Intermec

Service Manual

CV30 Fixed Mount Computer

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Contents

Before You Begin

This section provides you with safety information, technical support information, and sources for additional product information.

Safety Summary

Your safety is extremely important. Read and follow all warnings and cautions in this document before handling and operating Intermec equipment. You can be seriously injured, and equipment and data can be damaged if you do not follow the safety warnings and cautions.

Do Not Repair or Adjust Alone

Do not repair or adjust energized equipment alone under any circumstances. Someone capable of providing first aid must always be present for your safety.

First Aid

Always obtain first aid or medical attention immediately after an injury. Never neglect an injury, no matter how slight it seems.

Resuscitation

Begin resuscitation immediately if someone is injured and stops breathing. Any delay could result in death. To work on or near high voltage, you should be familiar with approved industrial first aid methods.

Energized Equipment

Never work on energized equipment unless authorized by a responsible authority. Energized electrical equipment is dangerous. Electrical shock from energized equipment can cause death. If you must perform authorized emergency work on energized equipment, be sure that you comply strictly with approved safety regulations.

Sicherheitsübersicht

Ihre Sicherheit ist äußerst wichtig. Lesen und befolgen Sie alle Warn- und Vorsichtshinweise in diesem Dokument, bevor Sie Intermec-Geräte verwenden und betreiben. Falls die Sicherheitswarnungen und Vorsichtshinweise nicht befolgt werden, kann es zu ernsthaften Verletzungen sowie Geräteschäden und Datenverlusten kommen.

Nicht alleine Reparaturen oder Einstellungen durchführen

Reparieren oder justieren Sie niemals alleine stromführende Geräte. Aus Sicherheitsgründen muss eine zweite Person anwesend sein, die erste Hilfe leisten kann.

Erste Hilfe

Nach einer Verletzung unverzüglich erste Hilfe oder medizinische Betreuung aufsuchen. Verletzungen dürfen nicht vernachlässigt werden, auch wenn sie noch so unbedeutend erscheinen.

Wiederbelebung

Wiederbelebungsversuche müssen unverzüglich eingeleitet werden, falls jemand verletzt wird und die Atmung aussetzt. Verzögerungen können zum Tod führen. Bei Arbeiten an oder in der Nähe von Hochspannung müssen Ihnen die zugelassenen Erste-Hilfe-Methoden vertraut sein.

Stromführende Geräte

Niemals an stromführenden Geräten arbeiten, es sei denn Sie wurden von einer verantwortlichen Stelle dazu berechtigt. Stromführende Geräte sind gefährlich. Stromschläge durch stromführende Geräte können zu tödlichen Verletzungen führen. Falls zugelassene Notreparaturen an stromführenden Geräten vorgenommen werden müssen, ist darauf zu achten, dass die genehmigten Sicherheitsvorschriften strikt eingehalten werden.

Safety Information

Your safety is extremely important. Read and follow all warnings and cautions in this document before handling and operating Intermec equipment. You can be seriously injured, and equipment and data can be damaged if you do not follow the safety warnings and cautions.

This section explains how to identify and understand dangers, warnings, cautions, and notes that are in this document. You may also see icons that tell you when to follow ESD procedures and when to take special precautions for handling optical parts.

A caution alerts you to an operating procedure, practice, condition, or statement that must be strictly observed to prevent equipment damage or destruction, or corruption or loss of data.

Vorsicht: Ein Vorsichtshinweis macht Sie auf ein Betriebsverfahren, eine Praktik, einen Zustand oder eine Anweisung aufmerksam, die genauestens befolgt werden muss, um Schäden oder eine Zerstörung der Maschine bzw. die Zerstörung oder den Verlust von Daten zu vermeiden.

This icon appears at the beginning of any procedure in this manual that could cause you to touch components (such as printed circuit boards) that are susceptible to damage from electrostatic discharge (ESD). When you see this icon, you must follow standard ESD guidelines to avoid damaging the equipment you are servicing.

Note: Notes either provide extra information about a topic or contain special instructions for handling a particular condition or set of circumstances.

Global Services and Support

Warranty Information

To understand the warranty for your Intermec product, visit the Intermec web site at **www.intermec.com** and click **Service & Support** > **Warranty**.

Disclaimer of warranties: The sample code included in this document is presented for reference only. The code does not necessarily represent complete, tested programs. The code is provided "as is with all faults." All warranties are expressly disclaimed, including the implied warranties of merchantability and fitness for a particular purpose.

Web Support

Visit the Intermec web site at **www.intermec.com** to download our current manuals (in PDF). To order printed versions of the Intermec manuals, contact your local Intermec representative or distributor.

Visit the Intermec technical knowledge base (Knowledge Central) at **intermec.custhelp.com** to review technical information or to request technical support for your Intermec product.

Telephone Support

These services are available from Intermec.

Services	Description	In the USA and Canada call 1-800-755-5505 and choose this option
Order Intermec products	• Place an order. • Ask about an existing order.	1 and then choose 2
Order Intermec media	Order printer labels and ribbons.	1 and then choose 1
Order spare parts	Order spare parts.	1 or 2 and then choose 4
Technical Support	Talk to technical support about your Intermec product.	2 and then choose 2
Service	• Get a return authorization number for authorized service center repair. • Request an on-site repair technician.	2 and then choose 1
Service contracts	• Ask about an existing contract. • Renew a contract. • Inquire about repair billing or other service invoicing questions.	1 or 2 and then choose 3

Outside the U.S.A. and Canada, contact your local Intermec representative. To search for your local representative, from the Intermec web site, click **Contact**.

Who Should Read This Manual

This manual contains all of the information necessary to repair the CV30 Fixed Mount Computer. It provides an exploded view of the computer, the spare parts lists, procedures that describe how to replace parts, and information on how to test and reflash the computer.

This manual is written for Intermec service technicians.

1 Replacing Parts

Use this chapter to learn how to open, replace parts in, and close the CV30 Fixed Mount Computer. This chapter also provides cautions to follow when servicing the CV30.

Cautions

Note: Opening this product can result in voiding the warranty. The internal workings of this product can only be accessed by Intermec service personnel.

Integrated circuits on the printed circuit board (PCB) in the computer are very sensitive to damage by electrostatic discharge (ESD). Prevent ESD by always wearing skin contact ground straps firmly attached to the equipment metal base assembly when working inside of the computer. Never open the computer without safeguarding the entire work area with ESD protection. Failure to comply may result in damage to PCB components.

Vorsicht: Integrierte Schaltungen auf der Leiterplatte (LP) im Computer sind äußerst empfindlich auf Schäden durch elektrostatische Entladung (ESD). Zur Verhinderung von elektrostatischer Entladung bei Arbeiten im Computer immer Ableitungsschlaufen mit Hautkontakt tragen, die fest am Metallsockel der Ausrüstung befestigt sind. Den Computer nie öffnen, bevor der gesamte Arbeitsbereich mit Schutzvorrichtungen gegen elektrostatische Entladung gesichert ist. Andernfalls könnten die LP-Komponenten beschädigt werden.

This icon appears at the beginning of any procedure in this manual that could cause you to touch components (such as printed circuit boards) that are susceptible to damage from electrostatic discharge (ESD). When you see this icon, you must follow standard ESD guidelines to avoid damaging the equipment you are servicing.

Replacing Parts

Use this section to understand how to replace the spared parts on the CV30. Each procedure lists the tools and parts you need to complete replacing the part.

Opening the Top Cover (Radome)

To open the top cover, you need these parts and tools.

Parts and Tools

Description	Part Number
Small Phillips screwdriver	
Antenna cable remover	591802-001

To replace the top cover

Follow ESD Procedures

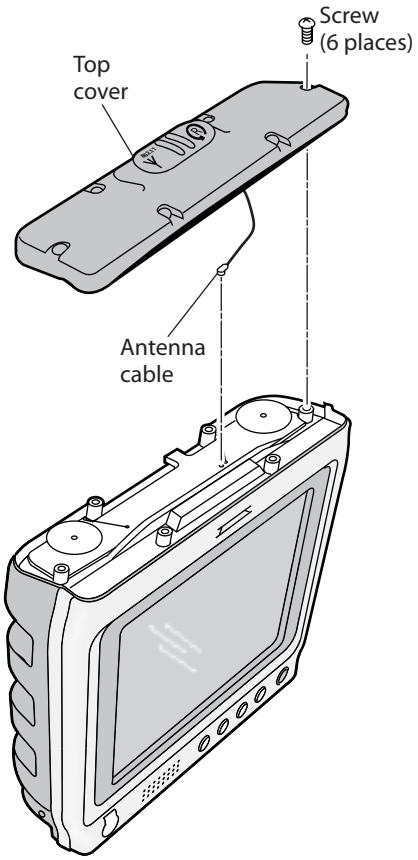
1. Disconnect the CV30 from power.
2. Remove the six 4-40 x 3/8 inch Phillips screws from the radome (top cover) and lift it away from the CV30.
3. Disconnect the antenna cable from the Remote Antenna connector on the radome board assembly PCB.

Caution

Do not pull on the antenna wire because the cable may break. If you do not have an antenna cable remover, insert your fingernail under the antenna cable socket and lift gently.

Vorsicht: Nicht am Antennenkabel ziehen, da das Kabel reißen könnte. Falls kein Antennenkabel-Ausbauwerkzeug verfügbar ist, einen Fingernagel unter den Sockel des Antennenkabels stecken und sacht anheben.

4. Completely separate the top cover from the CV30.



Opening the Front Cover

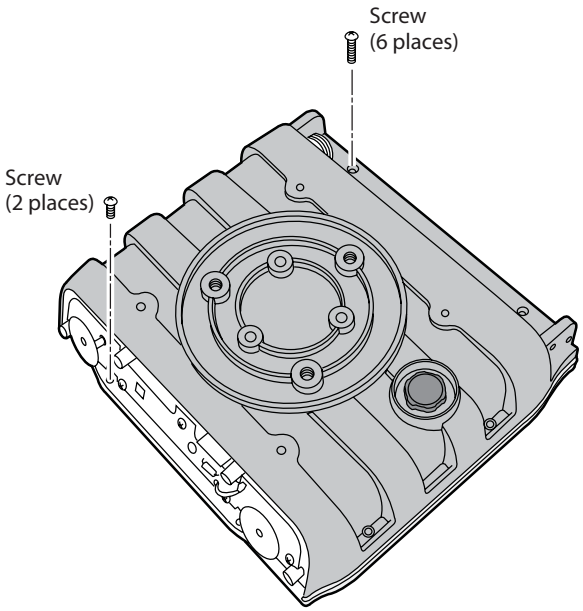
To open the front cover, you need these parts and tools.

Parts and Tools

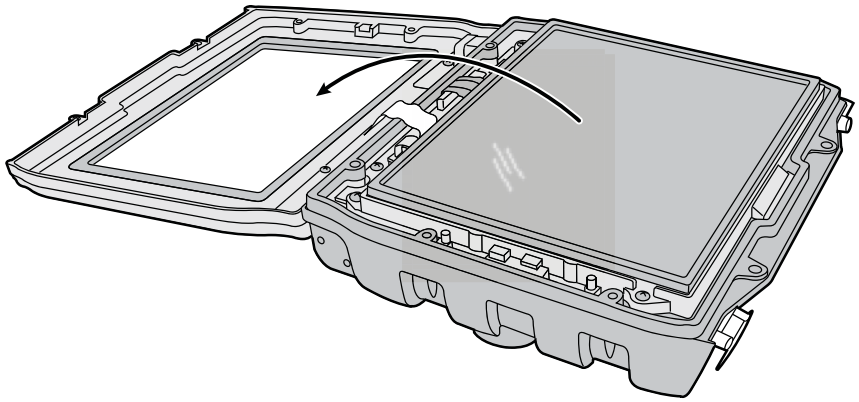
Description	Part Number
Small Phillips screwdriver	
Antenna cable remover	591802-001

To open the front cover

1. Open the top cover. For help, see **"Opening the Top Cover (Radome)" on page 2**.
2. Remove the six 4-40 x 5/8 inch screws and the two 4-40 x 3/8 inch Phillips screws that attach the front cover to the CV30.



3. Turn the CV30 over and lift the front cover away from the top of the CV30 being careful not to disconnect the keypad flex cable. Gently lay the front cover down with the flex cable connecting the two pieces.



Replacing the Radome (Top Cover)

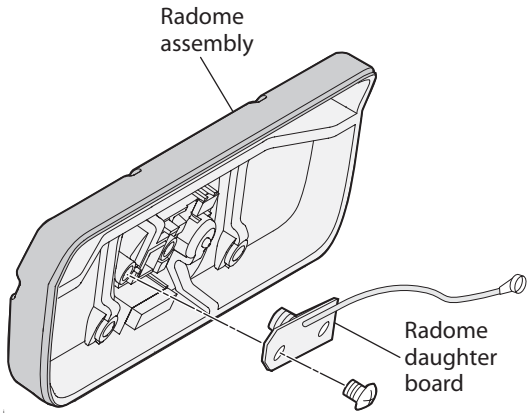
There are two spared parts on the CV30 radome or top cover. You can replace the entire top cover assembly or you can just replace the radome daughter board PCB. To replace the top cover or the radome PCB, you need these parts and tools.

Parts and Tools

Description	Part Number
CV30 radome assembly	VE011-S6015-xx
CV30 radome PCB	VE011-6011-xx
Small Phillips screwdriver	
Antenna cable remover	591802-001

To replace the radome assembly or radome PCB

1. Open the top cover. For help, see "Opening the Top Cover (Radome)" on page 2.
2. If you need to replace the radome daughter board PCB:
   a. Remove the two Phillips screws that attach the board to the radome assembly.
   b. Remove the daughter board from the radome cover.



c Insert the new daughter board into the radome cover being careful not to damage the antenna connector.

d Secure the daughter board with two Phillips screws.

3 Reconnect the radome antenna to the remote antenna connector on the radome board assembly PCB.

4 Attach the new radome cover and secure it with the six 4-40 x 3/8 inch Phillips screws removed previously and tighten to 5.5 lb-in.

5 Reconnect power to the CV30.

Replacing the Radome Board Assembly PCB

To replace the radome board assembly PCB, you need these parts and tools.

Parts and Tools

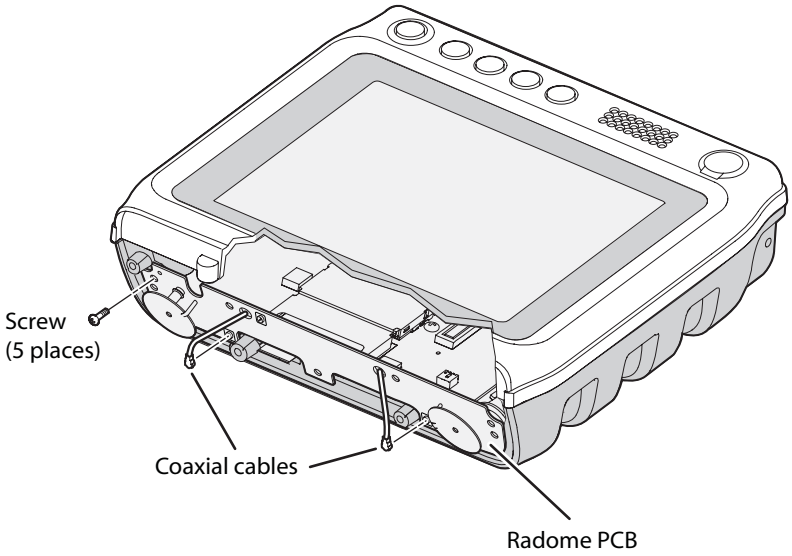
Description	Part Number
CV30 radome board assembly PCB	VE011-S6026-xx
Small Phillips screwdriver	
Antenna cable remover	591802-001

To replace the radome board assembly PCB

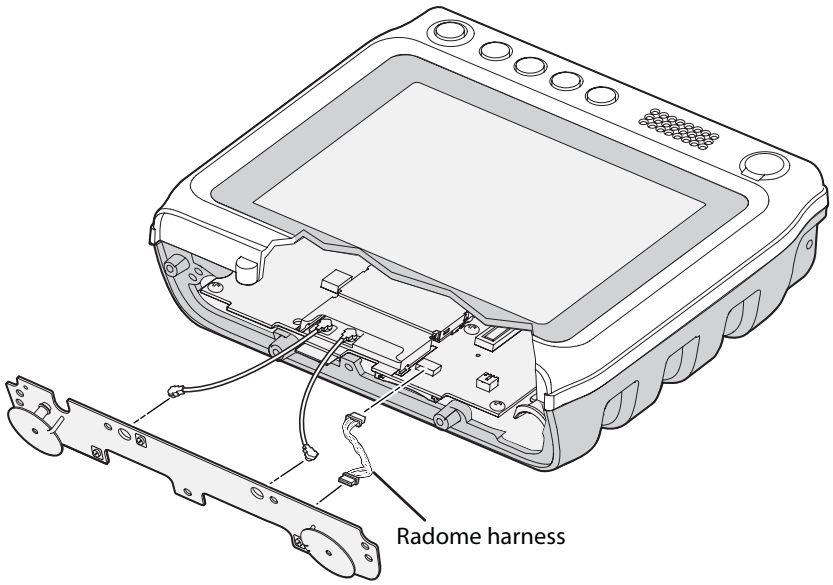
1 Open the top cover. For help, see **"Opening the Top Cover (Radome)" on page 2**.

2 Disconnect the two 802.11 radio antenna coaxial cables from the radome board assembly PCB.

3 Remove the five 4-40 x 1/4 inch Phillips screws that attach the radome board assembly PCB to the CV30 frame.



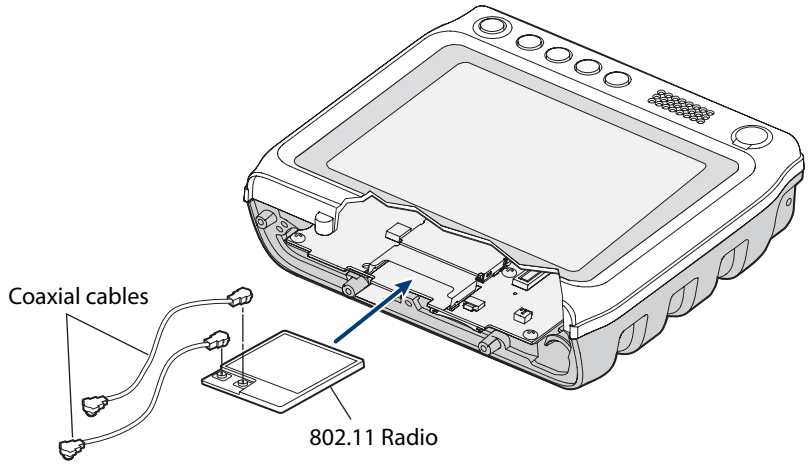
4 Lift the radome board assembly PCB away from the CV30 carefully and disconnect the CV30 radome harness. You will also need to carefully feed the 802.11 radio antenna coaxial cables through the radome board assembly PCB.



5 If you need to replace the 802.11 radio module:

a Using a needlenose pliers or your fingers, gently pull the 802.11 radio module out of the CV30.

b Disconnect the two coaxial cables from the 802.11 radio module.

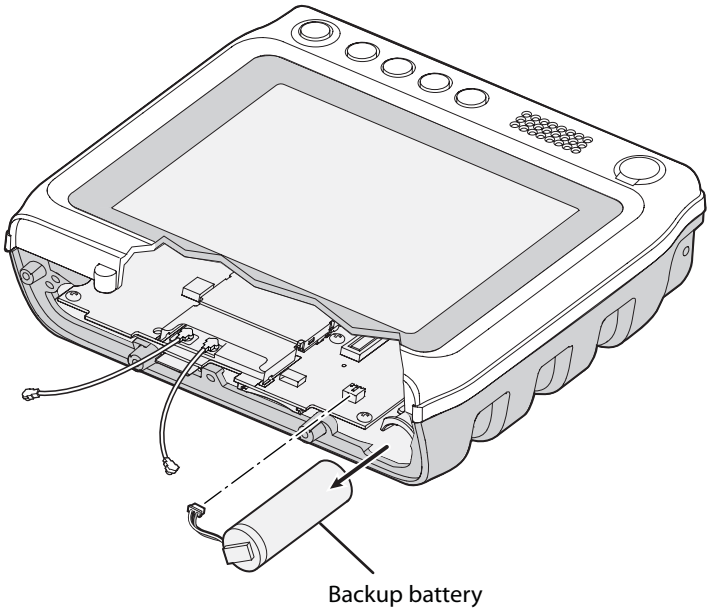


c Attach the two coaxial cables to the new 802.11 radio module. The longer cable attaches to the middle cable connector on the module. The shorter cable attaches to the connector closest to the edge.

d Insert the new 802.11 radio module into the CV30.

6 If you need to replace the backup battery:

a Disconnect the backup battery cable from the Main PCB and slide the backup battery out of the CV30.



b Insert the new backup battery and attach the cable to the Main PCB.

7 Attach the CV30 radome harness to the new radome board assembly PCB and feed the two 802.11 radio antenna coaxial cable connectors through the holes in the new radome board assembly PCB.

8 Replace the five 4-40 x 1/4 inch Phillips screws that attach the radome board assembly PCB to the CV30 frame.

9 Connect the two 802.11 radio coaxial cables to the radome board assembly PCB.

10 Reattach the radome daughter board antenna cable to the Remote Antenna connector on the radome board assembly PCB.

11 Attach the radome cover and secure it with the six 4-40 x 3/8 inch Phillips screws removed previously and tighten to 5.5 lb-in.

12 Reconnect power to the CV30.

Replacing the Touch Panel Assembly

To replace the touch panel assembly, you need these parts and tools.

Parts and Tools

Description	Part Number
Touch panel service assembly	VE011-S6018-xx
Small Phillips screwdriver	
Antenna cable remover	591802-001
Flathead screwdriver	
Cleaning solution and cloths for cleaning coated optical glass.	

To replace the touch panel assembly

1 Open the top cover. For help, see "Opening the Top Cover (Radome)" on page 2.

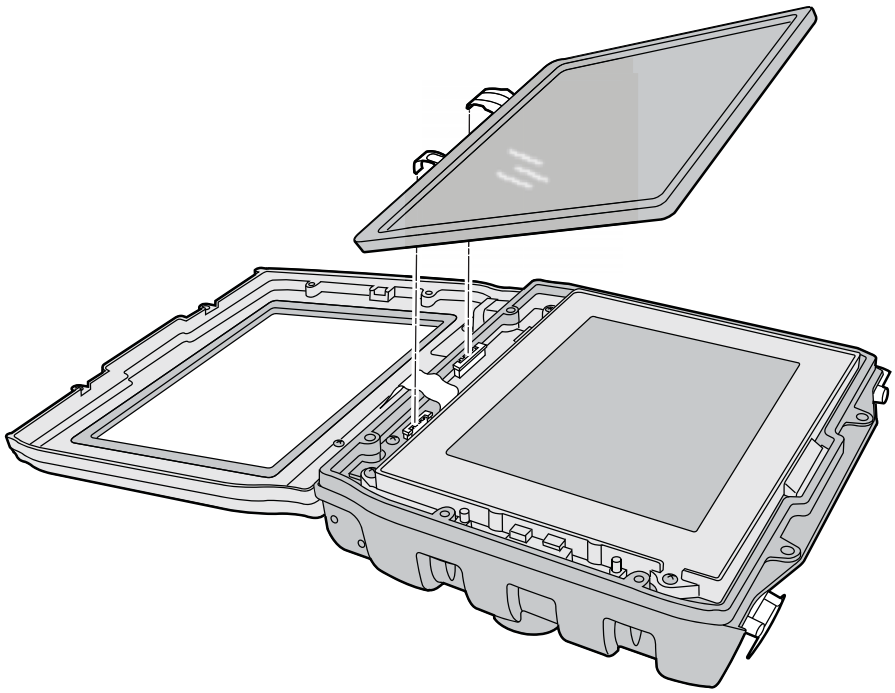
2 Open the front cover. For help, see "Opening the Front Cover" on page 4.

3 Use the flathead screwdriver to release the two flex connectors that connect the touch panel to the CV30.

The flex connectors are called zero insertion force (ZIF) connectors and they are very fragile. To avoid breaking the connectors, open and close them carefully. Do not apply excessive pressure to the movable part of the connector when opening and closing it.

Vorsicht: Die Flex-Steckverbinder werden als ZIF-Steckverbinder (Zero Insertion Force) bezeichnet und sind extrem zerbrechlich. Die Steckverbinder müssen vorsichtig geöffnet und geschlossen werden, damit sie nicht beschädigt werden. Beim Öffnen und Schließen keinen starken Druck auf den beweglichen Teil des Steckverbinders ausüben.

4 Lift the touch panel assembly away from the CV30.



5 Make sure the inner surface of the touch panel and the display are dust free and have no fingerprints before installing the touch screen. Use the cloth and cleaning solution if you need to clean any surfaces.

6 Insert the new touch panel assembly and connect the two flex cables to the CV30.

7 Replace the front cover and secure it with the six 4-40 x 5/8 inch screws and the two 4-40 x 3/8 inch screws removed previously and tighten to .73 Nm (6.5 lb-in).

8 Reattach the antenna cable to the Remote Antenna connector on the radome board assembly PCB.

9 Replace the top cover and secure it with the six 4-40 x 3/8 inch Phillips screws removed previously and tighten to .62 Nm (5.5 lb-in).

10 Reconnect power to the CV30.

Replacing the Display Frame Assembly

To replace the display frame assembly, you need these parts and tools.

Parts and Tools

Description	Part Number
Frame display assembly	VE011-S6019-xx
Small Phillips screwdriver	
Antenna cable remover	591802-001
Flathead screwdriver	

To replace the display frame assembly

1 Open the top cover. For help, see "Opening the Top Cover (Radome)" on page 2.

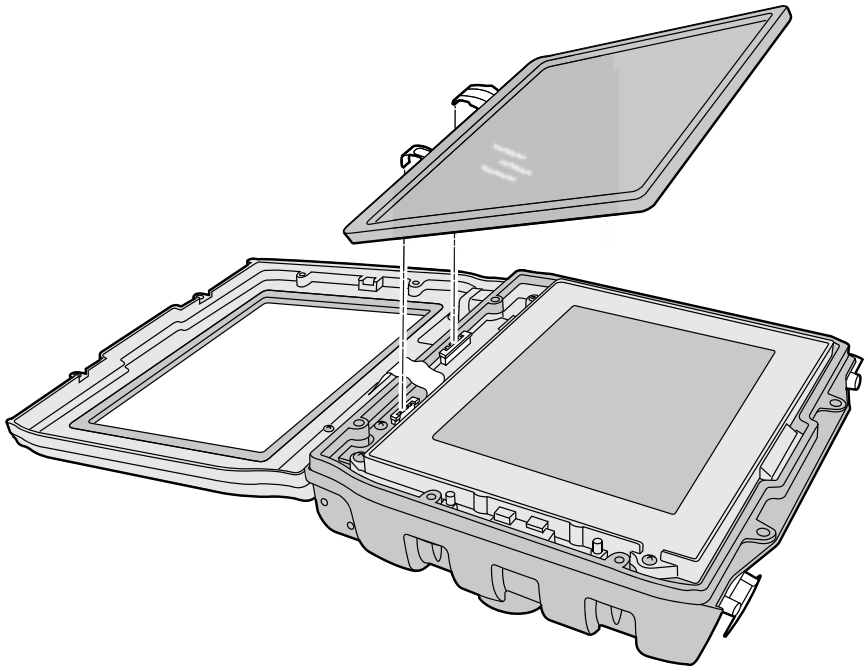
2 Open the front cover. For help, see "Opening the Front Cover" on page 4.

3 Use the flathead screwdriver to release the two flex connectors that connect the touch panel to the CV30.

Caution

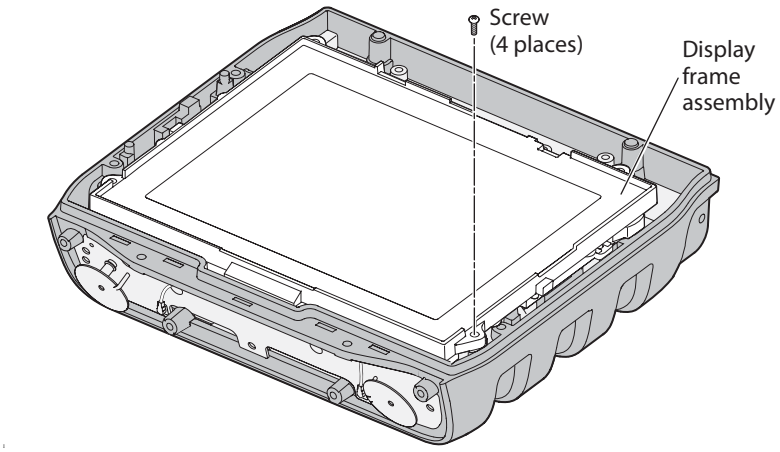
The flex connectors are called zero insertion force (ZIF) connectors and they are very fragile. To avoid breaking the connectors, open and close them carefully. Do not apply excessive pressure to the movable part of the connector when opening and closing it.

Vorsicht: Die Flex-Steckverbinder werden als ZIF-Steckverbinder (Zero Insertion Force) bezeichnet und sind extrem zerbrechlich. Die Steckverbinder müssen vorsichtig geöffnet und geschlossen werden, damit sie nicht beschädigt werden. Beim Öffnen und Schließen keinen starken Druck auf den beweglichen Teil des Steckverbinders ausüben.

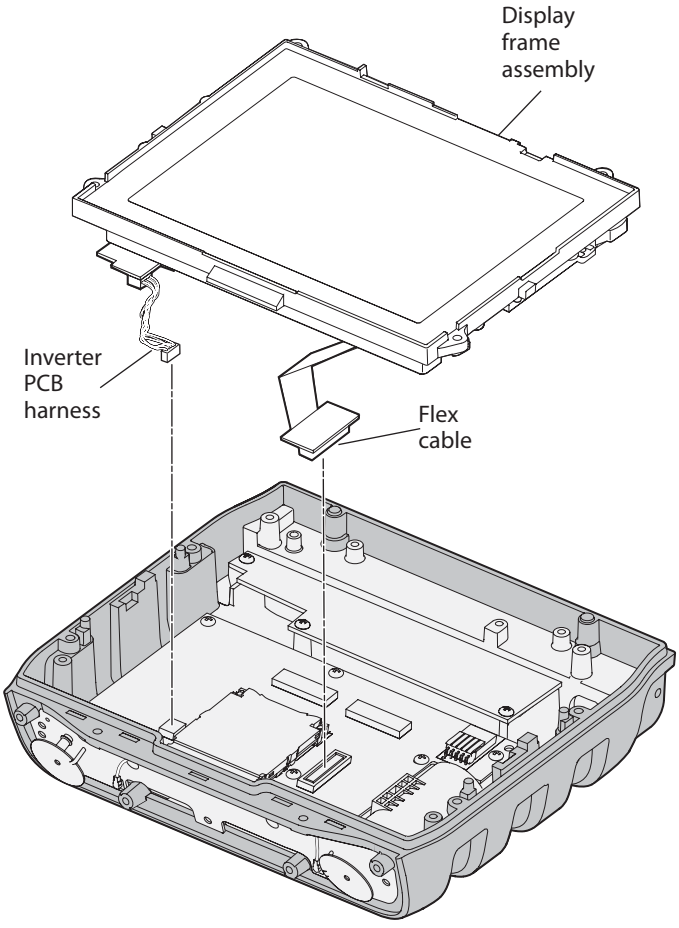


4 Lift the touch panel assembly away from the CV30.

5 Remove the four 4-40 x 3/8 inch Phillips screws that attach the display frame to the CV30 base.



6 Lift the display frame assembly away from the CV30 base and disconnect the display flex cable and the inverter PCB harness.



7 Insert the new display frame assembly and connect the display flex cable and the inverter PCB harness.

8 Make sure the inner surface of the touch panel and the display are dust free and have no fingerprints before installing the touch screen. Use the cloth and cleaning solution if you need to clean any surfaces.

9 Insert the touch panel assembly and connect the two flex cables to the CV30.

10 Replace the front cover and secure it with the six 4-40 x 5/8 inch screws and the two 4-40 x 3/8 inch screws removed previously and tighten to .73 Nm (6.5 lb-in).

11 Reattach the antenna cable to the Remote Antenna connector on the radome board assembly PCB.

12 Replace the top cover and secure it with the six 4-40 x 3/8 inch Phillips screws removed previously and tighten to .62 Nm (5.5 lb-in).

13 Reconnect power to the CV30.

Replacing the Inverter Board

To replace the inverter board, you need these parts and tools.

Parts and Tools

Description	Part Number
Inverter Board PCB	VE011-6006-xx
Inverter harness	VE011-8057-xx
Small Phillips screwdriver	
Antenna cable remover	591802-001
Flathead screwdriver	

To replace the inverter board

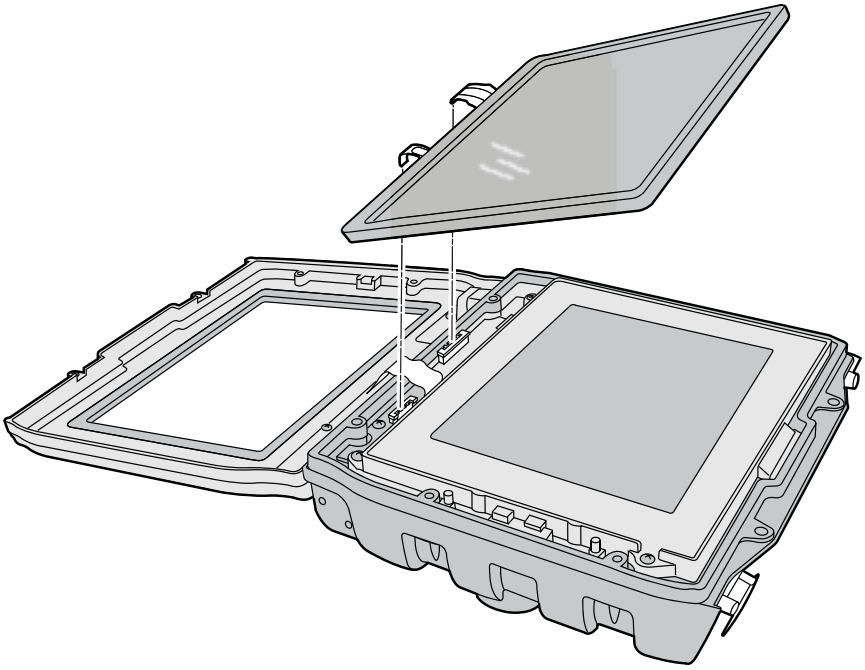
1 Open the top cover. For help, see "Opening the Top Cover (Radome)" on page 2.

2 Open the front cover. For help, see "Opening the Front Cover" on page 4.

3 Use the flathead screwdriver to release the two flex connectors that connect the touch panel to the CV30.

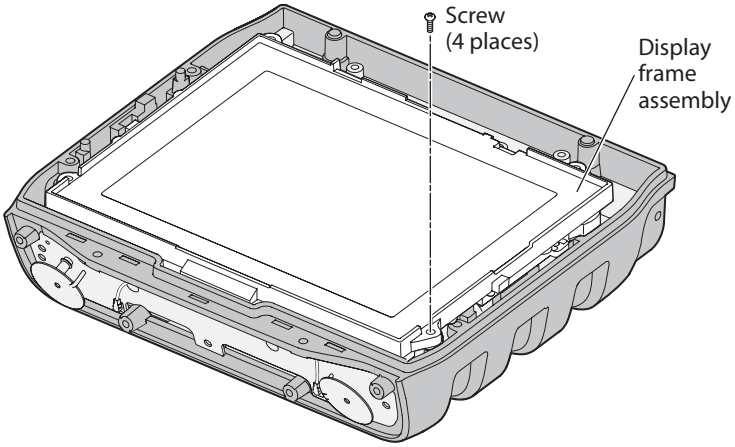
The flex connectors are called zero insertion force (ZIF) connectors and they are very fragile. To avoid breaking the connectors, open and close them carefully. Do not apply excessive pressure to the movable part of the connector when opening and closing it.

Vorsicht: Die Flex-Steckverbinder werden als ZIF-Steckverbinder (Zero Insertion Force) bezeichnet und sind extrem zerbrechlich. Die Steckverbinder müssen vorsichtig geöffnet und geschlossen werden, damit sie nicht beschädigt werden. Beim Öffnen und Schließen keinen starken Druck auf den beweglichen Teil des Steckverbinders ausüben.

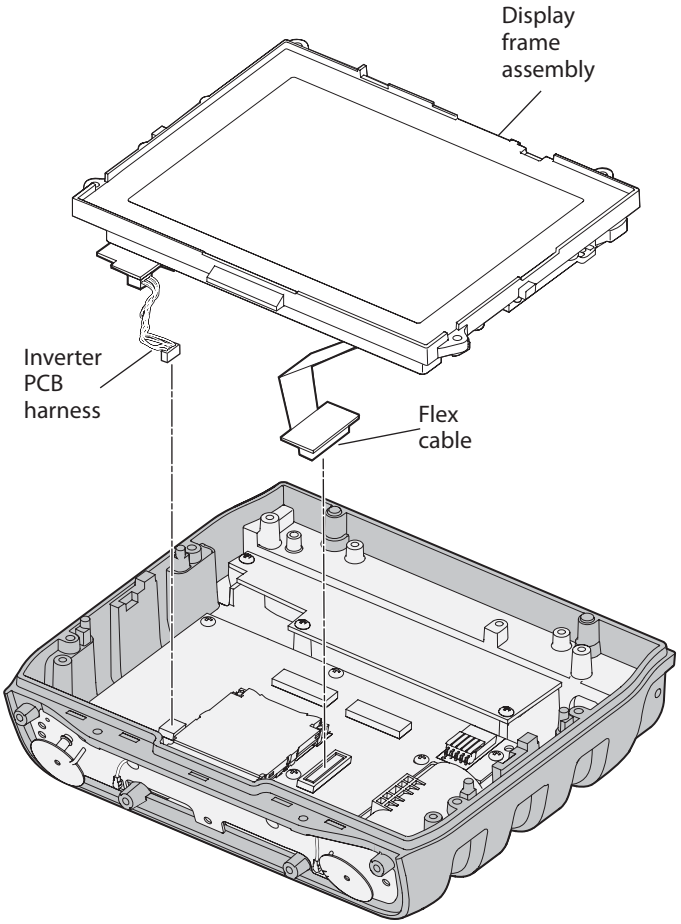


4 Lift the touch panel assembly away from the CV30.

5 Remove the four 4-40 x 3/8 inch Phillips screws that attach the display frame assembly to the CV30 base.

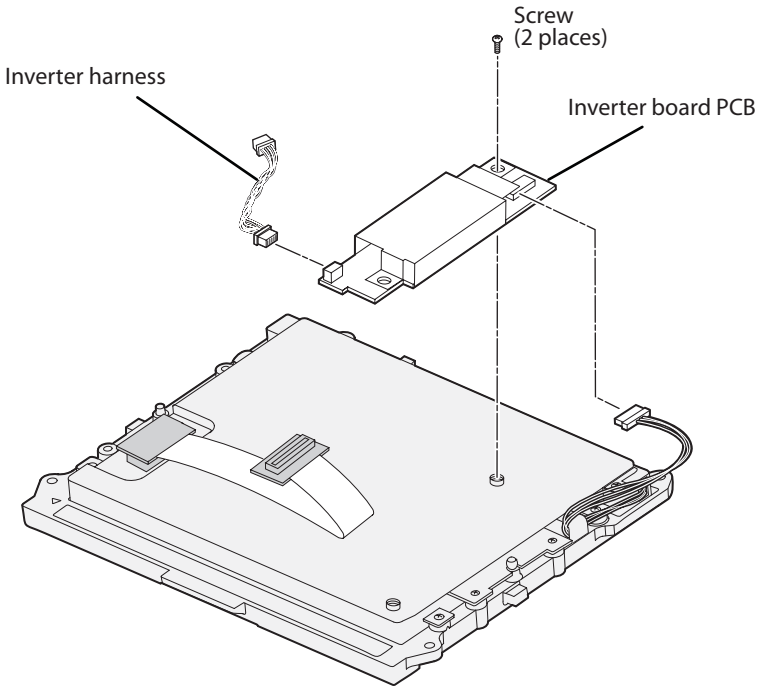


6 Lift the display frame assembly away from the CV30 base and disconnect the display flex cable and the inverter PCB harness.



7 Carefully lay the display frame assembly on a surface with the display facing downward.

8 Remove the two Phillips screws that attach the inverter board PCB to the frame display assembly, disconnect the display harness and the inverter harness from the inverter board PCB, and lift the inverter board PCB away from the frame display assembly.



9 Insert the new inverter board PCB and secure it to the frame display assembly with the two Phillips screws removed in the previous step.

10 Reattach the inverter PCB harness and the display harness to the inverter board PCB.

11 Insert the frame display assembly back into the CV30 base, connect the display flex cable and the inverter PCB harness, and replace the four 4-40 x 3/8 inch Phillips screws removed in Step 5.

12 Replace the touch panel assembly and connect the two flex cables to the CV30.

13 Replace the front cover and secure it with the six 4-40 x 5/8 inch screws and the two 4-40 x 3/8 inch screws removed previously and tighten to .73 Nm (6.5 lb-in).

14 Reattach the antenna cable to the Remote Antenna connector on the radome board assembly PCB.

15 Replace the top cover and secure it with the six 4-40 x 3/8 inch Phillips screws removed previously and tighten to .62 Nm (5.5 lb-in).

16 Reconnect power to the CV30.

Replacing the Keypad

To replace the keypad, you may need these some or all of these parts and tools.

Parts and Tools

Description	Part Number
Keypad board PCB	VE011-S6005-xx
CV30 keypad	VE011-8020-xx
CV30 keypad flex	VE011-8052-xx
Small Phillips screwdriver	
Antenna cable remover	591802-001
Flathead screwdriver	

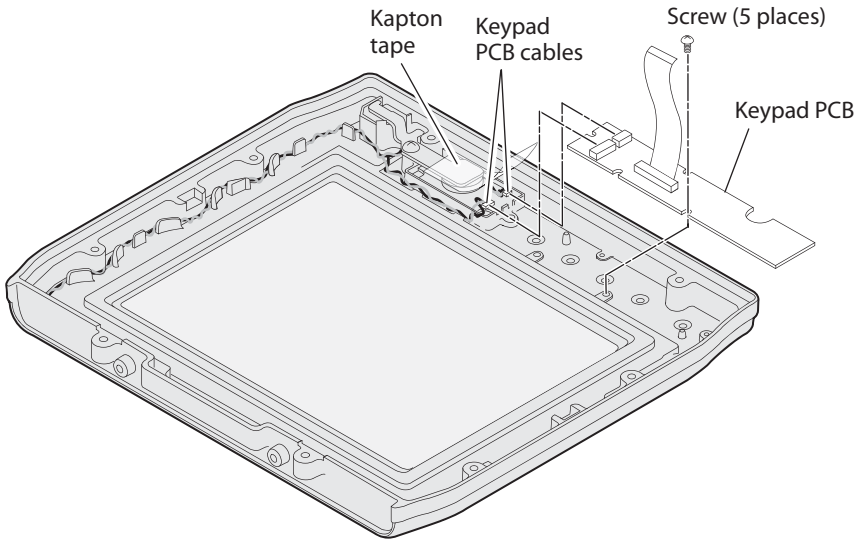
To replace the keypad

1. Open the top cover. For help, see "Opening the Top Cover (Radome)" on page 2.
2. Open the front cover. For help, see "Opening the Front Cover" on page 4.
3. Use the flathead screwdriver to release the keypad flex connector from the touch panel assembly and remove the front cover.

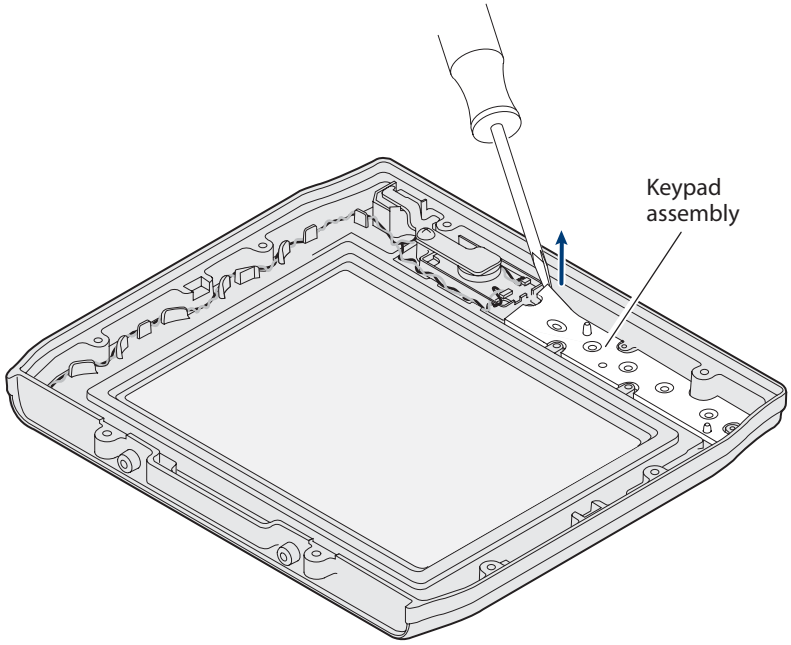
The flex connectors are called zero insertion force (ZIF) connectors and they are very fragile. To avoid breaking the connectors, open and close them carefully. Do not apply excessive pressure to the movable part of the connector when opening and closing it.

Vorsicht: Die Flex-Steckverbinder werden als ZIF-Steckverbinder (Zero Insertion Force) bezeichnet und sind extrem zerbrechlich. Die Steckverbinder müssen vorsichtig geöffnet und geschlossen werden, damit sie nicht beschädigt werden. Beim Öffnen und Schließen keinen starken Druck auf den beweglichen Teil des Steckverbinders ausüben.

4. Lay the front cover down on a flat surface with the keypad PCB facing up.
5. Remove the yellow Kapton tape that covers the back of the speaker and disconnect the two cables from the keypad PCB.
6. Remove the five Phillips screws that secure the keypad PCB to the front cover and remove it.



7 If you need to replace the CV30 keypad, use the flathead screwdriver to pry the keypad away from the front cover until you can peel it off.



8 Peel the backing off the new keypad assembly and firmly press it into place.

9 Insert the new keypad PCB and secure it with five M2x4 pan-head Phillips screws.

10 Reconnect the two cables to the keypad PCB.

11 Reconnect the keypad flex connector to the touch panel assembly.

12 Replace the front cover and secure it with the six 4-40 x 5/8 inch screws and the two 4-40 x 3/8 inch screws removed previously and tighten to .73 Nm (6.5 lb-in).

13 Reattach the antenna cable to the Remote Antenna connector on the radome board assembly PCB.

14 Replace the top cover and secure it with the six 4-40 x 3/8 inch Phillips screws removed previously and tighten to .62 Nm (5.5 lb-in).

15 Reconnect power to the CV30.

Replacing the Touch Heater PCB

To replace the touch heater PCB, you need these parts and tools.

Parts and Tools

Description	Part Number
Touch heater board PCB	VE011-S6004-xx
Touch heater PCB harness	VE011-8055-xx
Small Phillips screwdriver	
Flathead screwdriver	

To replace the touch heater PCB

1 Open the top cover. For help, see "Opening the Top Cover (Radome)" on page 2.

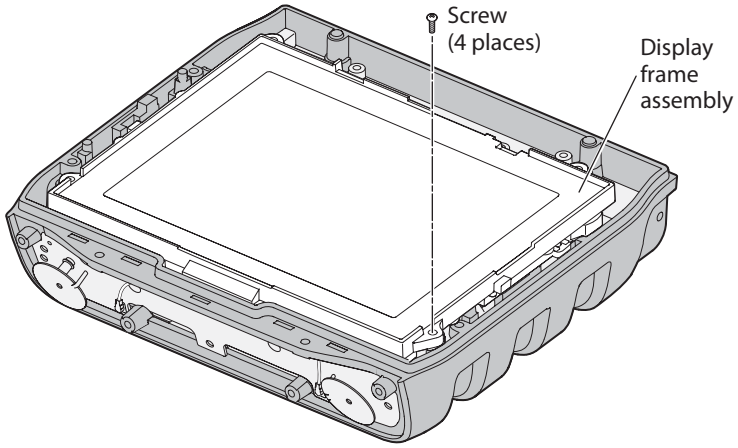
2 Open the front cover. For help, see "Opening the Front Cover" on page 4.

3 Use the flathead screwdriver to release the three flex connectors from the touch panel assembly and remove the front cover.

The flex connectors are called zero insertion force (ZIF) connectors and they are very fragile. To avoid breaking the connectors, open and close them carefully. Do not apply excessive pressure to the movable part of the connector when opening and closing it.

Vorsicht: Die Flex-Steckverbinder werden als ZIF-Steckverbinder (Zero Insertion Force) bezeichnet und sind extrem zerbrechlich. Die Steckverbinder müssen vorsichtig geöffnet und geschlossen werden, damit sie nicht beschädigt werden. Beim Öffnen und Schließen keinen starken Druck auf den beweglichen Teil des Steckverbinders ausüben.

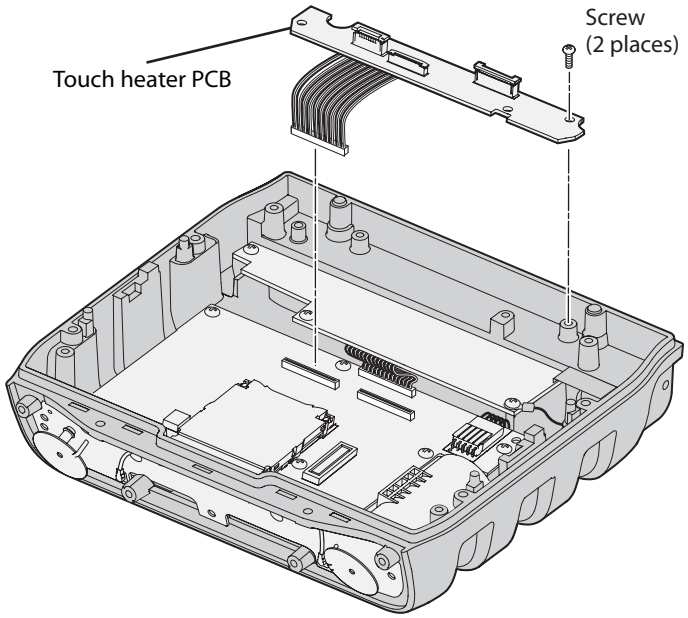
4 Remove the four 4-40 x 3/8 inch Phillips screws that attach the display frame to the CV30 base.



5 Lift the display frame and touch panel assembly away from the CV30 base assembly.

6 Disconnect the touch heater PCB harness from the main PCB.

7 Remove the two 4-40 x 1/4 inch Phillips screws that secure the touch heater PCB to the base assembly and remove it.



8 Insert the new touch heater PCB and harness and secure them to the base assembly with the two 4-40 x 1/4 inch Phillips screws.

9 Reconnect the touch heater harness to the main PCB.

10 Reinsert the display frame and the touch screen assembly and secure them to the base with the four 4-40 x 3/8 inch Phillips screws.

11 Reconnect the three flex connectors to the touch panel assembly.

12 Replace the front cover and secure it with the six 4-4- x 5/8 inch screws and the two 4-40 x 3/8 inch screws removed previously and tighten to .73 Nm (6.5 lb-in).

13 Reattach the antenna cable to the Remote Antenna connector on the radome board assembly PCB.

14 Replace the top cover and secure it with the six 4-40 x 3/8 inch Phillips screws removed previously and tighten to .62 Nm (5.5 lb-in).

15 Reconnect power to the CV30.

Replacing the Main PCB

To replace the main PCB, you need these parts and tools.

Parts and Tools

Description	Part Number
CV30 Main PCB	VE011-S6001-xx
CV30 I/O PCB harness	VE011-8056-xx
Antenna cable remover	591802-001
Small Phillips screwdriver	
Flathead screwdriver	

To replace the main PCB

1 Open the top cover. For help, see "Opening the Top Cover (Radome)" on page 2.

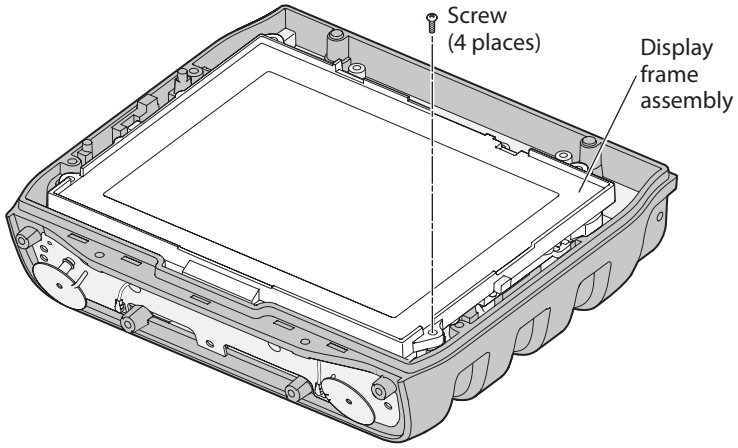
2 Open the front cover. For help, see "Opening the Front Cover" on page 4.

3 Use the flathead screwdriver to release the three flex connectors from the touch panel assembly and remove the front cover.

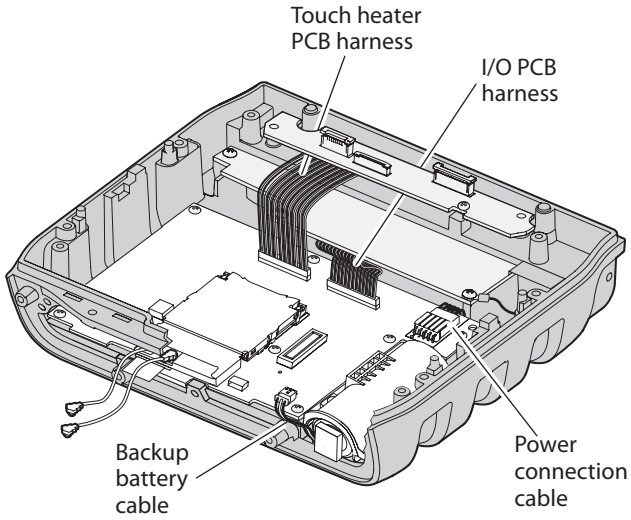
The flex connectors are called zero insertion force (ZIF) connectors and they are very fragile. To avoid breaking the connectors, open and close them carefully. Do not apply excessive pressure to the movable part of the connector when opening and closing it.

Vorsicht: Die Flex-Steckverbinder werden als ZIF-Steckverbinder (Zero Insertion Force) bezeichnet und sind extrem zerbrechlich. Die Steckverbinder müssen vorsichtig geöffnet und geschlossen werden, damit sie nicht beschädigt werden. Beim Öffnen und Schließen keinen starken Druck auf den beweglichen Teil des Steckverbinders ausüben.

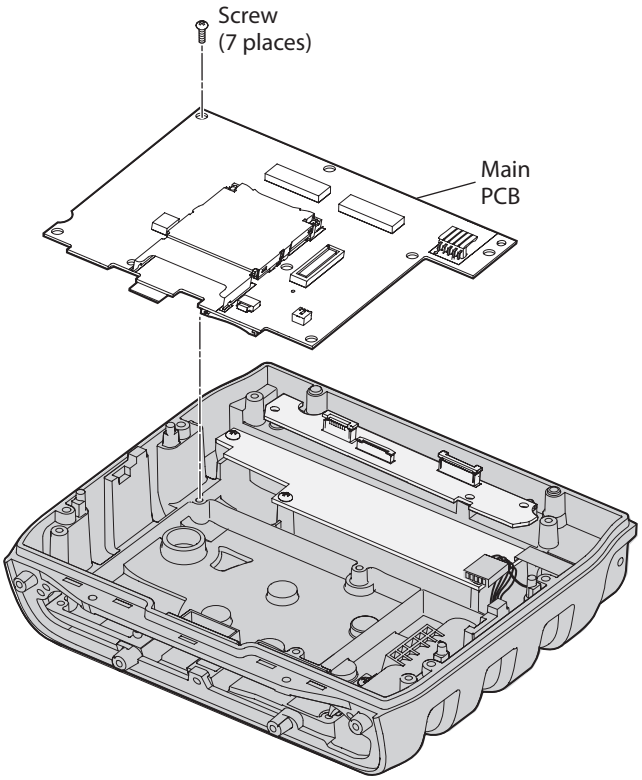
4 Remove the four 4-40 x 3/8 inch Phillips screws that attach the display frame to the CV30 base and lift them away from the base assembly.



5 Disconnect the touch heater PCB harness, the I/O PCB harness, the backup battery cable, and the power connection cable from the main PCB.



6 Remove the seven 4-40 x 1/4 inch Phillips screws that secure the main PCB to the base assembly and remove it.



7 Insert the new main PCB and secure it with the seven 4-40 x 1/4 inch Phillips screws.

8 Reattach the touch heater PCB harness, the I/O PCB harness, the backup battery cable, and the power connection cable.

9 Reinsert the display frame and touch screen assembly and replace the four 4-40 x 3/8 inch Phillips screws that attach it to the base assembly.

10 Reconnect the three flex connectors to the touch heater PCB.

11 Replace the front cover and secure it with the six 4-4- x 5/8 inch screws and the two 4-40 x 3/8 inch screws removed previously and tighten to .73 Nm (6.5 lb-in).

12 Reattach the antenna cable to the Remote Antenna connector on the radome board assembly PCB.

13 Replace the top cover and secure it with the six 4-40 x 3/8 inch Phillips screws removed previously and tighten to .62 Nm (5.5 lb-in).

14 Reconnect power to the CV30.

Replacing the Gasket

To replace the gasket, you need these parts and tools.

Parts and Tools

Description	Part Number
Rear housing gasket	VE011-8017-xx
Antenna cable remover	591802-001
Small Phillips screwdriver	
Flathead screwdriver	

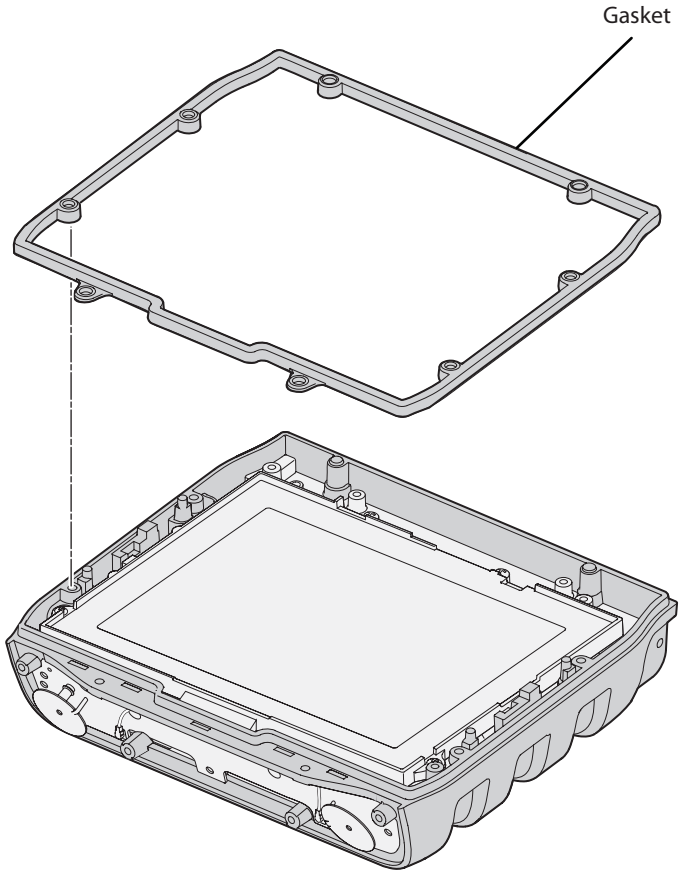
To replace the gasket

1. Open the top cover. For help, see "Opening the Top Cover (Radome)" on page 2.
2. Open the front cover. For help, see "Opening the Front Cover" on page 4.
3. Use the flathead screwdriver to release the keypad flex connector from the touch panel assembly and remove the front cover.

The flex connectors are called zero insertion force (ZIF) connectors and they are very fragile. To avoid breaking the connectors, open and close them carefully. Do not apply excessive pressure to the movable part of the connector when opening and closing it.

Vorsicht: Die Flex-Steckverbinder werden als ZIF-Steckverbinder (Zero Insertion Force) bezeichnet und sind extrem zerbrechlich. Die Steckverbinder müssen vorsichtig geöffnet und geschlossen werden, damit sie nicht beschädigt werden. Beim Öffnen und Schließen keinen starken Druck auf den beweglichen Teil des Steckverbinders ausüben.

4. Using your fingers, lift up on one corner of the gasket and pull up until the gasket is completely separated from the base assembly.



5 Place the new gasket on the CV30 base assembly and starting at one corner, gently press the gasket onto the base assembly until the gasket is firmly attached.

6 Reconnect the keypad flex connector to the touch panel assembly.

7 Replace the front cover and secure it with the six 4-40 x 5/8 inch screws and the two 4-40 x 3/8 inch screws removed previously and tighten to .73 Nm (6.5 lb-in).

8 Reattach the antenna cable to the Remote Antenna connector on the radome board assembly PCB.

9 Replace the top cover and secure it withthe six 4-40 x 3/8 inch Phillips screws removed previously and tighten to .62 Nm (5.5 lb-in).

10 Reconnect power to the CV30.

Replacing the Membrane Vent

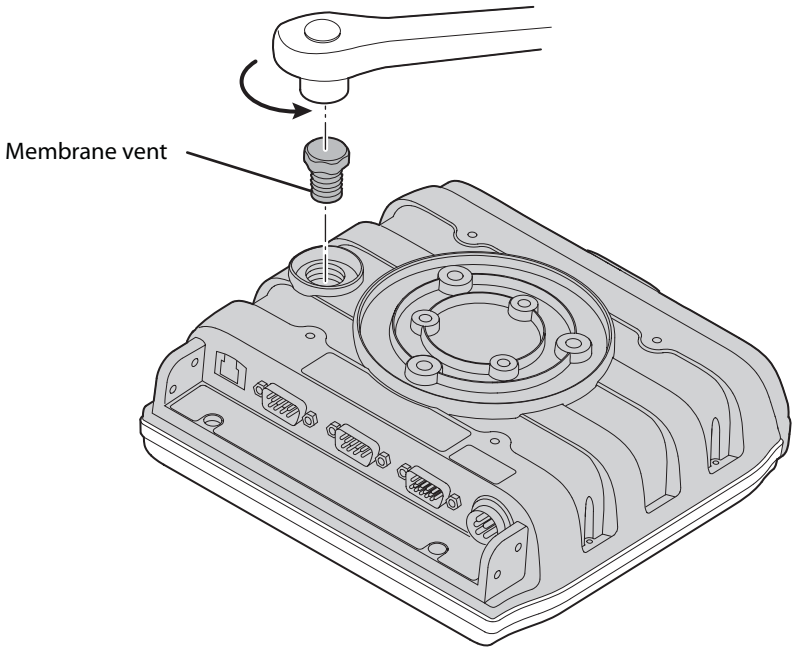
To replace the membrane vent, you need these parts and tools.

Parts and Tools

Description	Part Number
Membrane vent	VE012-5006-xx
Six Point Socket wrench	

To replace the membrane vent

1 Unscrew the membrane vent with the socket wrench and remove from the CV30.



2 Insert the new membrane vent and use the socket wrench to tighten it.

Testing the CV30 With the Test Fixture

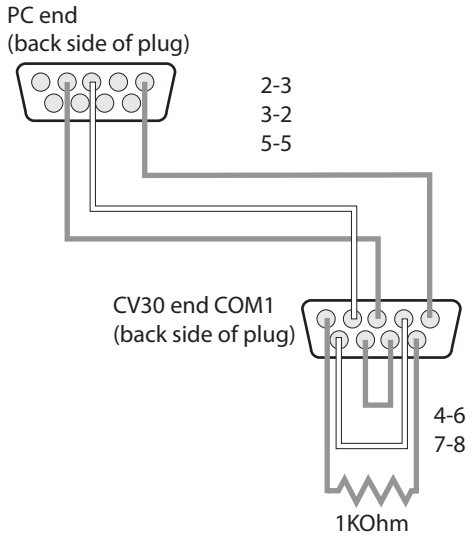
After you replace any part of the CV30, you should use the test fixture to make sure that the CV30 is operating properly. To test the CV30, you need:

- T46173 test fixture. The test fixture is located at: \\Usevtnas1\Operations\Records\Public\Test_SW if you are within the Intermec firewall. If not, contact your local Intermec representative to get the test fixture.
- Microsoft® ActiveSync® version 4.2 or later

The test system uses program T46174 and ActiveSync to push test fixture T46173 out to the CV30.

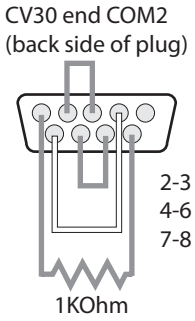
Here is a list of the hardware you need to use the test fixture:

- A PC or laptop
- An Ethernet switch or hub
- An access point
- A CV30 developer cable assembly (P/N VE011-2018)
- Three CAT5 cables
- A CV30
- A custom serial null modem cable



Custom Serial Null Modem Cable Schematic

- A custom serial loopback plug on COM3



Serial Loopback Plug Schematic

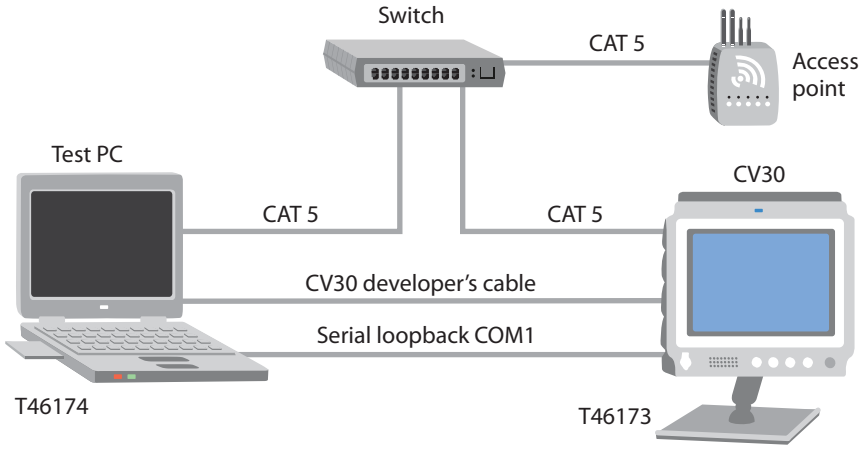
To connect the test system

1 Connect the custom null modem cable between the serial port of the PC and COM1 on the CV30.

2 Connect the developer's cable between the USB port on the CV30 and a host port on the PC or laptop.

3 Insert the custom loopback plug into COM2 on the CV30.

4 Connect a CAT5 cable between the CV30 and the switch (hub).



A Diagram of the CV30 Test System

5 (Optional) Connect the access point and the PC or laptop through the switch to make configuration easier and to facilitate troubleshooting.

To test the CV30 system

1 Install the test fixture T46174 on drive C of your laptop or PC.

2 Run the test fixture and write the configuration string and serial number to the CV30.

3 Load the operating system and the SmartSystems platform software bundle (SSPB). For help, see the next procedure, "Reflashing the CV30."

4 Finish running the test fixture.

Reflashing the CV30

When you replace the main PCB, you need to reflash the CV30. When you reflash the CV30 you update the operating system (OS) and the SmartSystems Platform Bundle (SSPB) files. The SSPB files are stored on the DiskOnChip, and deliver Intermec Value Add (IVA) functionality such as data collection, configuration, and wireless security.

There are two ways to reflash the CV30:

- You can reflash the CV30 using an SD card. For help, see the next section, "Reflashing the CV30 Using an SD Card."

- You can reflash your computer using the SmartSystems Server. For help, see **"Reflashing the CV30 Using SmartSystems Server" on page 30**.

You need to download the latest upgrade files from the Intermec web site to your PC or laptop.

To download the upgrade files

1. Start your web browser and go to the Intermec web site at www.intermec.com.
2. Go to **Service & Support** > **Downloads**.
3. Select **Computers: CV30 Fixed Mount** from the list.
4. Select the download you need. Make sure the download you select is for the CV30 computer and that it contains the upgrade you want: operating system only, SSPB only, or operating system and SSPB.
5. Download the .zip file to your laptop or PC.
6. Use the SD card or SmartSystems server to reflash the CV30.

Note: You cannot install the files for the OS and the SSPB bundle at the same time. You need to install one and then install the other.

Reflashing the CV30 Using an SD Card

To reflash the operating system, you need:

- an SD card.
- an SD card reader (optional).

You will need to set the network communications parameters on the CV30 to reestablish communications with the other devices in the wireless network.

To upgrade the operating system

1. Back up all of the applications and data.
2. Download the latest upgrade (.exe) file from the Intermec web site to your desktop PC.
3. Double-click the .exe file on your desktop PC. An installation wizard starts and walks you through the process of extracting the upgrade files. The installation wizard extracts the upgrade files to:

   C:\Program Files\Intermec\<version>
4. Copy all files in this directory to the SD card. Do **not** copy the .exe file to the SD card.
5. If you are using an SD card reader, remove the SD card from the CV30 and place it in the reader.
6. Copy the contents of the <version> folder to the SD card.

7 If you are using an SD card reader, insert the SD card into the CV30.

Note: Make sure the CV30 has completely loaded all of the upgrade files before you remove the SD card or reset the computer.

8 Perform a clean boot on the CV30. For help, see "Clean Booting the CV30" on page 31.

To upgrade the SSPB files

1 Back up all of the applications and data.

2 Download the latest SSPB (.exe) file from the Intermec web site to your PC or laptop.

3 Double-click the .exe file on your computer. An installation wizard starts and walks you through the process of extracting the upgrade files. The installation wizard extracts the upgrade files to:

C:\Program Files\Intermec\SmartSystem\ss_lib\Software\<version>

Copy all files in this directory to the SD card. Do **not** copy the .exe file to the SD card.

4 If you are using an SD card reader, remove the SD card from the CV30 and place it in the reader.

5 Copy the contents of the <version> folder to the SD card.

6 If you are using an SD card reader, insert the SD card into the CV30.

Note: Make sure the CV30 has completely loaded all of the upgrade files before you remove the SD card or reset the computer.

7 Perform a clean boot on the CV30. For help, see "Clean Booting the CV30" on page 31.

Reflashing the CV30 Using SmartSystems Server

You can use the SmartSystems server to reflash the operating system on the CV30. The server is part of SmartSystems Foundation, which is available from the Intermec web site.

Before you can reflash the CV30, you need:

- SmartSystems Foundation. To download SmartSystems Foundation, go to www.intermec.com/SmartSystems.
- the device upgrade .exe file. This file is available from the Intermec web site at www.intermec.com. Go to **Service & Support** > **Downloads**.

To reflash a CV30 using SmartSystems Server

1 Install SmartSystems Foundation on your desktop PC and open the server.

2 Make sure the server and the CV30s are on the same subnet.

3 Make sure your CV30s have power management disabled.

4 Download the device upgrade .exe file to your desktop PC.

5 Double-click the .exe file on your desktop PC. An InstallShield application starts and walks you through the process of extracting the upgrade files in the default location.

Note: Do not change the default location where InstallShield extracts the files. SmartSystems server requires that the files be located in the default directory.

6 In the software vault, locate the device upgrade you want to install.

7 Drag-and-drop the device upgrade onto each CV30 you want to reflash. SmartSystems server will tell you that it is installing the upgrade on your CV30.

Once the upgrade is done downloading to your CV30, your CV30 loads the operating system and then automatically cold boots. Progress messages appear on the CV30 screen.

The SmartSystems server will show the CV30 as being offline until the CV30 reboots and reconnects to the system.

Clean Booting the CV30

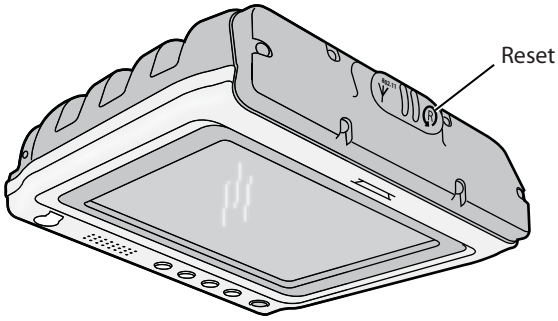
When you clean boot the CV30, it loads only those files and programs that are absolutely required by the operating system. Use the clean boot to troubleshoot the computer by getting it up and running so that you can perform diagnostic tests to determine which elements of the normal boot process are causing problems.

To clean boot the CV30

1 Using a small pointed device (such as the end of the stylus) or your finger, press the Reset switch on the top of the CV30 at the same time as you press the Power button.

Do not use force or a sharp object when pressing the reset switch. You may damage the reset switch.

Vorsicht: Keine Gewalt anwenden oder scharfe Gegenstände verwenden, um die Rücksetztaste zu drücken. Das könnte die Rücksetztaste beschädigen.



The blue light on the CV30 blinks once and the CV30 starts the booting sequence.

2 Reload any custom applications and reset the time and date.

2 Spare Parts List and Exploded Views

This chapter provides the exploded views and spare parts list for the CV30.

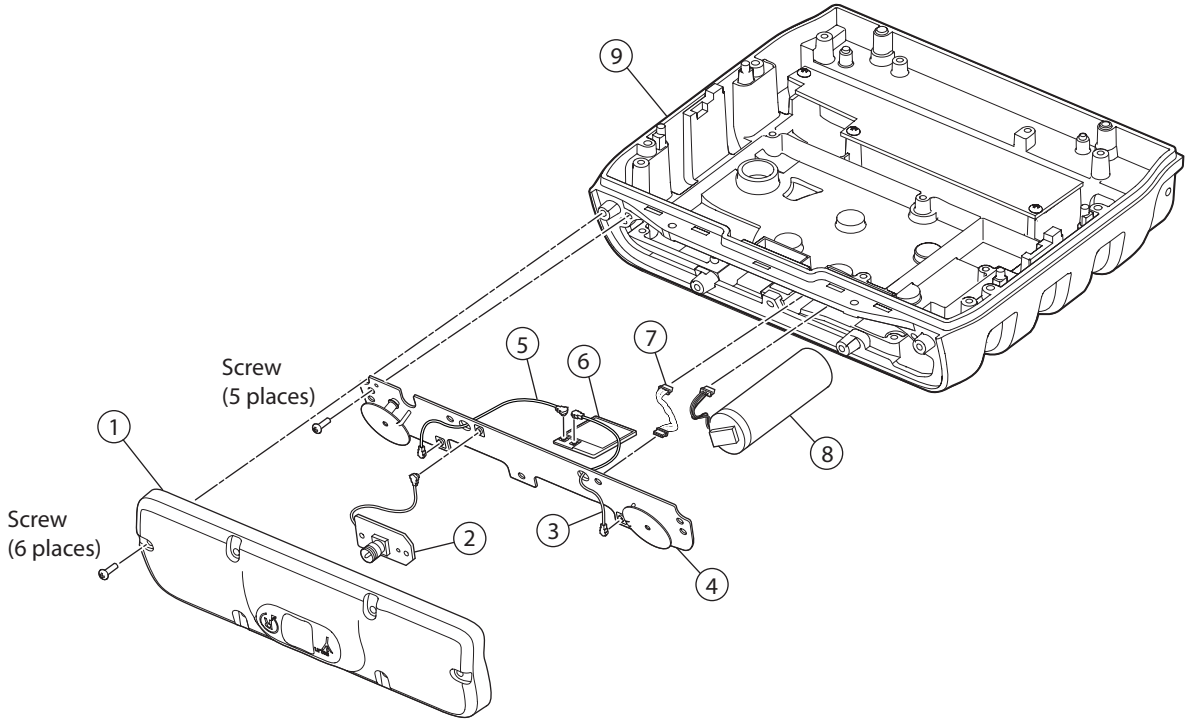
CV30 Exploded Views and Parts Lists

This chapter contains exploded views for the CV30. The exploded views have been broken down into these four parts:

- Radome assembly exploded view
- Touch panel and display exploded view
- Base I/O assembly exploded view
- Labels exploded view

Each exploded view has a spare parts list that appears on the facing page. It is easy to locate the part you need to replace and find the corresponding part number.

Radome Assembly Exploded View and Parts List



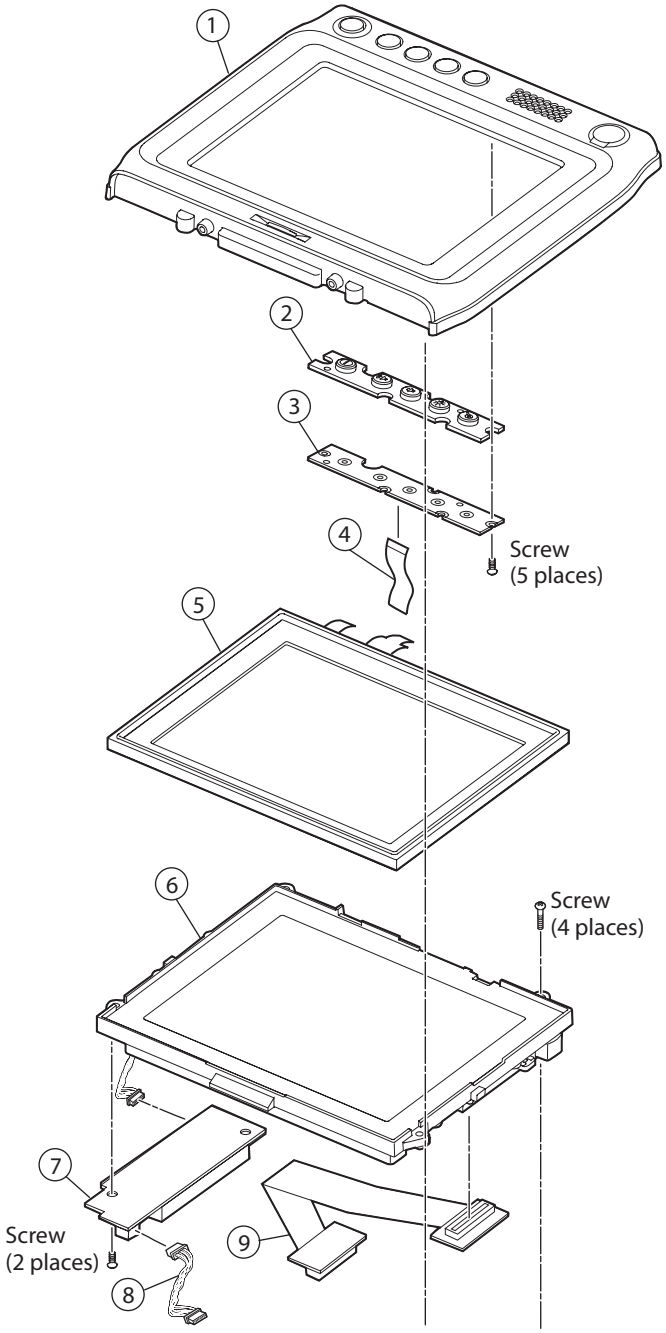
Radome Assembly Exploded View

To identify a part, find the callout in this list and locate the part in the exploded view.

Radome Assembly Spare Parts List

Callout	Description	Part Number
1	CV30 radome service assembly	VE011-S6015-xx
2	CV30 radome daughter board PCB	VE011-6011-xx
3	Coaxial 90 mm cable	VE011-8050-xx
4	Coaxial 52 mm cable	VE011-8051-xx
5	CV30 radome board service assembly PCB	VE011-S6026-xx
6	DRCB-M1 116 module radio	855-064-001
7	CV30 radome PCB harness	VE011-8054-xx
8	Battery assembly	VE011-S6027-xx
9	CV30 base I/O service assembly	VE000-S6022-xx

Touch Panel and Display Exploded View and Parts List



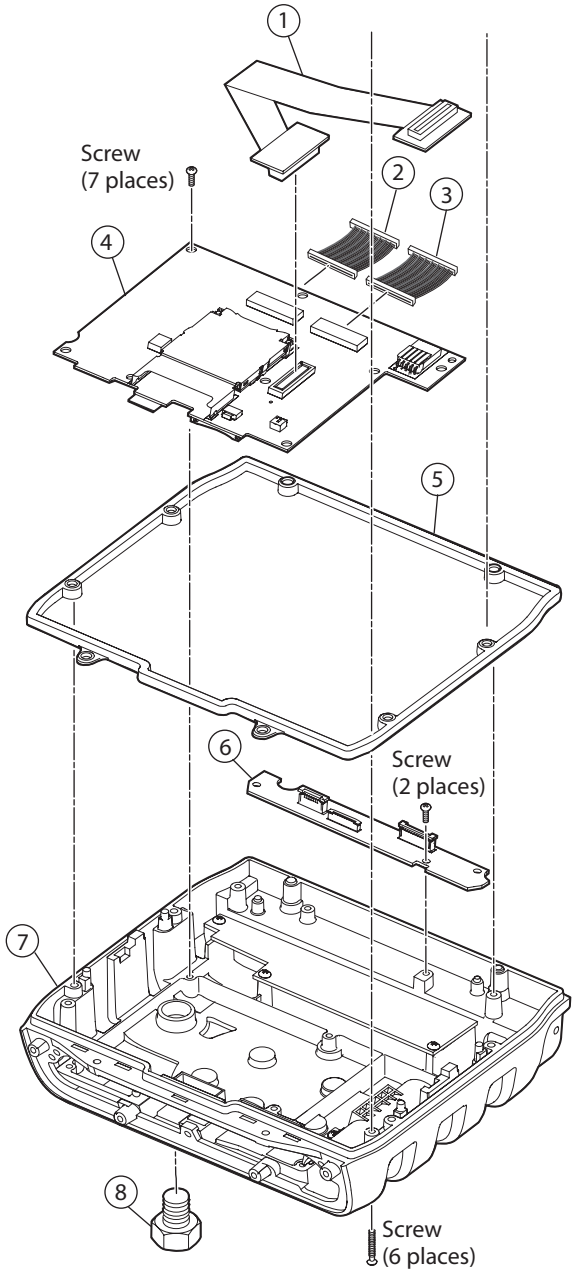
Touch Panel and Display Exploded View

To identify a part, find the callout in this list and locate the part in the exploded view.

Touch Panel and Display Assembly Spare Parts List

Callout	Description	Part Number
1	Top housing service assembly	VE011-S6020-xx
2	CV30 keypad with metal dome	VE011-8020-xx
3	CV30 keypad board PCB	VE011-S6005-xx
4	CV30 keypad PCB flex cable	VE011-8052-xx
5	Touch panel service assembly	VE011-S6018-xx
6	Frame display assembly	VE011-S6019-xx
7	Inverter board service PCB	VE011-6006-xx
8	CV30 inverter PCB harness	VE011-8057-xx
9	Cable display harness	VE011-8053-xx

Base I/O Assembly Exploded View and Parts List



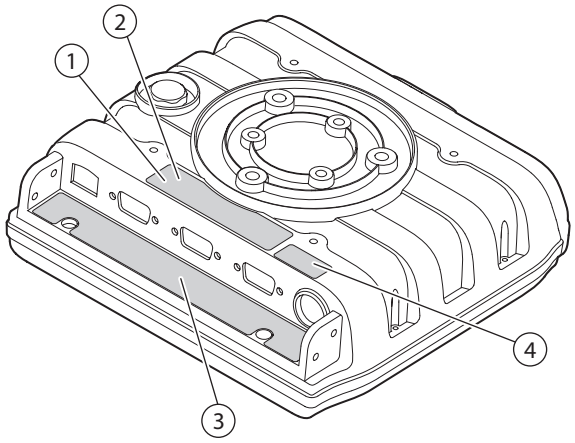
Base I/O Assembly Exploded View

To identify a part, find the callout in this list and locate the part in the exploded view.

Base I/O Assembly Spare Parts List

Callout	Description	Part Number
1	Cable display harness	VE011-8053-xx
2	CV30 touch heater PCB harness	VE011-8055-xx
3	CV30 I/O PCB harness	VE011-8056-xx
4	CV30 main PCB	VE011-S6001-xx
5	Housing rear gasket	VE011-8056-xx
6	CV30 touch heater board PCB	VE011-S6004-xx
7	Base I/O service assembly	VE011-S6022-xx
8	Membrane vent	VE011-5006-xx

Safety and Compliance Labels Exploded View and Parts List



Safety and Compliance Labels Exploded View

To identify a part, find the callout in this list and locate the part in the exploded view.

Safety and Compliance Labels Spare Parts List

Callout	Description	Part Number
1	Safety and Compliance print-on-demand (POD) blank label	VE011-8092-xx
2	Safety and Compliance print-on-demand (POD) protective cover	VE011-8044-xx
3	I/O identification label	VE011-8090-xx
4	COA WinMobile 2005, V5.0 label	471-004-141

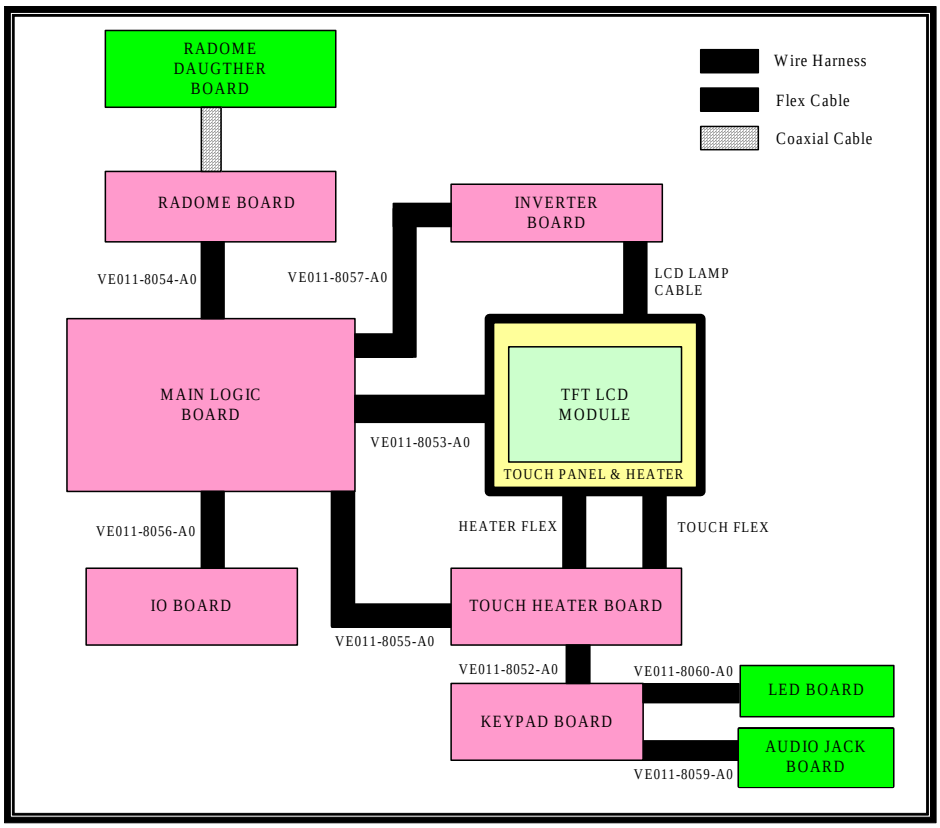
3 Theory of Operation

This chapter provides the theory of operation for the CV30.

Product Architecture

The main CV30 data terminal component is comprised of:

1. Color TFT LCD Module
2. Touch Panel and Touch Heater
3. Main Logic Board (MLB)
4. IO Board
5. Inverter Board
6. Touch Heater Board
7. Keypad Board
8. Radome Board



Block Diagram Showing the Interconnection of the CV30 Boards

The CV30 display is a module-based 6.4 inch diagonal color, transmissive, TFT LCD unit. It has a resolution of 480 x 640 pixels (VGA), each capable of 65,536 colors (16 bit RGB). It is backlit by cold cathode fluorescent lamps (CCFL). The LCD module is connected to the main logic board with a flex cable. The touch display is field replaceable.

Touch Panel and Touch Heater

A touch panel is placed on top of the touch heater and framed by the rubber boot. This unit block is placed above the LCD module. Both the touch heater and touch panel are connected to the touch heater board via individual flex cables.

Main Logic Board

The main logic board consists of a various circuits including the power supplies, core logic, and interfaces to the other supporting boards.

The key components contributing to the major functionality are as follows:

- CPU: Intel PXA270 520 Mhz processor
- SDRAM: 128 MB SDRAM
- Flash ROM: 128 MB DiskOnChip® flash memory
- VGA (640x480) graphics controller
- Real time clock (RTC)
- Audio Codec
- Class 1 Bluetooth module
- 10/100 BaseT Ethernet controller
- USB 2.0 hub controller
- Battery charger to the backup battery
- A PIC controller
- One Secure Digital (SD) card slot
- One compact flash (CF) Type I/II Card Slot (for 802.11b/g radio only)
- Interface to the touch controller board
- Interface to the I/O board supporting peripheral interface
- Interface to the inverter board on backlight control
- Interface to the radome Board for the WLAN antenna switching and RESET function

I/O Board

This board consists of the input/output peripheral interface as follows:

- Two RS-232 serial COM ports with 2 D-Sub 9-pin male connectors. The TI MAX3243 transceiver chip is used for these two serial COM circuits.
- A single D-Sub 15-pin male connector customized for the connection of two USB hosts and a USB client.

- An RJ45 connector for connecting a 10BaseT/100BaseT Full Duplex standard Ethernet interface to the CV30. The magnetic portion of the circuit is placed here.

The CV30 I/O board is connected to the MLB via the 50P wire harness connection. All differential signals were wired in twisted paired manner.

Inverter Board

The inverter board functions as the backlight source to power up the CCFL of the LCD Module. This circuit is designed to power up two CCFLs to at least 350 NIT brightness level on the LCD. The backlight is also user adjustable. This board is connected to the main logic board with a 10P wire harness connection.

Touch Heater Board

The Touch Heater board consists of these circuits:

- Power supply to the touch panel heater
- Touch panel controller circuit
- Interface to the Keypad board

This board is connected to the main logic board with the 50P wire harness connection. The differential signal for the speaker is wired in a twisted-pair manner.

Keypad Board

The keypad board was designed with a pattern as the switch for the console buttons. There are 5 console buttons, which are uniquely assigned to certain functions including magnification, brightness, volume up, volume down, and a power button used to put the unit into suspend/wakeup. This board also provides an interface to the LED board, internal speaker, and the audio jack connector. The keypad board is connected to the touch heater board with a 22P flex cable.

Radome Board

The radome board consists of two antennas that provide the antenna feed which is soldered onto the board. These antennas are the 2.4 Ghz antennas designed for the 802.11 b/g radio. There is also a switching circuit designed to detect the existence of an external antenna when connected. The external antenna can be connected to the CV30 by an SMA connector on the radome daughter board which is part of the radome cover. The radome daughter board connects to the radome board with an RF coaxial cable. The radome board is connected to the MLB with a 6P wire harness.

Design Description

The CV30 computer was designed to maximize data integrity in a mobile environment, regardless of external user control.

The detailed descriptions of the block design are separated into power block, battery charging, system function, audio system, and communication system.

Power Source

There are three available power supply categories: an AC/DC supply, a dual output and a wide range DC/DC supply, and a power supply compatible with the existing 2455 supplies (using a converter cable).

- AC/DC supply
  - Part number: 851-082-004
  - Input 100-240 VAC, 47-63 Hz, 1 A,
  - Output +12 VDC +/- 5% @ 4.15 A
- Dual Output DC/DC supply
  - Part Number: 851-070-003
  - Input 6-60 VDC, 14 A,
  - Output 1: +12 VDC, 4.5 A (Logic power)
  - Output 2: +12 VDC, 4 A (Heater power)
  - Requires output Y cable (M2F 1400A)
- Wide Range Input DC/DC supply
  - Input 6-96 VDC, 5.5 A
  - Output: +12 VDC +/- 5%, 4.5 A
  - Requires output cable (M2A F1100+ vehicle noise filter)
- 2455 DC/DC supplies
  - Part Number 851-040-001
  - Input: 10-36 VDC, 10 A
  - Output: +12 VDC +/- 10%, 4.5 A
  - Requires output cable (M2A F1100+ vehicle noise filter)

The CV30 main input connector from the external supply is a rugged, Singatron 5-pin connector. Input power to the CV30 is separated into logic power and heater power. Input voltage is +12 VDC +/- 4 VDC for logic power and +12 VDC +/- 25% for heater power. Both power inputs are accommodated through one connector. However, the heater power is only available with the dual output DC/DC power supply.

Internal Power System

The CV30 power system consists of several bucks and boost converters, power switches, and miscellaneous circuitry that orchestrate the power subsystem. The main processor and PIC continuously monitor and control various aspects of the power subsystem when operating.

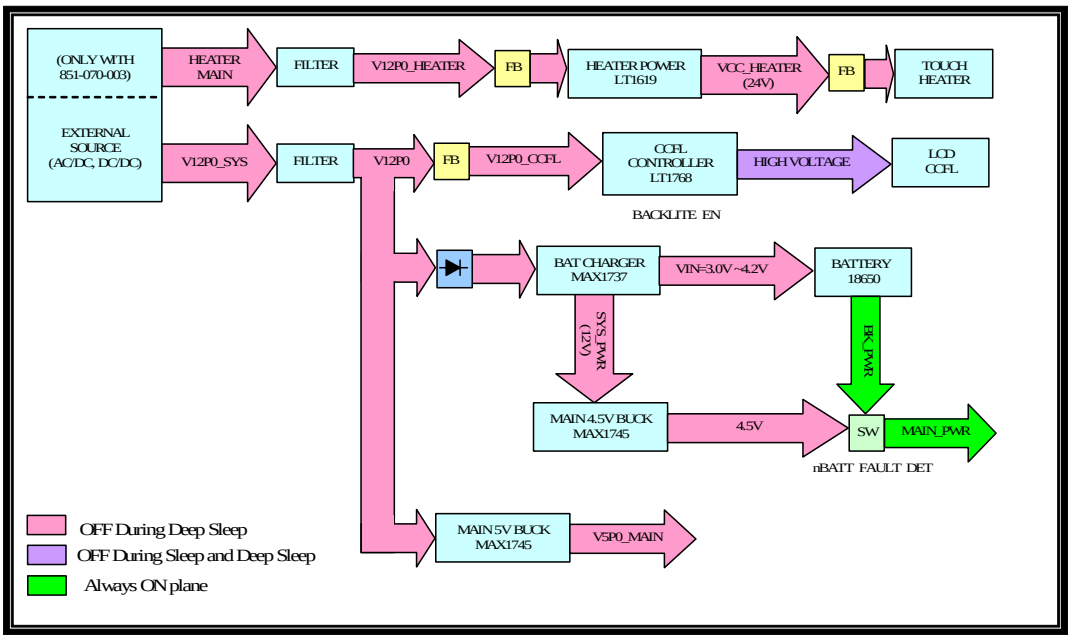
The CV30 power system is separated into 3 main circuits:

- Heater system
- Main logic power system
- Backup power system

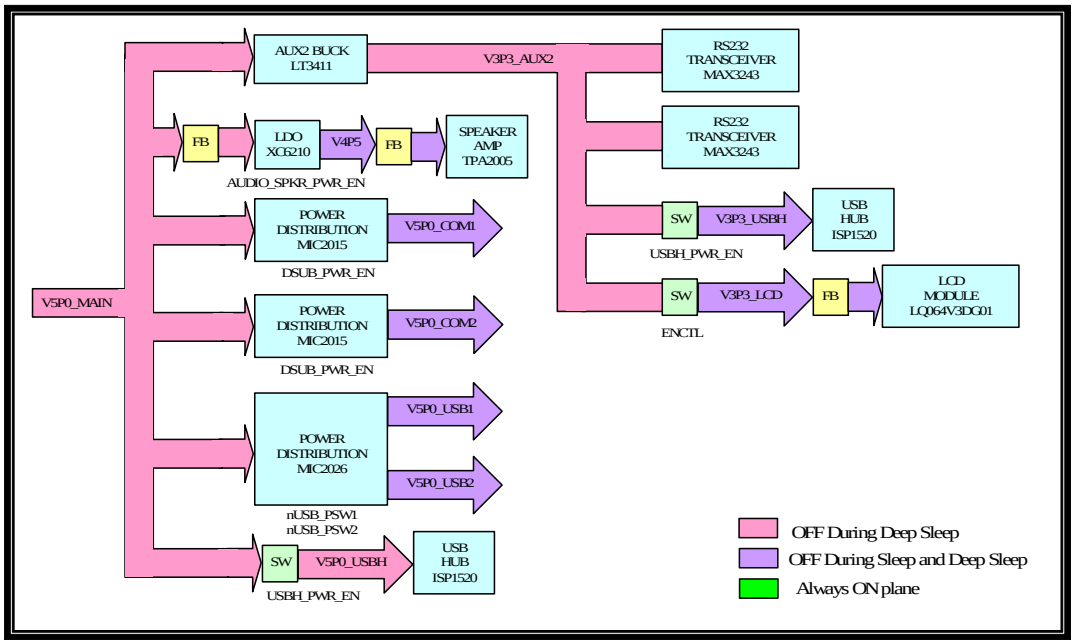
Many of these power nets can be independently powered down to conserve power. This document will explain the major power planes, their respective sources, and the controls required to operate this system. Each section shows the relationship of each power plane to its "root source."

The overall power block diagrams are illustrated in these three graphics:

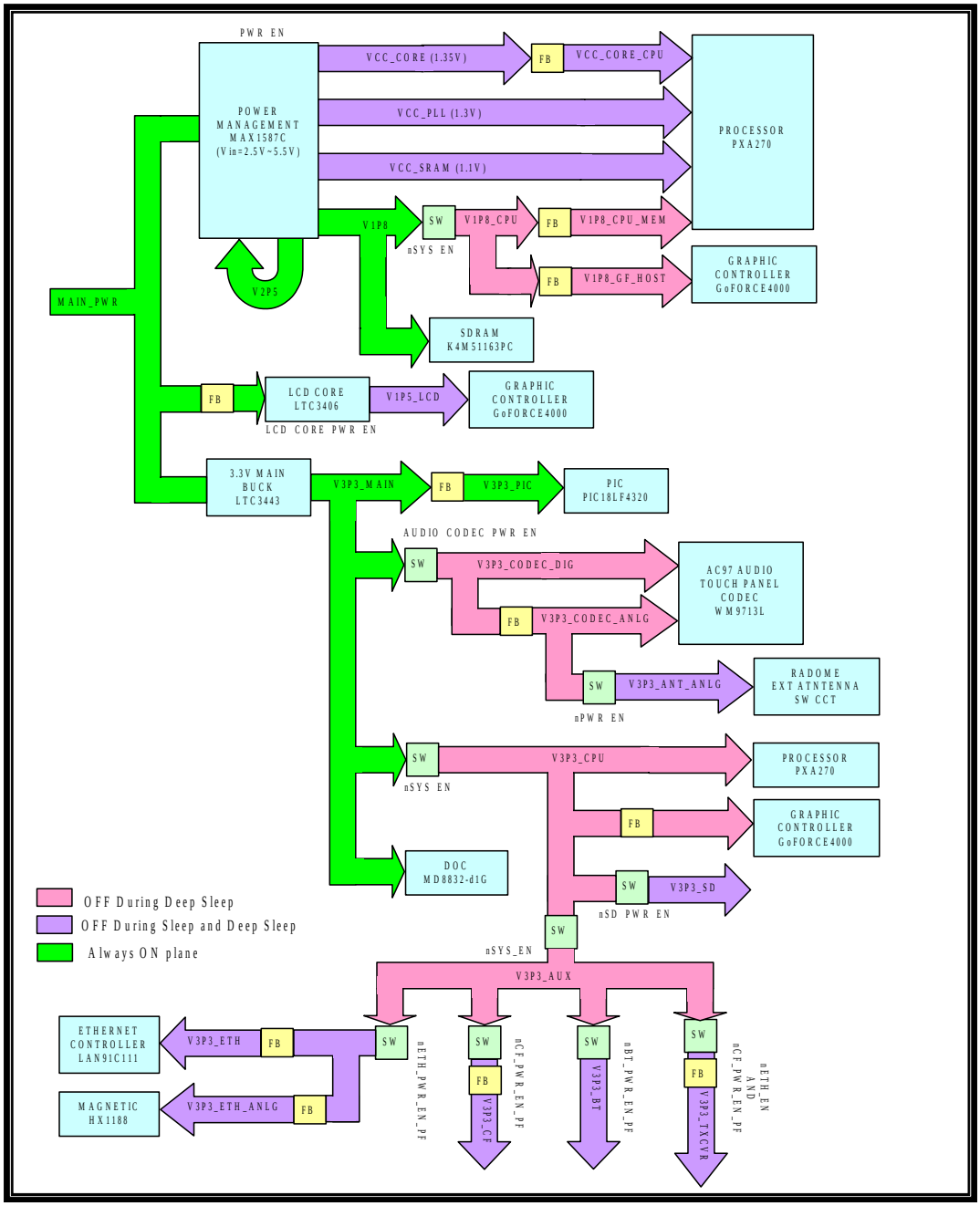
- "Input Power, Heater, Charger, and Main Buck System" on page 46.
- "V5PO_MAIN Power Distribution System" on page 47.
- "MAIN_PWR Power Distribution System" on page 48.



Input Power, Heater, Charger, and Main Buck System



V5PO_MAIN Power Distribution System



MAIN_PWR Power Distribution System

Heater Power System

The heater power system refers to the touch panel heater power. The purpose of the heater is to reduce the condensation and frost on the external surface of the display as a result of moving to and from sub-freezing temperatures to more temperate locations.

The input voltage to the heater system came from the Output 2 of the Dual output DC/DC power supply. HEATER_MAIN is the external DC source rated to accept 12 VDC. This source is channeled through a ferrite bead; a 5 A fuse and a common mode choke to V12P0_HEATER. The same technique is applied to the HEATER_NEUTRAL to HEATER_GND.

The heater functions within the input voltage range of 12 VDC +/- 25% and a maximum wattage of 10.145 W. The heater system consists of boost converter LT1619, hardware heater ON/OFF control circuit, software ON/OFF, and heater status query control.

A thermister is mounted on this heater. The resistance change in the thermister with temperature is reflected in the hardware control circuit. A comparator LM2903 in this control circuit compares the voltage across the thermister with a fixed voltage of 6 V. When temperature at the thermister measures approximately 15°C, the voltage across the thermister will be greater than 6 V. The output of the comparator will then turn on the MOSFET controlling the input power (12 V) to the boost converter LT1619. This converter steps up the voltage to 24 V and supplies power to the heater. Conversely, the heater voltage will be automatically cut off when the temperature at the thermister measures below 15°C. In normal operation, the heater is automatically turned ON/OFF through hardware control.

The software is also available to query the status of the heater (on/off) through the nHEATER_STATUS signal. Logic "0" indicates the heater is ON, vice versa for OFF status. Signal HEATER_ON will allow the software to ON the heater, overwrites the hardware control. Logic "1" on this signal line will enable the heater ON.

Logic Power System

The overall logic power system is illustrated in the power system illustrations on pages 46, 47, and 48. The MAIN_PWR Power Distribution System illustration indicates the power flow in the system and the control signal to each power plane.

V12P0

V12P0_SYS To V12P0

All the logic power originating from the input voltage of V12P0_SYS (from external power source), is channeled through a ferrite bead, a 5 A fuse, and a common mode choke to V12P0. The same manner is applied to the SYS_NEUTRAL to GND. Subsequently the V12P0 is used in the battery charger circuit and stepped down to other power rails. The fuse used in the over current protection is a polyswitch resettable type. This type of fuse latches into a high resistance state when a fault occurs and it automatically resets to its original state once the fault is removed. This V12P0 will remain ON if an external power source is attached.

V12P0_CCFL

V12P0 To V12P0_CCFL

The V12P0_CCFL is filtered from the V12P0 through a ferrite bead and supplied to the high power CCFL Controller LT1768 at the Inverter board. Subsequently this controller outputs high voltage to the LCD lamp.

V5P0_MAIN

V12P0 To V5P0_MAIN

The V5P0_MAIN is stepped down from V12P0 through MAX1745. This power is an always ON plane that provides power to numerous power distribution switches, an LDO, and a buck converter.

Main applications engaged by this source are the RS-232 Serial COM power, USB host and hub power, Audio Speaker Amp power, and buck to 3.3 V for applications in addition to the graphic controller chip.

V3P3_AUX2, V3P3_USBH, and V3P3_LCD

V5P0_MAIN To V3P3_AUX2

The V3P3_AUX2 is stepped down from V5P0_MAIN through LT3411. This 3.3 V power is an always ON plane that provides power to:

- RS-232 Transceiver MAX3243
- USB Hub ISP1520
- LCD Module LQ064V3DG01

V3P3_AUX2 To V3P3_USBH

The V3P3_USBH is the PFET controlled version of V3P3_AUX2 by the signal USBH_PWR_EN. The signal is asserted by the CPU to allow the power to the USB hub ISP1520.

V3P3_AUX2 To V3P3_LCD

The V3P3_LCD is the PFET controlled version of V3P3_AUX2 by the signal ENCTL. The graphic controller asserted this signal to allow power V3P3_LCD to the LCD module LQ064V3DG01.

V4P5

V5P0_MAIN To V4P5

The V4P5 is output from the ferrite filtered V3P3_AUX2 through an LDO, which is controlled by the signal AUDIO_SPKR_AMP_PWR_EN. The CPU asserts this signal to enable the LDO and the audio speaker AMP TPA2005, hence V4P5 will be channel through a ferrite bead to this audio speaker AMP.

V5P0_COM1 and V5P0_COM2

V5P0_MAIN To V5P0_COM1 and V5P0_COM2

Both the V5P0_COM1 and V5P0_COM2 are output from the V5P0_MAIN through the two individual fixed current limit power distribution switches MIC2015. The two switches are controlled by signal

DSUB_PWR_EN. The CPU exerted this signal; Logic "H" will enable both switches to channel individual V5P0_COM1 and V5P0_COM2 through a ferrite bead to the serial COM port. These two switches have a current limit minimum of 800 mA for each individual V5P0_COM1 and V5P0_COM2.

V5P0_USB1, V5P0_USB2, and V5P0_USBH

V5P0_MAIN To V5P0_USB1 and V5P0_USB2

Both the V5P0_USB1 and V5P0_USB2 are output from the V5P0_MAIN through a dual channel power distribution switch MIC2026. This switch has a current limit minimum of 500mA for each channel. Each channel will monitor the current consumption individually. Should any of the channel current exceed 500mA, a fault status output flag signal nUSBOC will be exerted to the USB hub to instruct the hub to exert a nUSB_PSW signal to off the switch.

V5P0_MAIN To V5P0_USBH

The V5P0_USBH is the PFET controlled version of V5P0_MAIN by the signal USBH_PWR_EN. The CPU asserted this signal to allow the V5P0_USBH power to the USB hub ISP1520.

SYS_PWR

V12P0 To SYS_PWR

The SYS_PWR originates from the V12P0 power source through a schottky diode. This power source supplies power to the battery charging system and main power buck MAX1745 to MAIN_PWR.

MAIN_PWR

SYS_PWR to MAIN_PWR

The MAIN_PWR is available through two main sources: the voltage 4.5 V voltage bucked through MAX1745 from SYS_PWR and the BK_PWR source from backup battery. With the external source attached, MAIN_PWR will always source from the buck converter. The BK_PWR will take charge as the source to the MAIN_PWR once the external power source is removed. The switching occurs when voltage detection IC S-80830C detects SYS_PWR drops below 8V.

BK_PWR

BK_PWR is the power source from the backup battery that supplies power to MAIN_PWR if the external power source is removed. The voltage range is defined between maximum of 4.2 V at full charge to minimum of 3.0 V at end of charge.

VCC_CORE, VCC_PLL, VCC_SRAM, V2P5, V1P8

MAIN_PWR To VCC_CORE, VCC_PLL, VCC_SRAM, V2P5, V1P8

All the above power VCC_CORE, VCC_PLL, VCC_SRAM, V2P5, V1P8 is bucked from the MAIN_PWR through a power management IC MAX1587. This IC is design to be optimized for the X-Scale Processor. It has 3 step-down DC-DC Output and 3 linear regulators (LDO). The DC-DC converters output the V2P5, V1P8 and the VCC_CORE. As for LDO, they output the VCC_PLL and VCC_SRAM. The VCC_PLL has a fix voltage of 1.3 V and the VCC_SRAM has a voltage of 1.1 V. Both of these voltages supply the CPU PXA270 SRAM and PLL power rail.

The V2P5 supply is feedback to the IN45 of the IC, which is the power input to the LDOs. The VCC_CORE voltage is set by the I^2C Serial Interface to the range between 0.75 V to 1.6 V with the default value of 1.35 V. This VCC_CORE power will feed through a ferrite bead prior to sourcing the CPU CORE power rail. The V1P8 power feeds2 directly to the SDRAM, the I/O Supply of DiskOnChip and through a MOSFET switch to output power V1P8_CPU to the CPU VCC_BB power and channel through ferrite bead prior to CPU MEM power rail. This V1P8_CPU also supplies power to the graphic controller through a ferrite bead (V1P8_GF_HOST). The MOSFET switch is controlled by signal nSYS_EN.

V1P5_LCD

MAIN_PWR To V1P5_LCD

The MAIN_PWR was channeled through a ferrite bead prior to being bucked to V1P5_LCD through the LTC3406 converter. The shutdown pin of the converter is controlled by the LCD_CORE_PWR_EN signal asserted by the CPU.

V3P3_MAIN

MAIN_PWR To V3P3_MAIN

This 3.3 V power source, which is an always ON power plane, is the main power supply to many of the main components, such as the CPU, PIC, Auxiliary circuits, and so on. The LTC3443 converter bucks the MAIN_PWR to V3P3_MAIN. This supply feeds directly to the supply voltage of the DiskOnChip.

V3P3_PIC

V3P3_MAIN To V3P3_PIC

The V3P3_PIC supplies power to the PIC controller. PIC18LF4320 is a ferrite filtered version of V3P3_MAIN.

V3P3_CODEC_ANLG, V3P3_CODEC_DIG, V3P3_ANT_ANLG

V3P3_MAIN To V3P3_CODEC_ANLG, V3P3_CODEC_DIG, V3P3_ANT_ANLG

The V3P3_CODEC_DIG is a PFET controlled version of V3P3_MAIN by signal AUDIO_CODEC_PWR_EN. This power feeds through a ferrite bead to V3P3_CODEC_ANLG. Both these two power supplies provide power to the Audio CODEC IC WM9713L on digital and analog power respectively. The V3P3_ANT_ANLG is a PFET controlled version of V3P3_CODEC_ANLG, controlled by the signal nPWR_EN.

V3P3_CPU

V3P3_MAIN To V3P3_CPU

The V3P3_CPU is a PFET controlled version of the V3P3_MAIN. This power is controlled by signal nSYS_EN, to the gate of the 2 PFET in parallel. Upon the assertion of the nSYS_EN signal the first PFET is ON immediately but the current is constant with the presence of the series resistor. The second PFET comes ON later due to the RC at the gate. The connection reduces the inrush current on power up. This power source supplies power directly to the CPU power rail VCC_IO, VCC_USB, VCC_LCD, VCC_USIM and ferrite filtered power to the FVDD, VVDD and SDVDD power rail of the graphic controller. It is also the power source to the PFET controlled version of the SD Card, Transceivers, and Peripherals such as Bluetooth, 802.11 radio, and Ethernet.

V3P3_SD

V3P3_CPU To V3P3_SD

The V3P3_SD is a PFET controlled version of the V3P3_CPU. This power controls signal nSD_PWR_EN.

V3P3_AUX

V3P3_CPU To V3P3_AUX

This power is the PFET controlled version of the V3P3_CPU by the signal nSYS_EN. This power goes through individual PFET controlled switches to supply power for Ethernet, CF (Radio), Bluetooth, and the transceivers.

V3P3_ETH, V3P3_ETH_ANLG

V3P3_AUX To V3P3_ETH, V3P3_ETH_ANLG

Both the V3P3_ETH and the V3P3_ETH_ANLG are the individual ferrite filtered, PFET controlled version of the V3P3_AUX by the signal nETH_PWR_EN_PF. This signal is asserted with the condition of both the ETH_PWR_EN and nBATT_FAULT_DET at Logic H. The CPU asserts the ETH_PWR_EN, unless the nBATT_FAULT_DET reveals the presence of the external power supply to the unit.

V3P3_CF

V3P3_AUX To V3P3_CF

This power is the PFET controlled and ferrite filtered version of the V3P3_AUX by the signal nCF_PWR_EN_PF. This signal is asserted when the condition of both CF_PWR_EN and nBATT_FAULT_DET is at Logic H. The V3P3_CF powers up the radio module attached to the CF connector.

V3P3_BT

V3P3_AUX To V3P3_BT

This power is the PFET controlled version of the V3P3_AUX by the signal nBT_PWR_EN_PF. This signal is asserted when the condition of both BT_PWR_EN and nBATT_FAULT_DET is at Logic H. V3P3_BT supplies power to the Bluetooth module.

V3P3_TXCVR

V3P3_AUX To V3P3_TXCVR

This power is the PFET-controlled and ferrite-filtered version of the V3P3_AUX by the signal nETH_EN and nCF_PWR_EN_PF. Either of these signal when asserted, makes V3P3_TXCVR available to the transceivers.

Backup Power System

The CV30 contains a single cell, Lithium-Ion battery to support the backup power system during the critical suspend state. The system monitors the external supply. When the system detects that the external supply is below a preset limit of 8 V or detached from the terminal, the system switches over to the internal battery, removes power to high current loads, and signals the operating system into critical suspend. The fully charged battery has a capacity 2400 mAh which is enough to support a graceful shutdown, and then supply suspend current to the unit to support the emergency suspend state for at least 72 hours. If external power is restored, the CV30 will resume the state it was in when power was removed.

There is an internal protection circuitry within the battery pack to protect the battery from:

- **Over discharge**. When the battery voltage has reached a point (2.20~2.40 V) at which further discharge will damage the cell, the internal FETs turn off to prevent further discharge of the battery. The battery can no longer provide power. Once the battery internally disconnects, charge voltage must be applied to the pack to recover or to turn the internal protection FET back on. This voltage is required before the internal protection circuitry of the battery allows power to come in or go out of the battery.
- **Over-voltage charging**. If the battery is overcharged, its cell voltage will continue to increase above 4.2 VDC. The internal protection circuit monitors the cell voltage (4.24~4.35 V) and will turn off the internal FET to prevent further over charging (a potentially dangerous situation).

- **Over-discharge current**. When discharge current exceeds 4.6 A, the battery is internally disconnected.

The circuit board also contains a thermistor that provides a way to measure the battery temperature to ensure the battery is only charged when its cell temperature is between 0°C and 40°C (32°F and 104°F).

An internal charger automatically charges the backup battery within four hours whenever external power is applied. If the backup battery fails, resulting in critically low power, the amber LED on the top of the display lights up. The backup battery can be replaced in the field by a qualified service technician.

The protection circuitry inside the battery decides that the cell voltage has reached a point at which further discharge will damage the cell and the internal FETs turn off to prevent further discharge of the battery. The battery can no longer provide power.

Power State Table

The system has the following basic power states:

1. **Dead**. This state occurs when nothing has power and the battery power falls to end voltage. The unit will not have any power to do anything. Data is only retained in non-volatile storage either in the persistent memory of the processor or in the DOC.
2. **Critical suspend/deep sleep.** This state occurs when the external power source is removed from the unit. When external power is removed, the voltage detector asserts the nBATT_FAULT_DET to instruct the CPU to perform the necessary task to store all current state data application programs from the SDRAM to the flash. Upon completion, nSYS_EN will be de-asserted to switch off certain power planes. The summary of the power plane status at deep sleep is shown in the Power Plane Status table on the next page. The external RTC remain powered by the V3P3_MAIN processor at minimum function. SDRAM is in self-refresh state. The current consumption at this state is approximately 5 mA.
3. **Suspend/sleep**. This state occurs when the keypad I/O button is pressed and an external power source is present. At this time CPU will de-assert the PWR_EN signal to switch off certain power planes. Refer to the summary table for the power plane that will be OFF in Power Plane Status table on the next page. Pressing the I/O button again will wake up the unit from sleep. Majority of the system is powered down but some options may be left on. SDRAM is in self-refresh state. The suspend current is approximately 5mA.
4. **Idle**. In this state the processor is powered and the internal clock is running but it is not executing any code. The SDRAM may be in auto power down mode. All the power planes are ON with the presence of the external power source.

5 **Operation**. In this state, the processor is operating. Full functionality of the CV30 is possible.

The below table summarize the power plane status during sleep and deep sleep mode with the corresponding switching control signals.

Power Plane Status

Power Plane	Sleep Mode	Deep Sleep Mode	Remark
HEATER_MAIN, V12P0_HEATER	ON	OFF	
VCC_HEATER	ON	OFF	nHEATER_EN
V12P0_SYS, V12P0	ON	OFF	
V12P0_CCFL	OFF	OFF	BACKLITE_EN
SYS_PWR	ON	OFF	
BK_PWR, MAIN_PWR	ON	ON	nBATT_FAULT_DET switch MAIN_PWR to source from BK_PWR@ DEEP SLEEP. Always ON plane.
V5P0_MAIN	ON	OFF	
V3P3_AUX2	ON	OFF	
V3P3_USBH	ON	OFF	USBH_PWR_EN
V3P3_LCD	OFF	OFF	ENCTL
V4P5	OFF	OFF	AUDIO_SPKR_PWR_EN
V5P0_COM1, V5P0_COM2	OFF	OFF	DSUB_PWR_EN
V5P0_USB1, V5P0_USB2	OFF	OFF	nUSB_PSW1, nUSB_PSW2
V5P0_USBH	ON	OFF	USBH_PWR_EN
VCC_CORE, VCC_PLL, VCC_SRAM	OFF	OFF	PWR_EN
V2P5	ON	ON	Always ON plane
V1P8	ON	ON	Always ON plane
V1P8_CPU, V1P8_CPU_MEM, V1P8_GF_HOST	ON	OFF	
V1P5_LCD	OFF	OFF	LCD_CORE_PWR_EN
V3P3_MAIN, V3P3_PIC	ON	ON	Always ON plane
V3P3_CPU	ON	OFF	
V3P3_CODEC_DIG, V3P3_CODEC_ANLG	ON	OFF	
V3P3_ANT_ANLG	OFF	OFF	nPWR_EN
V3P3_SD	OFF	OFF	nSD_PWR_EN
V3P3_AUX	ON	OFF	nSYS_EN
V3P3_ETH, V3P3_ETH_ANLG	OFF	OFF	nETH_PWR_EN_PF
V3P3_CF	OFF	OFF	nCF_PWR_EN_PF
V3P3_BT	OFF	OFF	nBT_PWR_EN_PF
V3P3_TXCVR	OFF	OFF	nCF_PWR_EN_PF and nETH_EN

Detection Circuit

There are two detection circuits that respond to special situations in the power system.

- **Battery Fault Detect**. In the event that the external supply power drops below the voltage level of 8 VDC the system detects this and performs the following:
  - Battery charging circuit is disabled.
  - MAIN_PWR source is from BK_PWR.
  - PIC is notified of power loss.
  - Main processor is interrupted with nBATT_FAULT_DET to complete all necessary tasks and assert the SYS_EN to turn off certain power planes as detailed in the Power Plane Status table on page 56.
- **Battery Low Power Detect**. The Low Battery Detect circuit is used to notify the system that the backup battery has been discharged to the critical low level. This voltage level is monitor by the Audio Codec IC through the BACK_PWR_MONITOR line. The Amber LED will light up to alert the user to change the backup battery.

Power Routing Circuit

Several power routing circuits are implemented to allow portions of the CV30 to be powered ON or OFF under software control as needed. These parts that can be powered ON or OFF include:

- LCD
- Bluetooth Radio
- SD card slot
- Codec (both analog and digital portions)
- Loud speaker amp
- Serial COM power
- USB power
- Ethernet power
- Battery charger
- Processor core power
- WLAN power
- LCD backlight

System Function

Battery Monitoring

During operation, the main processor periodically reads the battery voltage and then estimates the amount of charge left in the battery pack. The voltage level is reflected in the power bar settings in the operating system. Whenever the battery voltage is read, the charger will be able to give an accurate reading.

The BK_PWR comes directly from the main battery contacts. This signal is presented to the A2D in the Audio CODEC IC. The processor periodically reads this battery voltage only while the CODEC is ON, controlled by signal AUDIO_CODEC_PWR_EN.

Microchip PIC Controller

The Microchip PIC controller has several housekeeping tasks in the CV30:

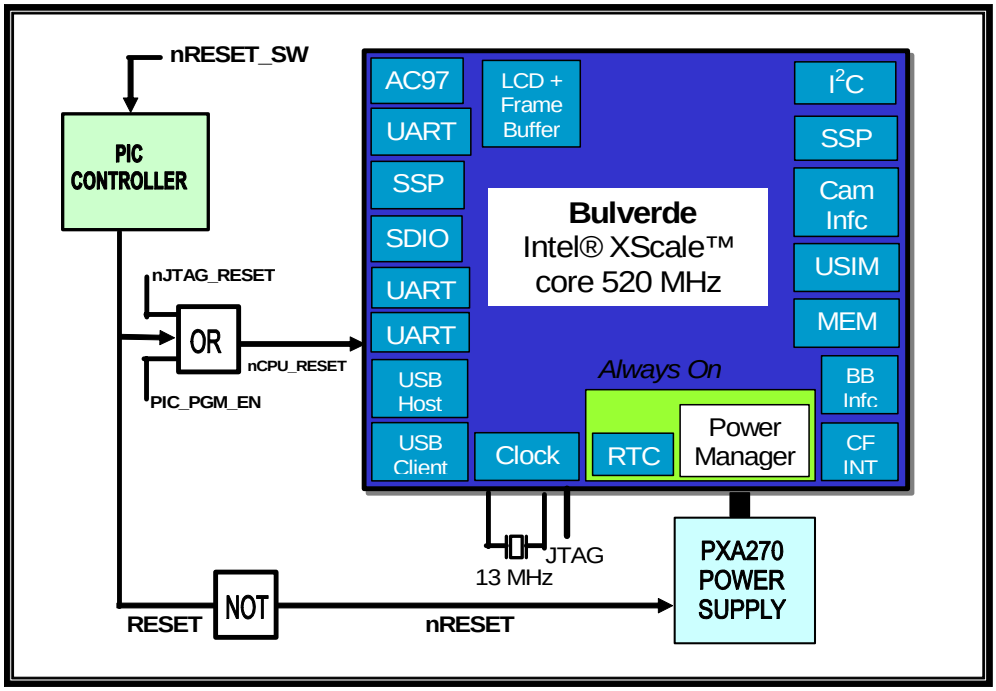
- External power source detect
- Cold / Warm RESET
- Status LED control
- Slave I2C communications
- Slave one wire communications
- ON/OFF key detection
- Sleep mode detect
- Battery temp monitoring and charger enable
- Detect headset connection
- EEPROM storage of unit configuration

External Power Source Detect

The PIC controller has a voltage detector connected to it that detects the presence of the external power source. The voltage detector monitors the SYS_PWR and has a threshold of 8 V. If the SYS_PWR voltage is above this threshold, the system assumes that the external power source is available. If the SYS_PWR voltage is below 8 V, the system determines that the CV30 should go into critical suspend. The signal nBATT_FAULT_DET from the voltage detector circuit routed to the PIC, triggers the processor to “wake up” when an external power source is detected.

Cold/Warm Reset and Clean Boot

The PIC controller also has the responsibility of providing the system with a cold reset, warm reset, and a clean boot. The following block diagram details the RESET path.



The Reset Path on the CV30

- **Cold reset**. The PIC controller has an internal circuit that resets itself upon initial cold power up or if the controller's supply voltage browns out or dips below 2.0 VDC. Once the controller goes through a reset and initialization, it in turn forces the main processor (PXA270) to cold reset through nCPU_RESET and initializes the rest of the unit. The user also has a cold reset button at the top of the Console unit that forces the controller to reset the main processor.
- **Clean boot**. In certain situations, the system needs to be completely reinitialized to the factory default settings. To perform a clean boot, press and hold the cold reset button while pressing the I/O button. During initialization, a dialog box appears to query if the user wants to clean boot. If the **Volume Up** button is pressed, the system will be restored to its factory settings and all other programs installed by user will be removed.

Status LED Control

The status lights on the CV30 turn on to indicate the status of the network connection, a successful decode of a bar code, or a user-defined function. The status indicators are comprised of green, amber, and blue LEDs. The blue LED is controlled by the PIC, while the main processor controls the green and amber LEDs. The following paragraphs describe the meaning of each LED.

- **Green LED** (Good Read). This light comes on when the CV30 successfully decodes a bar code with an attached scanner.

- **Blue LED** (Ready-to-Work indicator). The blue light indicates when the CV30 is ready to use in your application, typically TE 2000. The Ready-to-Work indicator has three states:
  - Off: The TE 2000 application has not loaded successfully, or you are not running a Ready-to-Work application.
  - Blinking: The CV30 is not connected to the host.
  - On: A connection to the server has been established and all network connections are active.

  The LED blinks once for every cold boot it performs.
- **Amber LED** (Battery). The amber light comes on when the backup battery is critically low. You need to replace the backup battery as soon as possible.

I2C Communication

The PIC controller has a slave I2C communication port that it uses to talk with the main processor to accept commands and report results back to the main processor.

ON/OFF Detection

The I/O or ON/OFF key is routed into the PIC controller debouncing and either waking the system up or putting it into suspend/sleep. PIC can issue the PIC_IRQ to suspend or wake up the main processor.

USB Host Detect

The system must be able to detect when a USB host device, such as a PC, is connected for ActiveSync communication. The 5 V provided in the USB cable from the HOST is detected as an interrupt and allows the PIC controller to wake the system up and begin communications. The signal that is being used for this purpose is USBC_5V_DET.

Sleep and Deep Sleep Mode Detect

The PIC controller also monitors the system signal PWR_EN, which comes out of the main processor and controls power to the processor core. In Sleep mode this power is turned off. By monitoring this signal, the PIC knows the status of the system and can respond accordingly. During wake up from deep sleep, nBATT_FAULT DET will ask the PIC to issue a PIC_IRQ to wake up the processor.

Headset Connect Detect

The PIC controller has the input nHEADSET_DET that is used to determine when an external headset is plugged into the CV30. This input notifies the software controlling the CODEC to route the audio signal accordingly and potentially mute other audio paths based on user preferences.

Internal Temperature Measurement

The PIC is also connected to an internal thermistor that can be read at the same time as the battery temperature thermistor to get an internal temperature for the unit.

Miscellaneous Signal

PIC port pin RE2 can be used in two different ways depending on design needs. The first is for control of the regulator that generates the core power for the main processor. The second is the input of SYS_EN signal from the processor to determine when the main processor is in DEEP SLEEP mode. The way the signal is used is determined by how the 0 ohm resistors are loaded on the board to route the desired signal to the PIC.

EEPROM Configuration Information

The PIC has a block of EEPROM that is used to store configuration information. The configuration information is loaded at the time of manufacture and must accurately match the hardware options and configurations of the CV30. The system software determines the functionality of the CV30 based on the configuration information. This EEPROM is non-volatile so this vital information is never lost. It is very important that if a unit is updated in service, or repaired (if the MLB is replaced, this EEPROM must be updated), **the EEPROM must be correctly loaded or the unit will not function properly**.

PIC Controller Programming

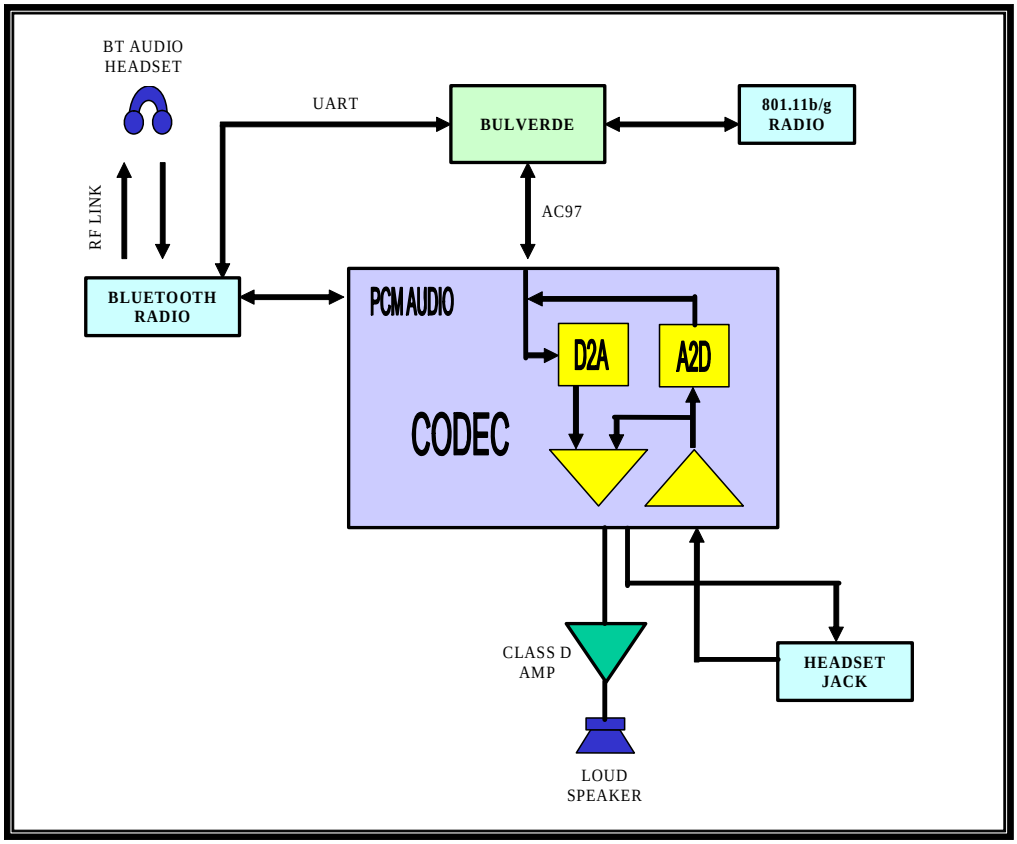
The PIC controller is preprogrammed before it is mounted onto the PCB. In the event that the internal code needs updating, a utility can be run from the main processor that can download new code to the PIC via the I2C port. It can then reload its internal flash with the new code.

In the event that this process fails or was aborted in mid update, a dedicated interface is available to reprogram the PIC. This can be accomplished without disassembly of the unit. A special programming device is attached to the MLB via a special adapter card that test engineering uses during manufacturing test. This adapter connects to the surface contacts on the MLB inside the SD card slot.

Audio System

The audio system is comprised of the following elements:

- Main processor with AC97 code interface
- AC97 CODEC
- Headphone jack
- Internal speakers and microphones
- Bluetooth digital audio interface
- Audio power supplies



Audio System Block Diagram

AC97 CODEC Interface

The main processor has an AC97 CODEC interface that is comprised of the following five signals:

- AC97_SD_OUT: Serial data from processor to the CODEC
- AC97_BIT_CLK: Clock from the CODEC to the main processor
- AC97_SD_IN: Serial data from CODEC to the processor
- AC97_SYNC: Synchronizing signal, places the CODEC in different modes
- AC97_RESET: Main processor resets the CODEC

This serial interface runs at approximately 12MHz. All audio digitized by the CODEC A2Ds is sent over this link (for example, audio recording). All digital audio to be converted to audio (such as MP3 decoded file) is sent over this link.

AC97 CODEC

The CODEC is comprised of the following functions:

- Stereo A2D converters with variable rate sampling.
- Stereo D2A converters with variable sample rate play.

- Multiple audio paths with variable gain and mixers.
- Multiple audio inputs and outputs.
- Integrated headphone amplifier.
- PCM interface for digital audio I/O.

The CODEC is used to route all audio signals to the proper destinations under software control. The software also controls the gain and mute as required by the user or application.

Headset Jack

The unit has a headset jack that allows the headphone, microphone, and speaker to connect to the CODEC. The CODEC directly drives the headphone speaker.

Bluetooth Digital Audio Interface

In situations where a Bluetooth headset is used, the internal Bluetooth module on the MLB will communicate over the PCM audio interface to the CODEC. This communication allows the wireless interface of an audio headset to the CODEC and then ultimately to the WAN radio or 802.11 radio to be utilized. The PCM audio interface is a serial, digital, bi-directional bus that routes digitized audio into a special port on the CODEC.

Audio Power Supplies

The audio CODEC has two power supplies:

- V3P3_CODEC_DIG powers the digital portion of the CODEC.
- V3P3_CODEC_ANLG powers the analog portion of the CODEC.

Both portions of the CODEC must be powered on at the same time or the CODEC may power up and remain in a confused state with erratic operation.

The analog section of the audio system has a ferrite bead to isolate the V3P3_CODEC_ANLG power from the rest of the device. This isolation ensures that the power is clean and does not inject audible noise that the user can hear.

The CODEC has a touch panel controller built in. In order to use the controller to operate the touch panel, power to the TPVDD needs to be supplied. However this part of controller was not used in the CV30.

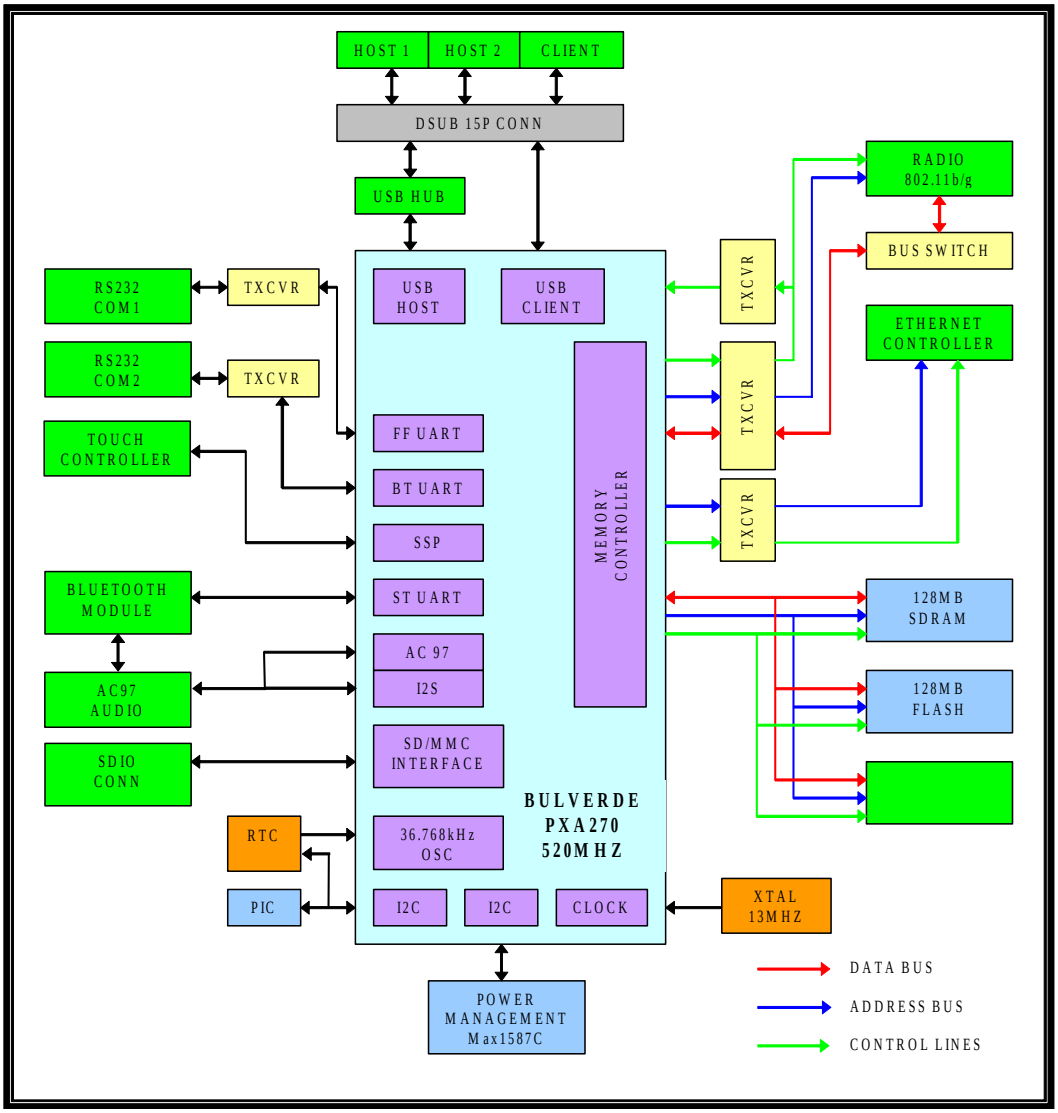
A separate LDO is provided to power the loud speaker amplifier TPA2005 from the V5P0_MAIN. The output of the LDO is ferrite filtered prior to supplying power to the loud speaker amplifier.

MLB Processor Functions

The terminal has an Intel X-scale processor that runs the Windows Mobile OS. The main engineering goals of the CV30 are to provide power management and option flexibility while maintaining open system standards. The CV30 can accommodate different modules and internal radios including 802.11b/g and Bluetooth.

The heart of the terminal is the X-scale processor that contains the following items:

- Main processor
- 64 MB flash
- Real Time Clock (RTC)
- CPU
- SDRAM controller
- GPIO (General Purpose Input/Output)
- LCD controller
- SPI interface
- SSP interface
- AC97 interface
- I2C interface (standard interface and a second power control)
- Client USB
- Host USB
- Full-featured UART
- Two-wire UART
- Four-wire UART
- SD card interface
- JTAG interface
- Processor address decode
- Processor bus interface



Main Processor Functional Diagram

RTC (Real Time Clock)

The main processor has an internal real time clock, but it does not retain time through a cold reset. To work around this limitation, an external clock IC was implemented to allow the time settings to bridge cold resets. The processor communicates with the clock chip through a two-wire I2C bus and can set the time in both the internal and external RTC via a software utility. The external RTC chip provides an accurate 32 KHz clock for the main processors internal RTC to use. The CV30 uses the Epson RTC-8564NB(LF).

Main Processor

The main processor has an ARM 4 core with several functional modules attached internally to the IC. Several clocking options are allowed to maximize performance. This is a RISC processor. 64 MB of Intel flash are stacked above the processor die in the same chip.

SDRAM Controller

The processor contains the SDRAM controller. The SDRAM controller is active only when the processor is active. In Sleep mode, the controller places the SDRAM into self-refresh mode and stops operation. Note that the processor must apply the SDRAM row and address lines on the Address bus plus use this bus for normal operation.

SDRAM Controller Description

SDRAM Signal	Description
SDCKE_1	SDRAM clock enable
SDCLK_0	SDRAM clock
SDCLK_0	SDRAM clock
nSDRAS	SDRAM row address strobe
nSDCAS	SDRAM column address strobe
DQM_0	SDRAM data byte path
DQM_1	SDRAM data byte path
DQM_2	SDRAM data byte path
DQM_3	SDRAM data byte path
nSDCS_0	Chip select used for 64 MB or less
nSDCS_1	Chip select used fro 64 MB to 128 MB

General Purpose IO

The processor has multiple functions for the GPIOs. When the special functions are not utilized, these pins have a variety of general purpose uses to control or sense the hardware.

12C Bus

There are two different 12C bus implementations in this product:

- Processor general purpose 12C bus
- Processor power control 12C bus

For more information on the connection of the 12C bus, refer to the "Main Processor Functional Diagram" on page 65.

The processor general purpose 12C bus is a two-wire, bi-directional, serial bus that communicates roughly at 100 Kbps between the following devices:

- Main processor
- PIC controller
- Real time clock

The main processor is the master and all other devices are slaves. Only one device on this bus can communicate at a time. The protocol looks for collisions and retries if they are detected. The main processor sends commands to the PIC controller to execute and the PIC sends results or responses back to the main processor over this bus.

Signal	Description
SCL	Serial clock for 12C
SDA	Serial data for 12C

The processor can set the RTC time and date as well as read the RTC time and date over this bus.

The processor power control 12C bus is a two-wire, bi-directional, serial bus that communicates roughly at 100 Kbps between the following devices:

- Main processor
- Processor power controller

The main processor is the master. This bus is used to change the core processor voltage to match the clock speed of the processor. When the processor is operating at low clock speeds, the core voltage can be reduced to lower power consumption. When performance is required, the core voltage is increased and then the processor clock is increased to meet the current work load.

Signal	Description
PWR_SCL	Serial clock for 12C
PWR_SDA	Serial data for 12C

Client USB

The processor supports a USB1.1 client interface. This interface is routed out to a D-Sub 15-pin connector for external connection to a PC for ActiveSync communications. The PIC controller detects when the external host 5 V is applied and informs the processor that the interface is active. This signal pair is differential. Both 1.5 and 12 Mbps operation is supported.

Signal	Description
USBC_P	USB data line positive
USBC_N	USB data line negative

Host USB

The processor has a USB2.0 host interface which is connected to a USB hub to output two USB hosts. This signal pair from the processor is differential. Both 1.5 and 12 Mbps operation is supported.

Signal	Description
USBH_P0	USB data line positive
USBH_N0	USB data line negative

The USB hub will output to two host interface to the D-Sub 16-pin connector with signal as shown in the next table.

Signal	Description
USBH_DP1	USB data line positive for HOST 1
USBH_DM1	USB data line negative for HOST 1
USBH_DP2	USB data line positive for HOST 2
USBH_DM2	USB data line negative for HOST 2

Full Function UART

The processor has a full-function UART (FFUART) that is compatible with the communication interface of the PC. The data rate is configurable and can range from 9600 to 115.2 Kbps.

Signal	Description	Direction
COM1_DCD	Data Carrier Detect	Input
COM1_DSR	Data Set Ready	Input
COM1_DTR	Data Terminal Ready	Output
COM1_CTS	Clear to Send	Input
COM1_RTS	Request to Send	Output
COM1_RXD	Received Data	Input
COM1_TXD	Transmitted Data	Output

This port is routed out the D-Sub 9-pin RS-232 connector through a RS-232 transceiver. The transceiver is located on the I/O board and it enables communication with an external RS-232 device. When a connected external device is removed, the transceiver detects the change in the input signal voltage, and automatically enters very low power mode to conserve power. When the external device is reconnected or powered on, the change in state is noted and the transceiver resumes operation. The RS-232 transceiver is also under software control and can be placed in a low power state through software.

Bluetooth UART

The main processors Bluetooth UART is connected to the second RS-232 communication port. The data rate varies from 9600 to 115.2 Kbps.

Signal	Description	Direction
COM2_DCD	Data Carrier Detect	Input
COM2_DSR	Data Set Ready	Input
COM2_DTR	Data Terminal Ready	Output
COM2_CTS	Clear to Send	Input
COM2_RTS	Request to Send	Output
COM2_RXD	Received Data	Input
COM2_TXD	Transmitted Data	Output

This port is routed out the second D-Sub 9-pin RS-232 connector through another RS-232 transceiver. Mainly this port will be used to connect to the scanner unit.

Standard UART

The main processors standard UART is connected to the Bluetooth module. The data rate varies from 9600 to 115.2 Kbps.

Signal	Description	Direction
BT_CTS	Clear to Send	Input
BT_RTS	Request to Send	Output
BT_RXD	Received Data	Input
BT_TXD	Transmitted Data	Output

SD Card Slot Interface

The SD card interface is a high-speed serial interface that sends all data either over a single bi-directional data line or a four-bit data bus. The SD card interface also supports the SDIO cards which uses the same signal set.

Signal	Description	Direction
SD_CMD	Command line	Input
SD_CLK	SD serial communcation clock	Output
SD_DAT [3:0]	Bi-directional data lines	Input/Output
SD_CD	SD slot detect	Input

The higher order data lines have a dual function when the SDIO interface is used.

JTAG Interface

The processor has a JTAG interface to facilitate testing and can be used to load the bootloader into flash with a special program. These signals can be accessed on the board by using a special fixture that plugs into the SD slot. This is a method that the service center can use to reprogram the CV30 bootloader into flash if it becomes corrupted. Normally, the flash can be upgraded using the bootloader software.

Signal	Description
TCK	Target Clock
TDI	Target Data Input
TDO	Target Data Output
TMS	Target Control Signal
TRST	Target Reset

Processor Address Decoder

The processor also has internal logic to provide programmable address decode to select external devices on the bus. When not used as address decode, these pins can be used as general purpose inputs or outputs.

Signal	Signal	Description
nCS[1]	nCS[1]	Ethernet chip select
nCS[2]	-	
nCS[3]	nVIDEO_CS	Graphics contoller chip select
nCS[4]	-	
nCS[5]	-	

Processor Bus Interface

The processor has the typical address and data buses along with a few miscellaneous signals.

Signal	Description
MA_LCL [25:0]	Address bus, bi-directional
MC_LCL [32:0]	Data bus, bi-directional
RDY	Ready signal
nWE_LCL	Write enable
nOE_LCL	Output enable

Main Bus Device

The main bus devices share the same data and address bus lines. Some devices use different subsets of the address and data lines to accomplish their functionality and each device may use the bus for longer or shorter amounts of time depending upon their speed. The transceiver buffers convert the signal level of portions of the main bus for connection to the Wireless LAN and Ethernet. The processor address and data bus are 1.8 V levels while the Wireless LAN and Ethernet controller address and data bus are 3.3 V levels. Devices on the main bus are:

- Mobile SDRAM
- Flash ROM (DiskOnChip)
- Graphic controller
- Bus transceiver for Wireless LAN and Ethernet connection

Mobile SDRAM

The mobile SDRAM is the main memory used by the CPU to operate applications. Power to this memory is provided continuously to prevent loss of programs or data. There are two SRAM with a combined capacity of 64 MB.

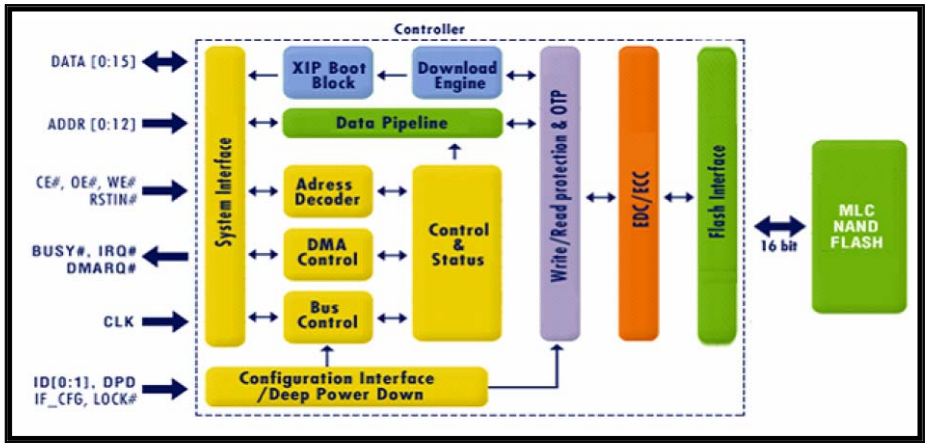
The performance for the mobile SDRAM parts is:

- CL=2 @ 83 MHz or CL=3 @ 133 MHz

We can utilize mobile SDRAM with different core voltage requirements depending upon the board loading. Both 1.8 V and 2.5 V core parts can be used.

Flash ROM

The ROM is the M-System DiskOnChip, with embedded thin flash controller and flash memory on a single die. It has a capacity of 128 MB (1 GB) and a 2 Kbyte programmable boot block. This block provides eXecute In Place (XIP) functionality, enabling DiskOnChip to replace the boot device and function as the only non-volatile memory device on board.



Major Function Blocks of the Controller

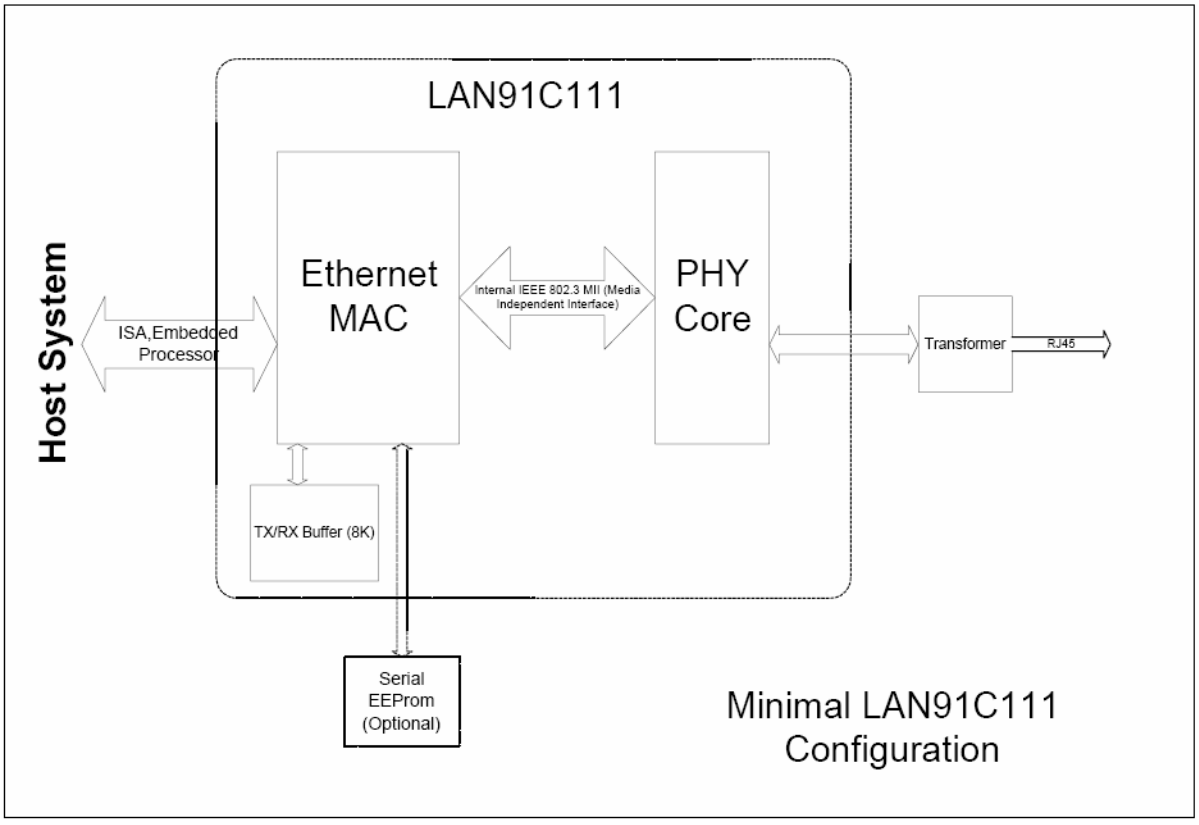
Ethernet Controller

The Ethernet controller LAN91C111 is a 3.3 V single chip, consisting of three indexing address lines and sixteen data lines. These buses will be routed through transceivers for signal level conversion. The main chip addressing is handled by the chip select from the processor through the transceiver (nETH_AEN).

The chip supports both the 10 and 100 Mbps speed. Two different interfaces are supported on the network side. The first interface is the standard Magnetics transmit/receive pair interfacing to 10/100 BaseT utilizing internal physical layer block. The second interface follows the MII (Media Independent Interface) specification standard.

Both the isolation transformer and the standard RJ45 connector reside on the I/O board. The transmit and receive signals are routed through an internal wire harness from the MLB board to the I/O board. Both the transmit and receive signal lines are differential pairs.

Signal	Description	Direction
ETH_TXDP	Twisted pair transmit positive	Output
ETH_TXDN	Twisted pair transmit negative	Output
ETH_RXINP	Twisted pair receive positive	Input
ETH_RXINN	Twisted pair receive negative	Input
ETH_SA [2:0]	Address A1-A3 input (for internal register selection)	Input
nETH_AEN	Address enable	Input
TXCVR_SD [15:0]	D1-D15, 16-bit data bus.	Bi-direction
ETH_RESET	Controller reset	Input
RDY	Asynchronous ready	Output
ETH_IRQ	INTRO, interrupt to the processor	Ouput
nETH_IORD	nRD, read strobe	Input
nETH_IOWR	nWR, write strobe	Input
nETH_BE [1:0]	nByte enable	Input

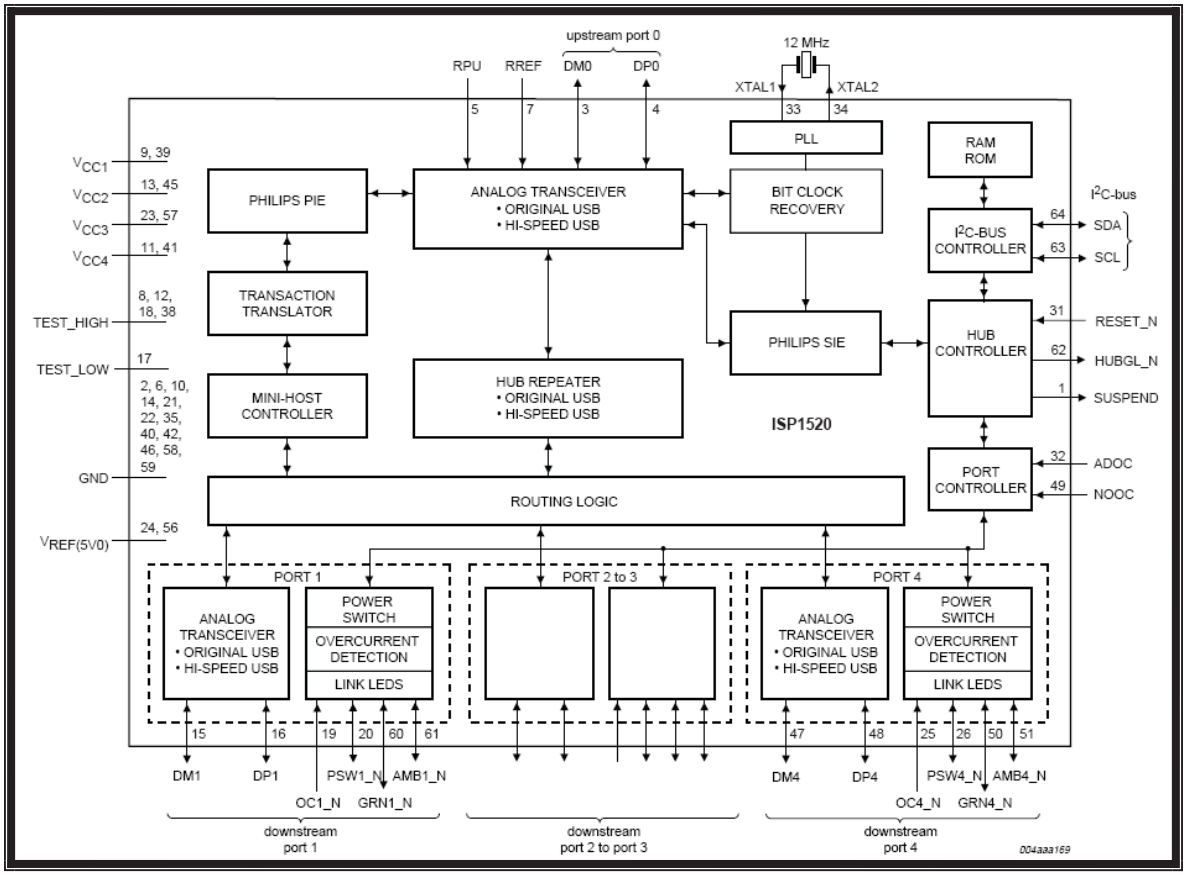


Ethernet Controller Diagram

USB Hub

The USB Hub ISP 1520 is a standalone controller that complies with the USB Specification 2.0. It supports data transfer at high speed (480 Mbps), full speed (12 Mbps), and low speed (1.5 Mbps). The processor is limited to full speed, therefore the controller will operate as a full speed device.

Signal	Description
USBH_DPn	Downstream USB line positive
USBH_DMn	Downstream USB line negative
USBH_P0	Upstream USB line positive
USBH_N0	Upstream USB line negative
USBH_RESET	Hub RESET, controlled by processor
nUSBOCn	Over current sense input
nUSB_PSWn	Power switch control output



USB Hub Block Diagram

The hub is protected by the external over-current switch MIC2026, which is connected through the digital over current signal nUSBOC1/2 to the hub. The protection can be configured as individual port control or ganged-port control depending on the pin PSWn_N configuration.

CV30 Connectors

The CV30 contains numerous internal connectors and external peripheral connectors. These connections allow for maximum flexibility in the configuration of the system.

Internal Connectors

The internal connectors provide board-to-board interfaces and interfaces to other devices. The internal connectors consist of:

1. Power connector: Molex (22-28-1050)
2. Battery connector: Molex (87438-034)
3. LCD connector: Hirose (DF9B-31P-1V(32))
4. CF connector: Molex (55358-5029)
5. SD card connector: Molex (500998-0900)
6. MLB to I/O board connector: JST (BM50B-SRDS-G-TFC(LF)(SN))
7. MLB to touch heater board connector: JST (BM50B-SRDS-G-TFC(LF)(SN))
8. MLB to radome board connector: JST (SM06B-SRSS-TB(LF)(SN))
9. MLB to inverter board connector: ACES (87216-1016)
10. RF connector: IPEX (20279-001E-01)
11. Touch heater connector: Molex (52610-1271)
12. Touch panel connector: Molex (52610-0871)
13. Touch heater board to keypad board: Molex (52559-2270)
14. Keypad board to audio jack board and speaker: JST (SM07B-SRSS-TB(LF)(SN))
15. Keypad board to LED board: JST (SM04B-SRSS-TB(LF)(SN))
16. Inverter board to LCD CCFL: JST (SM04(4.0)B-BHS-1-TB(LF)(SN))

External Connectors

The external connectors consist of:

- 5-pin power connector (Singatron 91M-701-5P)

Pin Number	Signal
1	FRAME_GND
2	V120_SYS
3	SYS_NEUTRAL
4	HEATER_NEUTRAL
5	HEATER_MAIN

- 3-pin audio headset jack, 2.5 mm (Singatron AJ413A-3-SMT)

- RS-232 serial D-Sub 9-pin (Kycon K22X-E9P-N)

Pin Number	Signal
1	DCD
2	RXD
3	TXD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	5V

- D-Sub 15-pin: 2 USB Host and 1 USB Client (Kycon K66X-E15P-N)

Pin Number	Signal
1	USBC_5V_DET
2	USBC_N
3	USBC_P
4	SG
5	FRAME GND
6	USBH_DM1
7	USBH_DP1
8	V5P0_USB1
9	SG
10	FRAME GND
11	V5P0_USB2
12	USBH_DM2
13	USBH_DP2
14	SG
15	FRAME GND

- RJ45 8-pin Ethernet connector (Kycon GWX-S-88-50)

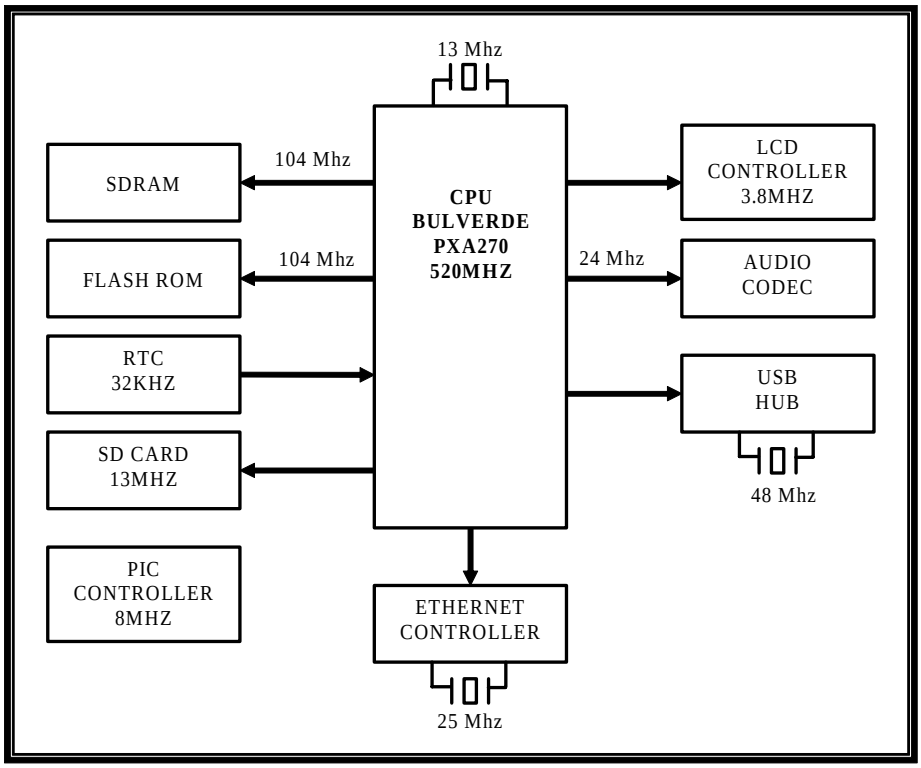
Pin Number	Signal
1	TX+
2	TX-
3	RX+
4	RX-
5	NA
6	NA
7	NA
8	NA

- SMA Connector (IO Precise Corp12-21813)

All data line signals that enter or exit the terminal are ESD and EMI protected to prevent damage to the terminal and to meet agency requirements.

Clock Map

Use the following clock block diagram to understand the all clock frequency used by the CV30 system.



Clock Block Diagram

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CV30 Fixed Mount Computer Service Manual

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