M211946EN-A

Technical Reference

Upgrading RT20 for

RS41-D and MW41

VAISALA

PUBLISHED BY

Vaisala Oyj
Street address: Vanha Nurmijärventie 21, FI-01670 Vantaa, Finland
Mailing address: P.O. Box 26, FI-00421 Helsinki, Finland
Phone: +358 9 8949 1

Visit our Internet pages at www.vaisala.com.

Table of Contents

List of Figures

List of Tables

1. About this Document

1.1 Version Information

This manual is intended for the local technician installing the upgrades in radiotheodolite RT20 antenna needed for operating with the MW41 sounding system and radiosonde RS41-D. The manual describes the steps for a successful system upgrade for RT20.

These upgrade instructions apply to RT20, RT20M, and RT20A. Unless otherwise specified in the instructions, the different RT20 configurations are all referred to as RT20.

Table 1 Manual Revisions

Manual Code	Description
M211946EN-A	March 2018. First version of this manual.

1.2 Documentation Conventions

WARNING! Warning alerts you to a serious hazard. If you do not read and follow instructions carefully at this point, there is a risk of injury or even death.

CAUTION! Caution warns you of a potential hazard. If you do not read and follow instructions carefully at this point, the product could be damaged or important data could be lost.

Note highlights important information on using the product.

Tip gives information for using the product more efficiently.

Lists tools needed to perform the task.

Indicates that you need to take some notes during the task.

1.3 Trademarks

DigiCORA® is a registered trademark of Vaisala Oyj.

Windows® is a registered trademark of Microsoft Corporation in the United States and/or other countries.

2. Overview of the Upgrade

2.1 RT20 Upgrade

A hardware and software upgrade for radiotheodolite RT20 is required before using it with MW41 and RS41-D. The actual upgrade procedure differs for RT20(M) and RT20A device types, but in both cases a new additional UPP210A processor is installed in the RTF20/21 card frame for serial communication with MW41.

In case of RT20A, the required serial mode connection can be selected by jumper settings, while in case of RT20/RT20M, modification in system wiring is also required.

In both cases, a software update is needed.

The main upgrade steps for the different RT20 device systems are the following:

2.1.1 RT20 and RT20M Upgrade

- Modification in wiring from Control Frame RTF20 to motherboard RTM20.
- Jumper wire installation in RTM20.
- Receiver Processor UPP20(A) replacement with UPP210A (if this has not been done in a previous update).
- Installation of second UPP210A in the leftmost card slot of the RTF20 (needed for communication with MW41).
- An upgrade in the radiotheodolite RT20 software.

2.1.2 RT20A Upgrade

- Jumper and jumper wire connections in the motherboard RTM21 for RS232C communication mode via UPP210A.
- Installation of second UPP210A in the leftmost card slot of the RTF21 (needed for communication with the MW41). Interface Processor MWI210 is removed if the unit has been installed for a different type of serial communication protocol.
- An upgrade in the radiotheodolite RT20A software.

2.2 Preparing for the Upgrade

This manual assumes that the MW41 and RT20 systems are assembled at the site. This is necessary for upgrading the embedded software in the RT20 units via MW41 as instructed in Upgrading RT20 Card Firmware (page 17) and for verifying the system functionality after the upgrade.

Before beginning the upgrade, check that the system works in the normal way with other radiosondes that are compatible with the current system.

2.2.1 Upgrading Procedure

The system upgrade consists of the following steps, explained in more detail in the following chapters:

1. Perform the necessary hardware modifications to the RT20 system.
2. Upgrade the software for the RT20 units.
3. Test the operation of MW41 with RS41-D.
4. Test the system with other applicable radiosondes.
5. Attach the label to the device and record the upgrade information for Vaisala Services.

2.3 Safety

Injury might occur if the following precautions are not observed:

WARNING! RT20 might move at high speed. Do not stand near the antenna when it rotates. The safe distance is 3 meters from the antenna.

WARNING! Take great care when using the optical telescope. RT20 might move at high speed.

2.4 ESD Protection

Electrostatic Discharge (ESD) can cause immediate or latent damage to electronic circuits. Vaisala products are adequately protected against ESD for their intended use. However, it is possible to damage the product by delivering electrostatic discharges when touching, removing, or inserting any objects inside the equipment housing.

To make sure you are not delivering high static voltages yourself:

- Handle ESD sensitive components on a properly grounded and protected ESD workbench. When this is not possible, ground yourself to the equipment chassis before touching the boards. Ground yourself with a wrist strap and a resistive connection cord. When neither of the above is possible, touch a conductive part of the equipment chassis with your other hand before touching the boards.
- Always hold the boards by the edges and avoid touching the component contacts.

2.5 Certificates

RT20 conforms to the requirements of:

- EMC directive 2004/108/EC

- Machinery directive 2006/42/EC

3. Hardware Modifications

3.1 Required Tools and Materials

- Upgrade kit RT20UPMW, including the required upgrade unit(s) (UPP210A) and software, jumper wire RT45229, adhesive label, cable CBL210055 for RT20/ RT20M upgrade, and cable RP45035 for connecting MW41 PC to Power Unit RP20.
- Soldering iron (only for RT20/RT20M upgrade)
- Screwdrivers, flat, 2 mm and 3 mm
- Documentation

In the RT20A upgrade the soldering iron and cable CLB210055 are not required.

3.2 Modifying RT20 and RT20M Hardware

If the system to be modified is RT20 or RT20M, perform the hardware modifications listed below. These systems have Control Frame RTF20 with units RTR20, RTQ20, UPP20/20A/210A, RTC20, RTP20, RTP21, RTD20, and RTH20.

1. Take note of the positions of the antenna cables on the RTR20 front panel.
2. Disconnect the antenna cables and the PTU cable from RTR20.
3. Open the fixing screws at the lower left and right corner of the RTF20 Control Frame and carefully pull the frame out. Turn the frame downwards to get access to the cables in motherboard RTM20.

   CAUTION! Be careful not to damage the cabling between the frame and the elevation unit. Do not allow the frame to hang on the cables alone.

4. Disconnect all cables from the motherboard to get the card frame fully out for modifying the wiring. Note that all connectors are keyed to prevent incorrect connections when reconnecting cables after the wiring modification.

5. Connect jumper wire 1 in the motherboard according to the figure below.

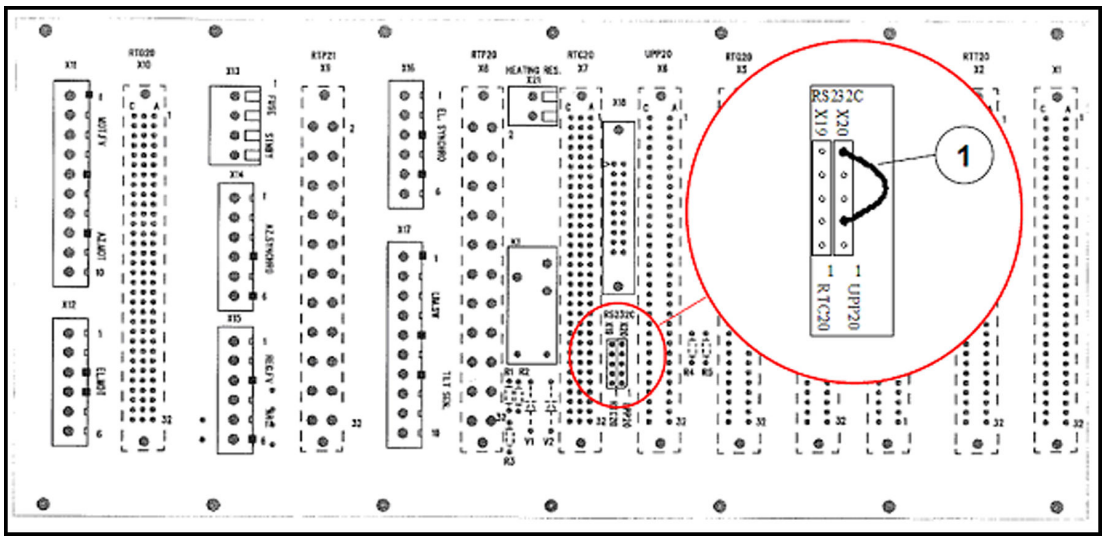


Figure 1 Connecting Jumper Wire 1 in the Motherboard

6. Install the wires of cable CBL210055 through the cable clamps and solder the white wire to pin a25 and the yellow wire to pin a26 of connector x1 as shown in the figure below.

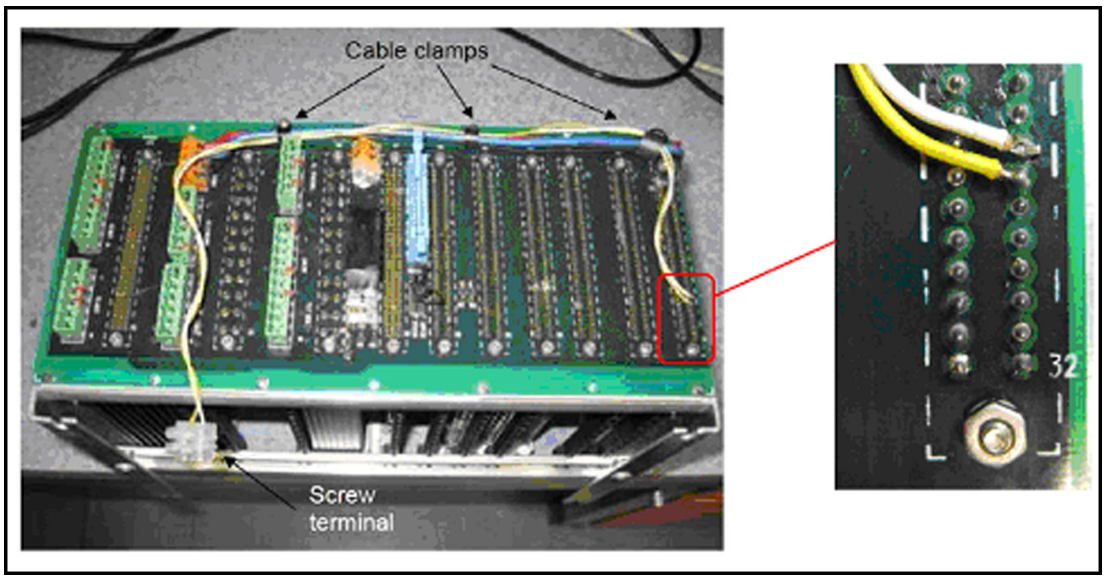
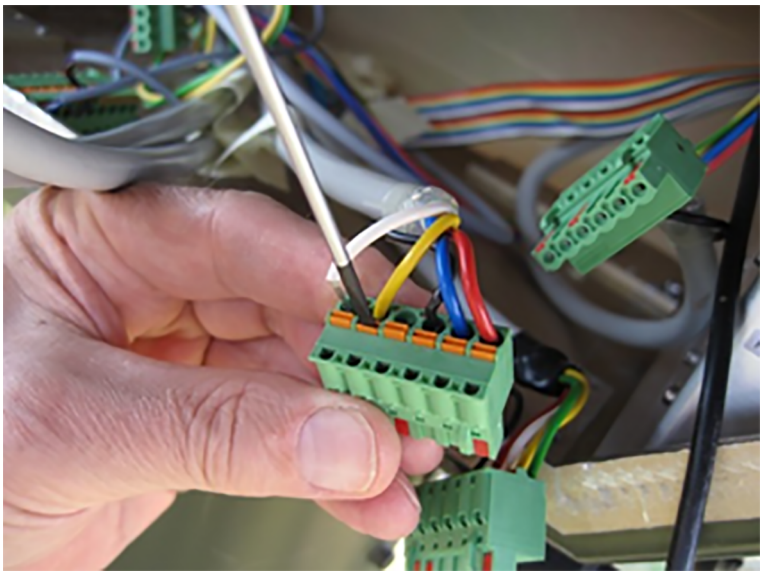
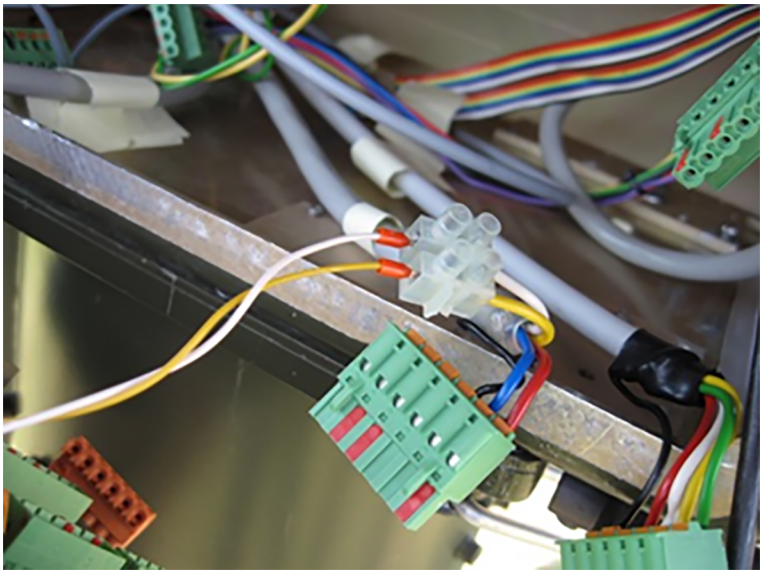


Figure 2 Installing Wires

7. Disconnect the white and yellow wires from pins 5 and 6 of cable connector X25 by pressing down the wire's locking latch according to the figure below. Make sure that you disconnect the wires at X25 where pin 4 is unconnected as a certain indication of the right connector.



8. Connect the disconnected white and yellow wires to the screw terminal of cable CBL210055 as shown in the figure below. Make sure that the white wire connects to white wire and the yellow wire connects to yellow wire.



9. Reconnect all disconnected cables and check that all cables are firmly connected in the motherboard. Also check that there are no loose cable ends at the cable connectors.
10. Carefully pull the frame back and check that the rear left and right fixing slots fit to the rear fixing screws at the bottom.

11. Install and tighten the front fixing screws.
12. Reconnect the antenna and PTU cables to their original positions.
13. Replace the UPP20 Receiver Processor with UPP210A according to the following steps:
    a. Open the two fastening screws of the old UPP20(A) processor.
    b. Pull out the unit from the frame carefully.
    c. Insert the new UPP210A receiver processor carefully in the place of the old processor.

    This procedure is not necessary if the RT20 already has the UPP210 or UPP210A installed in the slot between units RTQ20 and RTC20.

14. Install the second UPP210A in the leftmost card slot of the RTF20.

    CAUTION! Be careful not to damage the EMI shields of the new processor or the adjacent units.

3.3 Modifying RT20A Hardware

If the system to be modified is RT20A, perform the hardware modifications listed below. These systems have Control Frame RTF21 with units RTR20, RTQ20, UPP20/20A/210A, RTC21, RTP20, RTP21, RTD20, and RTH21.

This modification is not required if the system already has an additional UPP210(A) installed in the leftmost slot.

Modification steps:

1. Record the positions of the antenna cables on the RTR20 front panel and disconnect the antenna cables and the PTU cable from RTR20.
2. Open the fixing screws at the lower left and right corners of the RTF21 Control Frame and carefully pull the frame out. Turn the frame leftwise to get access to motherboard RTM21.

   Be careful not to damage the cabling between the frame and the elevation unit. Do not allow the frame to hang on the cables alone.

3. Connect the jumpers 1 - 4 and a jumper wire 5 according to the table and the figure below:

1	X23/5 to X23/6	(X1/RXD)
2	X22/5 to X22/6	(X1/TXD)
3	X25/2 to X25/3	(RS)
4	X24/2 to X24/3	(RS)
5	X20/2 to X20/5	Jumper wire, part no RT45229

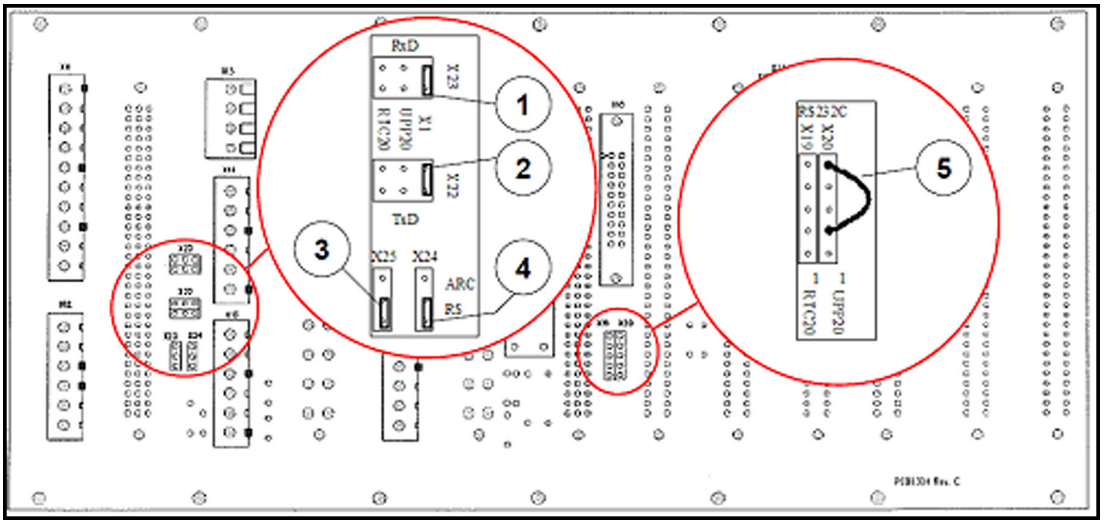


Figure 3 Connecting Jumpers 1-4 and Jumper Wire 5

4. Check that all cables are firmly connected in the motherboard. Also check that there are no loose cable ends at the cable connectors.
5. Carefully pull the frame back and check that the rear left and right fixing slots fit to the rear fixing screws at the bottom.
6. Install and tighten the front fixing screws.
7. Reconnect the antenna and PTU cables to their original positions.
8. Follow the steps below to replace the UPP20(A) with UPP210A receiver processor. This procedure is not necessary if the RT20A already has the UPP210(A) installed in the slot between RTQ20 and RTC21.
   a. Open the two fastening screws of the old UPP20(A) processor.
   b. Carefully pull out the unit from the frame.
   c. Insert the new UPP210A receiver processor carefully in the place of the old processor.

9. Install the second UPP210A in the leftmost card slot of the RTF21. Before installation remove Interface Processor MWI210 if it has been installed.

CAUTION! Be careful not to damage the EMI shields of the new processor or the adjacent units.

4. Upgrading Software

4.1 Upgrading RT20 Card Firmware

Three RT20 units, RTC20/RTC21, RTH20/RTH21, and UPP210A contain embedded software that can be updated with the instructions given in this section.

To update the embedded software, you need the admistration password to MW41.

For the correct operation of the sounding system, it is important to have compatible version levels of all programs. Three RT20 units contain embedded software that can be updated.
In RT20/RT20M, the units are RTC20, RTH20, and UPP210A. In RT20A, the units are RTC21, RTH21, and UPP210A. Make sure you select the correct software and update them all.

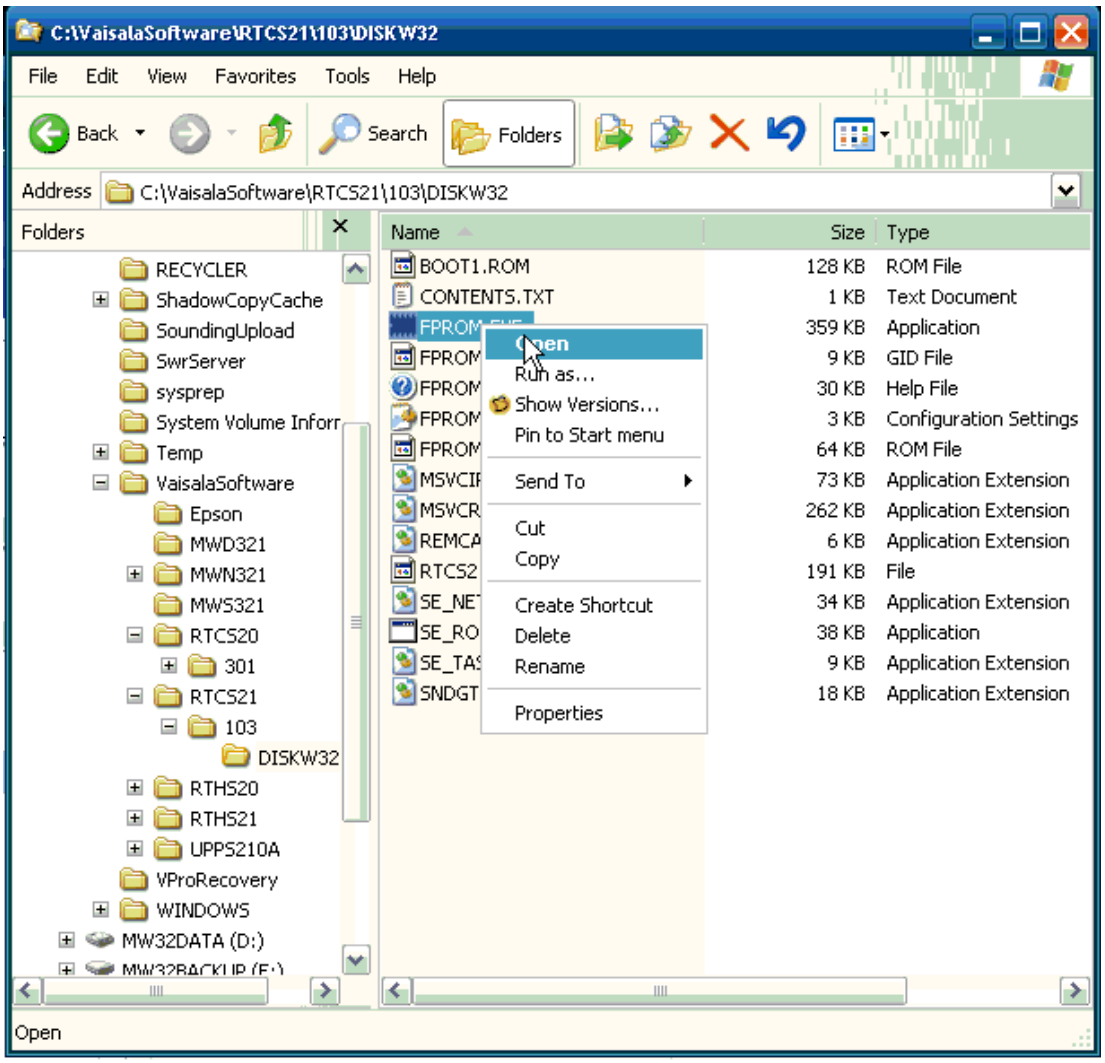
It is not possible to upgrade the software to all the cards simultaneously. Therefore you have to repeat the procedure separately for each card (both UPP210A cards are upgraded in one procedure).

1. Connect the serial cable from Power Unit RP20 to the MW41 computer serial port.
2. Power on MW41.
3. Click the MW41 icon and log in as sounding administrator.
4. Turn on the power supply RP20 for RT20.
5. In MW41, make sure that RT20 is disabled in **Administration > Devices and System > RT20**.

   Make sure that RT20 is disabled in MW41 before you start. You cannot perform the upgrade if RT20 is set to enabled state in MW41.

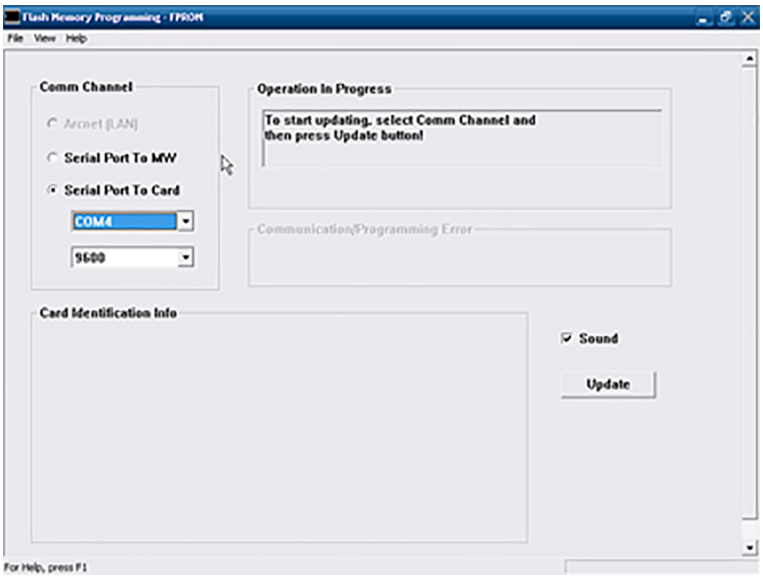
6. Locate the embedded software in folder *Embeddedsoftware* on the MW41 installation media. Each unit (RTC20 / RTC21, RTH20 / RTH21, UPP210A) has its own folder.

7. Click the file **FPROM.EXE** and select **Open**.

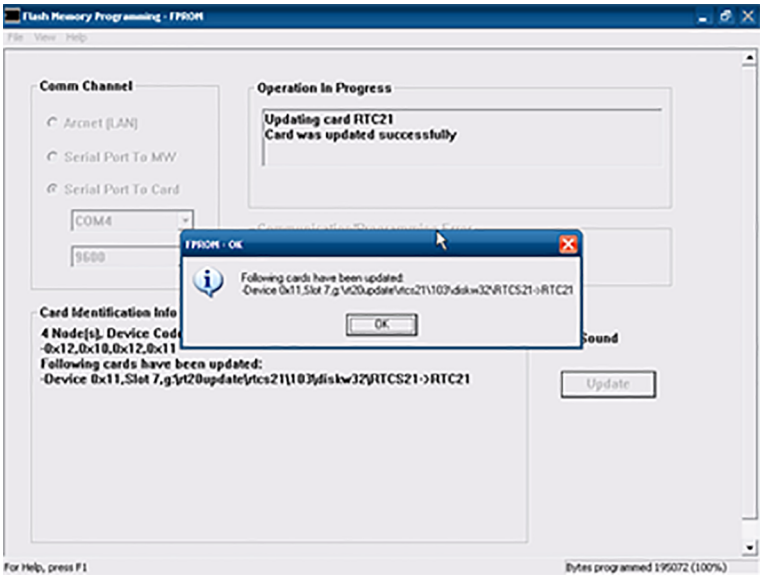


8. Select the option **Serial Port to Card** from FPROM.

9. Make the selections shown in the figure:
   - **Serial Port to Card**
   - **COM4**
   - Baud rate **9600**

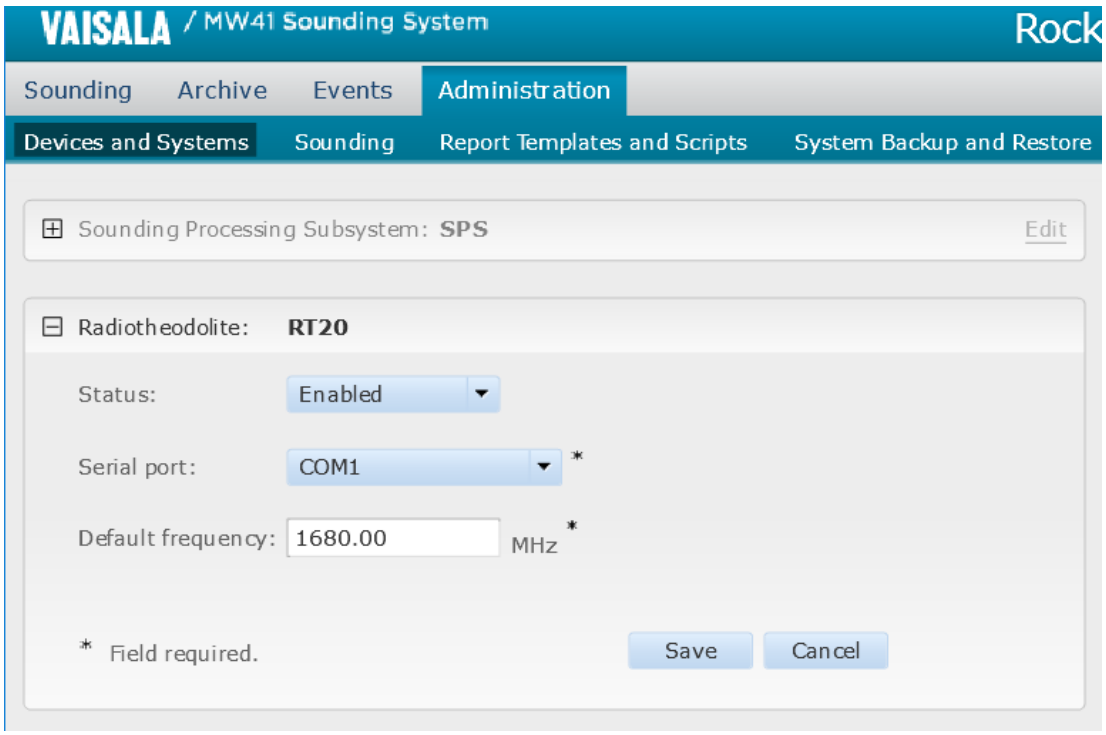


10. Click **Update**.
11. The program starts updating the embedded software.
12. After the update has been completed, click **OK** to close the FPROM application.



13. Repeat the steps above to update all units.

14. When you have updated all units, close the window and set RT20 state to enabled in MW41: select **Administration > Devices and System > RT20 > Enabled**.



15. Set the other needed values and click **Save**.

5. Finalizing the Upgrade

5.1 Testing

Perform end-to-end tests with RS41-D. Test other radiosonde models as well, if applicable.

5.2 Recording Serial Numbers

Record the serial numbers in RT20 and both UPP210(A) cards. Update the Vaisala Services Installation database correspondingly, or send the update information to Vaisala technical support: helpdesk@vaisala.com.

5.3 Attaching Adhesive Labels

Attach adhesive label "Upgraded for operation with RS41-D and MW41" inside the Elevation Unit RTE20/21 on the left side plate.

Appendix A. EU Declaration of Conformity for RT20

VAISALA

2010-09-27B/JTL Page (1/2)

EU DECLARATION OF CONFORMITY

Manufacturer: Vaisala Oyj

Post address: PL 26 , FIN-00421 Helsinki
Street address: Vanha Nurmijärventie 21, Vantaa, Finland

herewith declares that

MMS Radiotheodolites; RT20 (M) and RT20 (A)

with optional

Power Unit; RP20

or with optional

Power Connection Box; RPC112

are in conformity with the provisions of the following EU directive(s).

Low Voltage Directive (2006/95/EC)
EMC-Directive (2004/108/EC)
Machinery Directive (2006/42/EC)

and that the conformity is shown by compliance with the following standards:

EN 60950-1:2006 + Am 11:2009 Information technology equipment - Safety - Part 1: General requirements

EN 61326-1:2006 Electrical equipment for measurement, control and laboratory use - EMC requirements - Basic immunity test requirements.

EN 55022:2006 + Am 1:2007 Class B. Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement.

EN 61000-3-2:2006 Limits for harmonic current emissions

EN 61000-3-3:2008 Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems.

EN/ISO 12100-1:2003 + Am 1:2009 Safety of machinery - Basic concepts, general principles for design - Part 1: Basic terminology, methodology

Vaisala Oyj | PO Box 26, FI-00421 Helsinki, Finland
Phone +358 9 894 91 | Fax +358 9 8949 2227
Email firstname.lastname@vaisala.com | www.vaisala.com
Domicile Vantaa, Finland | VAT FI01244162 | Business ID 0124416-2

VAISALA

2010-09-27B/JTL Page (2/2)

EN/ISO 12100-2:2003 + Am 1:2009 Safety of machinery - Basic concepts, general principles for design - Part 2: Technical principles

EN 60204-1:2006 + Am 1:2009 Safety of machinery – Electrical equipment of machines – Part 1: General requirements

Vantaa 2010-09-27

.....

Jorma Antson
Quality Manager, Vaisala Group

Technical Support

Contact Vaisala technical support at helpdesk@vaisala.com. Provide at least the following supporting information:

- Product name, model, and serial number
- Name and location of the installation site
- Name and contact information of a technical person who can provide further information on the problem

For more information, see www.vaisala.com/support.

Warranty

For standard warranty terms and conditions, see www.vaisala.com/warranty.

Please observe that any such warranty may not be valid in case of damage due to normal wear and tear, exceptional operating conditions, negligent handling or installation, or unauthorized modifications. Please see the applicable supply contract or Conditions of Sale for details of the warranty for each product.

Recycling

Recycle all applicable material.

Follow the statutory regulations for disposing of the product and packaging.

VAISALA

www.vaisala.com