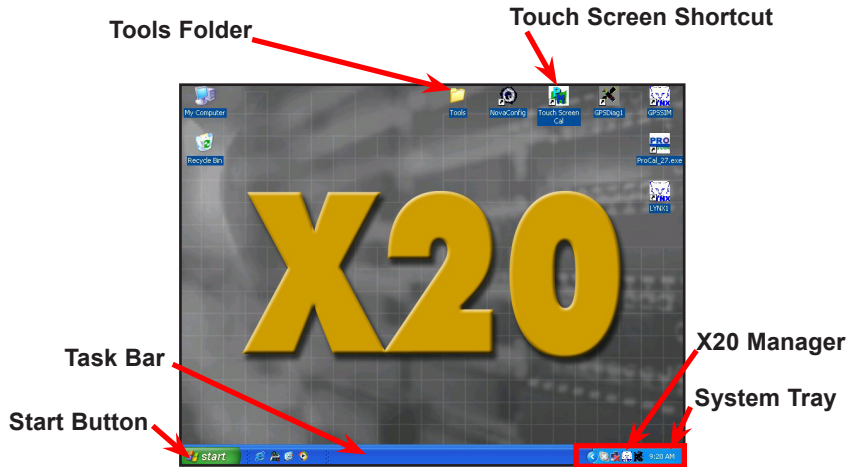Refer to Chapter 5 to rectify the problem.

Windows Desktop

Tools Folder

Touch Screen Shortcut

Task Bar

X20 Manager

System Tray

Start Button

Figure 7-1. Windows® Desktop

Figure 7-1 shows the ***Windows® Desktop*** screen, after the X20 has started up.

Task Bar

To display the ***Task Bar*** press the **screen** down the bottom, using your finger, Pen stylus (provided in the kit) or USB Mouse (provided in the kit).

Start button

The **Start** button is displayed when the ***Task Bar*** is displayed.

The **Start** button allows access to Windows® programs and other programs loaded on the X20 console.

7-1

System Tray

The *System Tray* is displayed when the *Task Bar* is displayed.

The *System Tray* displays programs which are running in the background.

X20 Manager

The X20 Manager starts automatically when the X20 console starts up.

When the X20 Manager is displayed in the *System Tray*, it means the X20 Manager program is running in the background.

Accessing X20 Manager from the System Tray

The X20 Manager can only be accessed from the *System Tray* using a mouse.

1. Display the **Task Bar** using the mouse

2. Place the mouse pointer over the **X20 Manager** icon

3. Using a right mouse click, click the **X20 Manager** icon (which only shows if the X20 Manager is running)

A Menu is displayed with the following options:

- Show X20 Manager- Displays the *X20 Manager* window

- Hide X20 Manager- Hides the *X20 Manager* window

- Close X20 Monitor- Closes the X20 Manager program and stops the program running in the background

Please refer to Chapter 8 for more information on X20 Manager.

X20 Manager

Accessing X20 Manager Using the X20 Logo

Press and hold the **X20 logo** (Figure 8-1) for 5 seconds until the *X20 Manager* window is displayed.

Please note: Your X20 logo may look different.

💡 **TIP**

The X20 Manager window can be displayed anytime after the Windows® operating system has started; it will be displayed over the top of any programs running at the time.

X20 Logo

Figure 8-1. Accessing X20 Manager

X20 Manager Window

The *X20 Manager* window will allow the operator to:

• Adjust the screen brightness

• Adjust the volume control of internal or external speakers

• Check the status of the external power supply

• Check the status of the internal battery

• Change the auto-shutdown delay and enable auto-shutdown

• Check the status of the Topcon logo and test the audio volume

• Allow the X20 console to be shutdown from this window
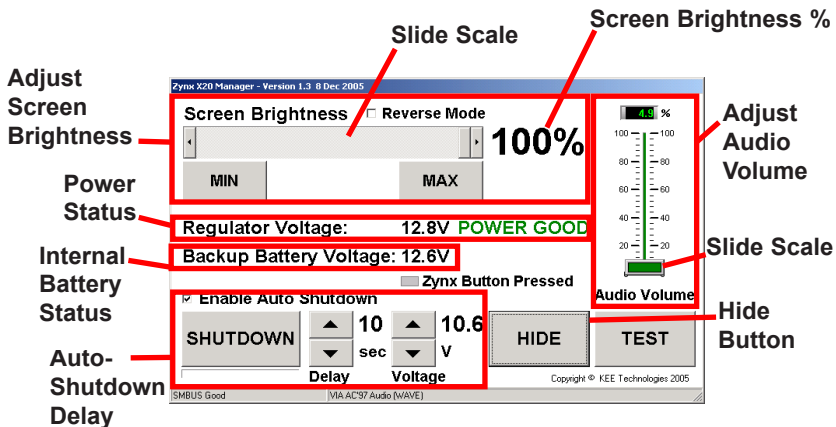
• Adjust the internal battery trip point voltage.

Figure 8-2. X20 Manager Options

Adjust Screen Brightness

Selecting the 'MAX' button (Figure 8-2 on page 8-2) adjusts the screen brightness to the maximum (100% will be displayed).

Selecting the 'MIN' button (Figure 8-2 on page 8-2) adjusts the screen brightness to the minimum (0% will be displayed).

Press and slide the **slide scale** button (Figure 8-2 on page 8-2) using your finger or Pen stylus, slide the button backwards and forwards to adjust the screen brightness to your needs. The screen brightness is displayed as a (%) between (0% to 100%).

TIP

By default there is no tick in the 'Reverse Mode' checkbox. If when the MAX button is selected the screen brightness goes dull, select the 'Reverse Mode' using your finger or Pen stylus.

Adjust Audio Volume

The audio volume option adjusts the audio volume for the X20's internal speaker or external speaker if fitted.

Adjust the audio volume by pressing the **audio slide scale** button (Figure 8-2 on page 8-2) using your finger or Pen stylus and sliding the button up and down, as the button is moved the audio volume is displayed as a (%) between 0% and 100%.

Where 100% represents maximum audio volume and 0% switches the audio volume OFF.

The current audio volume can be tested by pressing the **Test** button and a beep will be sounded through the X20 internal speaker or external speaker.

Power/Battery Status

The power/battery status (Figure 8-2 on page 8-2) displays the regulator voltage and the internal battery voltage.

Regulator voltage displays the external supply voltage; and informs the operator whether the regulator battery voltage is either:

1. POWER GOOD (greater than 10.6 Volts)

   OR

2. FAILED (10.6 Volts or less)

Backup battery voltage displays the actual voltage of the internal battery in the X20 console.

Auto-Shutdown Delay

By default the 'Enable Auto Shutdown' is selected, (see the tick in the box shown in Figure 8-2 on page 8-2). This allows the X20 console to perform an ATX shutdown when the regulator voltage (external supply voltage) drops below 10.6 Volts.

The *X20 Manager* window will be displayed when the regulator voltage falls below 10.6 Volts.

The time displayed in seconds (default is 10 seconds) determines how long the X20 Manager will wait before the X20 console starts an ATX shutdown.

The regulator voltage (external supply voltage) has to stay below the 10.6 Volt threshold for the time delay period before the ATX shutdown is started. If the voltage is restored above the 10.6 Volt threshold, then the Auto-Shutdown is stopped.

The delay can be set between (1 and 10 seconds), the delay can be set using the up and down arrows. A value higher than 10 seconds will be overridden by the firmware which will automatically start the ATX shutdown at 10 seconds.

The voltage can be set using the up and down arrows.

NOTICE *NOTICE*

The 'Voltage' for 'Regulator Voltage' is set at 10.6 volts and should not be changed unless instructed by a Topcon Precision Agriculture Representative.

8-5

Procedure of Auto-shutdown

When the regulator battery voltage drops below 10.6 Volts:

1. The Status LED for external supply (left LED) will turn RED

2. The *X20 Manager* window will be displayed. No matter what programs are running

3. The regulator voltage displayed will be below 10.6 Volts and 'POWER FAILED' will be displayed in RED, in the *X20 Manager* window

4. An audio beep will be sounded (if audio volume is turned ON)

5. At the end of the Auto-Shutdown delay period (default 10 seconds); both Status LED's will start flashing indicating the X20 console is shutting down, both LED's will continue to flash while the shutdown is being performed

6. Windows® will start shutting down all ATX compliant programs and save data, then Windows® operating system will start shutting down and will save all data and then the X20 console will turn OFF.

Procedure of Auto Shutdown, When 'Disabled'

If the 'Enable Auto Shutdown' is deselected (no tick in box) OR the X20 Manager program is not running in the background then the X20 Manager will not be activated, when the external supply voltage drops below the 10.8 Volt threshold.

In this situation the X20 console's Power Management ATX hardware takes over:

1. The Status LED for the external supply (left LED) will turn RED

2. The default time delay for the ATX hardware is 60 seconds

3. Therefore if the external supply voltage stays below the 10.8 Volt threshold for more than 60 seconds then an ATX Shutdown will be started

4. Once the 60 seconds has been reached then both Status LED's will flash indicating the X20 console is shutting down

5. Windows® will start shutting down all ATX compliant programs and save data, then Windows® operating system will start shutting down and will save all data and then the X20 console will turn OFF.

Shutdown Button

When the *X20 Manager* window is displayed the operator can choose to shutdown Windows® from this screen.

To shutdown Windows®:

1. Select the **Shutdown** button (Figure 8-2 on page 8-2).

2. In the window displayed select '**YES**' to continue shutdown OR '**NO**' to cancel shutdown

   If 'YES' is selected then Windows® will start shutting down

3. The X20 console will automatically turn OFF.

X20 Logo Pressed

When the X20 logo is pressed for 5 seconds, while the *X20 Manager* window is displayed, a green button will be displayed next to the X20 button. This test determines whether the X20 Logo is working or not.

If the X20 Logo **is** working correctly the button will turn green.

If the X20 Logo **is** not working correctly the button will stay grey.

Please note: When the X20 Logo is pressed the operator will notice the Backup Battery Voltage will drop, this is normal.

Hide Button

The **Hide** button (Figure 8-2 on page 8-2) when selected hides the *X20 Manager* window.

The **Hide** button is used when the operator has finished making adjustments and wants to hide the window.

TIP

The X20 Manager is still running in the background and can still be accessed any time by pressing the X20 logo for 5 seconds, while Windows® is running.

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Touch Screen Calibration

The X20 console touch screen is calibrated from the Topcon Precision Agriculture factory and under normal conditions there should be no need to re-calibrate the touch screen.

It will become necessary to re-calibrate the screen when the screen is being touched using your finger or Pen stylus, and the area of the screen being touched is not been activated, but another part of the screen is.

To calibrate the touch screen the following steps should be taken:

TIP

It is best to use the Pen stylus supplied with the X20 console to do the calibration.

1. Double click the **Touch Screen Cal**, on the *Windows® desktop*

    The *PenMount* screen will appear (Figure 9-1)

Standard Calibration Button
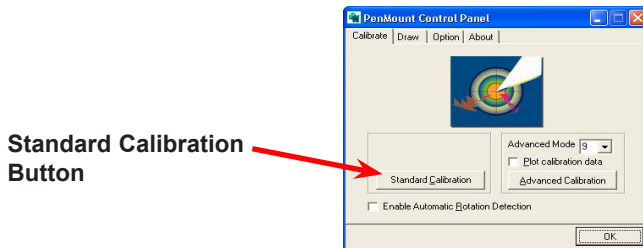
Figure 9-1. PenMount Screen

2. Select the **Standard Calibration** button (Figure 9-1)

3. A screen will be displayed (Figure 9-2)

Touch the red square.
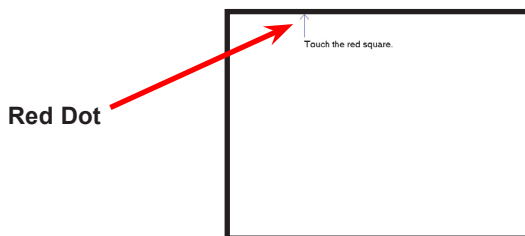
Red Dot

Figure 9-2. Touch Screen Calibration

4. Using the Pen stylus press and hold the **Red Dot**

   While holding the pen on the Red Dot the screen will display 'HOLD'.

5. When the screen display changes to 'Lift Off Display' then lift the pen from the screen

6. The above procedure needs to be repeated as the Red Dot progresses around the screen in a clockwise direction (top, right, bottom, left, centre).

7. In total you will have to touch>hold>lift the screen 5 times. Once the screen has been touched 5 times the new calibration settings will be saved automatically and the screen will go back to the PenMount screen (Figure 9-1 on page 9-2)

TIP

If there is a delay of more than 10 seconds between lifting from the screen and touching the screen again, the PenMount screen (Figure 9-1 on page 9-2) will be displayed and no settings will be saved.

8. Select **OK** to close the *PenMount* screen and go back to the *Windows® Desktop*.

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Switching the X20 Console OFF

TIP

This is the preferred way of shutting down the X20 console.

The ATX Shutdown Process

1. Close all applications that are running, save any data if prompted.

2. The *Windows Desktop* will be displayed.

3. Press the **Power** button for 3 seconds. Both status LED's will flash to indicate that the shutdown is in progress.

4. X20's Power Management will start the full ATX Shutdown, then Windows® will start shutting down and save all settings

5. The X20 console will automatically switch OFF.

WARNING

Holding down the Power button for 10 seconds will cause an immediate shutdown and no data will be saved. This function is not recommended and should only be used if absolutely necessary.

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X20 Accessories

External Speaker

- In the X20 console kit an external speaker is provided.

- With the X20 console kit an Audio Adapter Harness is provided (Figure 11-1).

Connecting the external speaker

1. Mount the external speaker in a suitable location in the vehicle

2. Connect the 8 Pin plug on the Speaker Out Audio Harness (H1173)to plug marked 'A' on the back of the X20 console.

3. Connect the other end of the Speaker Out Audio Harness to the external speaker harness.

Figure 11-1. Audio Adaptor Harness

GPS Hook-Up Cable

The GPS Hook-Up cable allows connection to a DGPS serial cable, which enables the GPS strings to be output to 2 Communications Ports (COM Port). This enables 2 applications to be running simultaneously on the X20 console at the same time, while using the same GPS strings.

To connect the GPS Hook-Up cable:

1. Connect the Male 9 Pin Serial (DB9) plug of the A1901 cable, to the DGPS Receiver's serial cable

2. Connect 2 Female (DB9) plugs into the COM Ports on the back of the X20 console

Please note: Depending on your X20 kit this part may not be supplied.

240 Volt Adapter (optional)

The X20 console can be powered using an optional 240/12 Volt power pack when the X20 console is not being used in a vehicle.

The 240/12 volt power pack still connects to the same Bayonet Power Connector on the back of the X20 console.

The part number for the 240/12 Volt Power Pack is A1098.

Transferring Data

USB Ports

There is a USB Thumbdrive supplied with the X20 console kit.

There are 4 USB ports on the X20 console, 2 on the left side of the console (Figure 2-2 on page 2-6) and 2 at the rear (Figure 2-3 on page 2-7). The USB Thumbdrive can be plugged into any one of the 4 USB ports on the X20 console.

The USB Thumbdrive is used for software upgrades for the X20 console, and for transferring data to between the X20 console and other PC's.

USB Thumbdrives are very rugged and do not have multiple fine pins as with PCMCIA or Compact Flash Cards. USB Thumbdrives are also HOT pluggable which means they can be carefully plugged in and removed at any time whilst the X20 console is running.

TIP

Software supplied on the CD for the Thumbdrive must be loaded on any other PC before the Thumbdrive will operate on that PC.

TIP

If the PC is running Windows® XP then there is no need to load drivers as Windows® XP automatically detects and loads the USB Thumbdrive.

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Looking After the X20 Console

Operating the X20 Console

⬡ DANGER **DANGER**

NEVER START THE VEHICLE WHILE THE X20 CONSOLE IS SWITCHED ON

1. Start the vehicle.

2. Switch the X20 console ON.

⚠ CAUTION *CAUTION*

If the vehicle is left unattended for any time without the vehicle's air-conditioning running, the X20 console should be switched OFF.

In case of extreme temperatures the X20 console may shutdown, should this occur, allow the X20 console to cool down to a normal operating temperatures and then restart.

Cleaning the X20 Touch Screen

To prevent damage to the X20 console use only a soft cotton or microfibre cloth to remove dust and grime.

The touch screen can easily be cleaned by using a cotton or microfibre cloth damped with water.

 WARNING

Never use petroleum based products, acetone or organic based solutions to clean the X20 console, as this will damage both the X20 touch screen and the housing.

Touch Screen Use

Only touch the X20's touch screen with clean fingers (not greasy or oily) or use the pen stylus supplied.

 WARNING

Never use Ballpoint pens, screwdrivers or similar objects on the touch screen.

Storing the X20 Console

NOTICE *NOTICE*

It is important that you read and understand all of the following notes.

- The X20 console should never be left in a vehicle if the temperature is likely to fall below -20°C (-4°F)

- The X20 console should never be left in a vehicle if the temperature is likely to go above 60°C (140°F)

- The X20 console should never be left so direct sunlight is exposed to the Heat Sink Fins (Figure 1-3 on page 2-7) on the back of the X20 console.

WARNING **WARNING**

If any of the above conditions are likely to occur then the X20 console should be removed from that environment.

- Be aware that if the X20 console is left on a tractor connected to the supply, it will draw on power from the tractor battery if the X20 internal battery drops below 8V. This would happen infrequently and is related to the natural discharge rate of the cells.

TIP **TIP**

To stop the vehicle battery from going flat, disconnect the X20 from the tractor battery, when not in use.

- The best way to long-term store an X20 ready for use is switched off and attached to a 13.8V mains adapter (optional extra) at room temperature. This will continuously cycle the internal battery between 8V and 10.8V. The charger will operate for twenty minutes with the first 14.5 minutes at rapid charge followed by 7.5 minutes of pulsed top-up. The charger will switch on about once every two weeks, but depends on the initial charge level. This will keep the battery at about 40% charge.

TIP

Storing the X20 console in this way will give the battery its longest possible life.

- After extended storage, and if the X20 console will not start (battery LED is red), bring the X20 up to room temperature (above 10°C (45°F)) and connect to 13.8VDC mains adapter or connect to tractor harness. Leave it switched off but connected, and notice that the battery LED will start to flash green. This means that rapid charge is in progress. The X20 console is usable after about 5 -10 minutes. This cycle will last for about 20 minutes if left. If the battery is so discharged that the voltage is below 8V the battery will trickle charge until the voltage rises above 8V and will then rapid charge. This is a function of the battery chemistry, as are the temperature limitations on charging.

- Be aware that fast charge and pulse top-up only operates in the range 0°C (32°F) to 50°C (122°F). At temperatures outside this range the charging process is a trickle charge only.

Nickel-Metal Hydride Battery Characteristics

All batteries are affected by self-discharge. This is not a defect per se, although improper use enhances the condition. Self-discharge is not linear; the highest loss occurs right after charge, and then tapers off.

Nickel-based batteries exhibit a relatively high self-discharge. At ambient temperature, a new nickel-cadmium loses about 10% of its capacity in the first 24 hours after charge. The self-discharge settles to about 10% per month afterwards. Higher temperature increases the self-discharge substantially. As a general guideline, the rate of self-discharge doubles with every 10°C (18°F) increase in temperature. The self-discharge of nickel-metal-hydride is about 30% higher than that of nickel-cadmium.

The success of nickel-metal hydride has been driven by high energy density and the use of environmentally friendly metals. The modern nickel-metal hydride offers up to 40% higher energy density compared to the standard nickel-cadmium. There is potential for yet higher capacities, but not without some negative side effects.

Nickel-metal hydride is less durable than nickel-cadmium.

⚠ CAUTION **CAUTION**

Cycling under heavy load and storage at high temperature reduces the service life of the battery.

Nickel-metal hydride suffers from high self-discharge, which is higher than that of nickel-cadmium.

Nickel-metal hydride has been replacing nickel-cadmium in markets such as wireless communications and mobile computing. Experts agree that nickel-metal hydride has greatly improved over the years, but limitations remain. Most shortcomings are native to the nickel-based technology and are shared with nickel-cadmium. It is widely accepted that nickel-metal hydride is an interim step to lithium-based battery technology.

Nickel-metal-hydride is less forgiving than the nickel-cadmium if charged under high and low temperatures. Nickel-metal-hydride cannot be fast charged below 10°C (45°F) neither can it be slow charged below 0°C (32°F). The X20 charger is designed to adjust the charge rate to existing temperatures. This is why this manual recommends that the X20 is brought to room temperature before being charged after an extended period of storage.

At higher temperatures, the charge acceptance of nickel-based batteries is drastically reduced.

 TIP

A battery that provides a capacity of 100% when charged at moderate room temperature can only accept 70% if charged at 45°C (113°F), and 45% if charged at 60°C (140°F).

Advantages of Nickel-Metal Hydride Batteries

- 30-40% higher capacity than standard nickel-cadmium. Nickel-metal-hydride has potential for yet higher energy densities

- Less prone to memory than nickel-cadmium - fewer exercise cycles are required

- Simple storage and transportation - transport is not subject to regulatory control

- Environmentally friendly - contains only mild toxins; profitable for recycling

Disadvantages of Nickel-Metal Hydride Batteries

- Limited service life - the performance starts to deteriorate after 200-300 cycles if repeatedly deeply cycled. Deep cycling does not occur in normal X20 use

- Relatively short storage of three years

TIP

Cool temperature and partial charge slows battery aging

- Limited discharge current - although nickel-metal-hydride is capable of delivering high discharge currents, heavy load reduces the battery's cycle life. High discharge only occurs during an emergency battery-supported shutdown of the X20

- More complex charge algorithm needed - nickel-metal-hydride generates more heat during charge and requires slightly longer charge times than nickel-cadmium. Trickle charge settings are critical because the battery cannot absorb overcharge. This is managed by the X20's microprocessor controlled power management system

- High self-discharge - typically 50% higher than nickel-cadmium

- Performance degrades if stored at elevated temperatures- nickel-metal-hydride should be stored in a cool place at 40% state-of-charge

- High maintenance - nickel-metal hydride requires regular full discharge to prevent crystalline formation; nickel-metal-hydride once in every 3 months. This will happen between seasons but probably not as often as required for absolute maximum life span

The X20 Console

The X20 has a power management system that remains active even when the unit is switched OFF. However it uses very little standby power, typically 600uA at 5V or 0.003W.

This management system ensures that before an X20 can be turned on and used there is enough internal battery energy available to successfully close the unit down in the event of the sudden and unexpected loss of the external supply. This is designed to protect the users data and also protect the integrity of the operating system and the compact flash it is built on.

The internal battery is not there in order to use the X20 as a fully mobile device and will not support this function.

Any voltage transients from vehicle start-up are also controlled by the internal battery.

The battery packs are deep cycled at Topcon Precision Agriculture before the X20 is dispatched.

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X20 Console Specifications

System Software

- Windows® XP PRO SP2

Processing

- Low-power 1GHz CPU; 0°C to 60°C (32°F - 142°F) Fanless Operation
- SDRAM SODIMM 512Mb
- 2GB Industrial Flashcard

Display and Touch Screen

- 8.4" TFT Active Matric Colour
- Indoor/Outdoor display with Resistative touch screen
- SVGA 800 X 600 pixels
- 32 bit Colour
- Contrast Ratio 400:1
- Brightness 400 cd/m2
- Brightness Control via 'X20 Manager' software
- External XGA monitor support 1024 X 768

Interfaces

- 4 X RS232 Serial Ports
- COM 2 configurable to RS232 or RS485
- 4 X USB 2.0 Ports (2 at Rear, 2 at side)
- 1 X CANBUS Port (ISO11783)
- 1 X PS2 Mouse port
- 1 X PS2 Keyboard port
- 1 X 8 Pin Audio DIN port
- 1 X VGA Port (1280 X 1024 at 60Hz), (1024 X 760 at 85Hz)
- 1 X 10/100 Base T Ethernet Port (RJ45)

Power

- Input Voltage 10.8- 18.0 Volts DC
- Built in protection against vehicles start up.
- Full ATX safe Shut Down
- 3 Pin MIL-C-5015 Bayonet connector

Audio

- 1.5 Watt Stereo audio amplifier
- Internal speaker
- External stereo line inputs/outputs and microphone (8 pin DIN socket)

Dimensions

- Size: 248mm x 188mm x 70mm (7.4 " x 9.8" x 2.7")
- Weight: 2.35kg (5.2 pounds)
- International Standard Mounting System (RAM® Type)

Environmental

- Operating Temp: 0°C - 50°C (32°F - 122°F)
- Storage: -20°C to 60°C (-4°F to 140°F)
- Humidity: (0% - 90% RH, NC)

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