ADCON TELEMETRY

A75*x* addWAVE GSM/GPRS Series 4 A753/A755/A757

User Guide

SMART WIRELESS SOLUTIONS

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Contents

Chapter 1. Introduction

This manual explains the hardware aspects of Adcon's A753 addWAVE GSM/GPRS Series 4 remote telemetry units, including installation issues and certain parameter configurations. The manual is divided as follows:

- *Introduction*, which gives some general information and document conventions.
- *Using the addWAVE*, which details the installation and use of the remote telemetry unit.
- *Performing Advanced Functions*, which discusses connectors and controllers and provides other information for advanced users.
- *Specifications*, which describes operating parameters for the devices.

About the A753 addWAVE GSM/GPRS Series 4

The A753 addWAVE GSM/GPRS Series 4 remote telemetry unit (RTU) is a low-power, GSM/GPRS-based telemetry device with four digital I/O ports, twelve analog inputs, and four counter inputs.

The A753 incorporates a GSM module and uses the standard GSM network for retrieving telemetry data (900/1800 MHz in Europe, 850/1900 MHz in the US).

The A753 is a ruggedized RTU, complying with the IP65 ingress protection class (NEMA 4). Depending on topography, it ensures a reliable wireless connection to your cellular service provider. Your provider's cellular network must cover the site where you want to

install the RTU. The maximum theoretical distance to a base station of your provider is approximately 35km, due to timing constraints of the GSM system. The A753 operates in conjunction with the A840 and A850 Telemetry Gateway only.

Due to its construction as well as to the software controlling it, the power consumption is extremely low. The unit operates off an internal 6.2 Volt rechargeable battery, which is charged either by a solar panel or an external power adapter. A special configuration can be implemented where no internal battery is used, rather the power is obtained exclusively over an external connector.

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

1. This device must not cause harmful interference.
2. This device must accept any interference received, including interference that might cause undesired operation.
3. Any changes to the device other than those mentioned in this manual void the FCC type of approval.

Conventions

Certain conventions apply in this document.

Italics	Indicate that the text is variable and must be substituted for something specific, as indicated in the explanation. Italics can also be used to emphasize words as words or letters as letters.
Bold	Indicates special emphasis of the text. Also indicates menu names and items in a window.
`fixed font`	Indicates characters you must type or system messages.
File ⏩ Save	Indicates menu selection. For example, select the **File** menu, then the **Save** option.
Note	Indicates information of interest. Notes appear **after** the information they apply to.
CAUTION	Indicates that you may get unexpected results if you don't follow the instructions. Cautions appear **before** the information they apply to.
WARNING	Indicates danger to yourself or damage to the device if you don't follow the instructions. Warnings appear **before** the information they apply to.

Chapter 2. Using the addWAVE

The A753 addWAVE remote telemetry unit (RTU) is part of the A7*xx* series. For testing purposes, you should have an A840 or A850 Telemetry Gateway with access to the internet installed before you install the A753 RTU. For information about installing the A840 or A850, refer to device's user's guide.

CAUTION *The A840/A850 Gateway must have a working internet connection and a fixed IP address that is accessible from the internet. Your network router must also be set up correctly. You might need assistance from your IT personnel to set up the required port forwarding on the network router to your A840/A850.*

Be sure to verify that you have the required setup before you proceed.

Opening the packages

The addWAVE RTU package contains the following items:

- A753 GSM/GPRS Series 4 RTU
- GSM/GPRS antenna (short antenna in the package)
- ISM antenna including a mounting bracket and a 3 m (9 ft.) cable
- three ring clamps (one for tightening the mounting bracket of the ISM antenna)
- several documents, including an installation guide and IMEI - notice

If ordered, the following items come in separate packaging:

- solar panel with ring clamp
- set of aluminum poles
- LED tool

Make sure you have received all the equipment and read through the instructions that follow. When you are sure you understand them, you are ready to install your RTU.

Figure 1 shows the front view of an addWAVE RTU.

Figure 1. addWAVE RTU

Installing the RTU

As with all wireless communication devices, the higher the transmitter is installed, the better the communication will be.

Special Notes on GSM/GPRS Functionality

The A753 GSM/GPRS RTU is based on a GSM module, which employs a GSM cellular network to transmit the telemetry data. Before you install such a device, you must make sure a sufficient signal for proper operation of the RTU on the site where you plan to use it exists. You can do this by using a standard cellular phone operated by the same cellular provider. You can also verify communicatation with the RTU by calling it as you would a normal cellular phone.

Operating the A753

The two ways to operate your A753 GSM/GPRS RTU are as follows:

1. GSM mode: You must ensure that your provider offers CSD connections.
   Most cellular/GSM providers use a different telephone number for data communication than for voice communication. **Don't forget to ask for this data number when you order your SIM card, if you plan to use the RTU in GSM mode.**
   When your modem calls the RTU from a land line, it must use the data number. If the modem uses the voice number, the RTU will answer but will immediately send a busy tone, because the voice line cannot make a data connection. **Voice calls cannot connect to a data terminal, so be sure to set up your modem to use the data number when calling the RTU from a land line.**
2. GPRS mode: You must ensure that your SIM card is well suited for GPRS operation.

Inserting the SIM Card

You also need to insert that cellular provider's SIM card into the A753GSM/GPRS RTU's SIM card holder by following these steps:

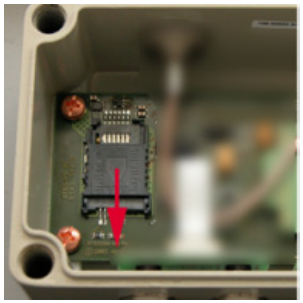
1. Open the lid of the A753 by unscrewing the four bolt screws in the corners of the unit and removing the lid as shown in Figure 2. Make sure to use a 3mm Allen key to prevent damage to the screw heads.

Figure 2. Lift the A753 lid

Note: You don't have to remove the battery plug from the base board during this operation, but make sure nothing is attached to the POWER connector.

2. Locate the SIM card holder and open it by sliding it as indicated by the red arrow (see Figure 3).

Figure 3. Open the SIM card holder

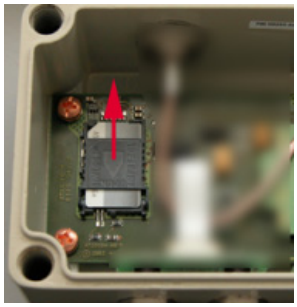


3. Raise the holder top and slide the SIM card into it (see Figure 4).

Figure 4. Insert the SIM card into the holder

4. Snap the holder top back on and slide it back as shown again by the red arrow depicted in Figure 5.

Figure 5. Close the SIM card holder



5. Close the lid, taking care that the rubber gasket seal is inside its track and free of dust or dirt.

WARNING *Be sure to mount the rubber gasket properly, so that the unit's IP65 environmental protection is not affected.*

6. Put the four screws back in place, applying moderate force, tightening crosswise. Be sure not to overtighten the screws or leave them too loose.

This completes the SIM-card installation. For additional information, please contact Adcon Telemetry or your local reseller of Adcon Telemetry products.

Activating the SIM Card

You need to activate the card by using a personal identification number (PIN). This number is in the package you received from your cellular service provider.

Before you can activate your card, the A753 must be properly powered. As the units are delivered from the factory with the batteries uncharged (they have a longer shelf life in this state), you must charge the batteries first. The best way to do this is to attach the solar panel to the power connector and expose the RTU to sunlight for at least one hour. If the sky is overcast the battery will still charge, but at a lower rate; in this case allow at least four hours for charging.

You need a serial adapter for configuring the RTU (e.g. for entering the PIN code, etc.). You can order this serial adapter from ADCON Telemetry or your distributor. Please proceed to set up the serial connection to the RTU as follows:

1. Connect the serial cable to the COM port of your PC and to the A753. Configure your terminal as follows:
   - 19200 baud
   - 1 stop bit
   - 8 data bits
   - no parity
   - no handshaking protocol (neither hardware nor software)

   For more details, see "Communicating with the RTU" on page 22.
2. Make sure that you can communicate with the RTU by pressing the enter key. The device will answer with its own ID number and a hash sign (#).
3. Enter the command `GSMPIN nnnn` (where *nnnn* is the PIN code). If the PIN conforms to the standard PIN format requirements, the RTU will answer **`ID GSMPIN #`**, where the hash mark represents the PIN (a zero indicates an invalid PIN, so check with your provider if you get a zero).

Note: *The user can enter the PIN code a maximum of three times (possibly more, depending on the setting on the SIM). After the maximum is reached, the SIM is locked and must be unlocked using a mobile phone. To unlock the SIM, you will also need the PUK code, which is included in the SIM package you got from your provider.*

This completes the PIN entry procedure. After a few minutes of initialization you can check the status of the A753 at any time by

entering the **GSMSTAT** command. This command returns a list of GSM parameters:

```
# gsmstat
42395 gsmstat
Power supply on:  yes
DTR on:           yes
DCD on:           yes
RI on:            no
RTS on:           yes
CTS on:           no
Modem on:         yes
Modem present:    yes
Modem initialized:yes
SIM card present: yes
PIN required:     yes
PIN accepted:     yes
PIN count:        3
PUK required:     no
GSM network:      registered
Operator:         T-Mobile Austria
Signal quality:   31 99
Phone call:       no
GPRS network:     registered
IP address:       10.11.12.13
TCP connection:   216.163.137.68
0
#
```

The above system output shows that:

- The GSM/GPRS modem is present and activated (`Power supply on`).
- A valid SIM card is inserted (`SIM card present`).
- The SIM card was activated with the valid PIN code (`PIN accepted`).
- A GSM network was detected with the operator name *T-Mobile Austria* (`Operator`).
- The signal quality 31 (maximum) and the bit error rate could not yet be determined.
- The RTU is registered in the GPRS network (`GPRS network`)
- The IP address of the RTU is 10.11.12.13 (`IP address`)
- A connection is active to a gateway with IP address 216.163.137.68 (`TCP connection`)

To establish the data connection between the A850 and the A753, certain steps must be executed. These steps are split into two sections:

1. Configuring the GPRS parameters
2. Configuring the TCP parameters

CAUTION *Parameter values are case sensitive. Be sure to correctly spell the values of the GPRS parameters and use the appropriate case. Misspelled names/entries will cause the RTU to not connect to the GPRS network and/or A850.*

Configuring the GPRS Parameters

Enter the GPRS parameters for your cellular network provider to configure GPRS operation of the A753. The GPRS configuration commands are:

GPRSAPNSERV "*[servername]*"
: where *[servername]* is the name of the network provider's GPRS access point name (required)

GPRSAPNUN "*[username]*"
: where *[username]* is the name of the GPRS user's name for your network provider (sometimes optional, depends on your provider)

GPRSAPNPW "*[password]*"
: where *[password]* is the password for the GPRS user (sometimes optional, depends on your provider)

The following examples show the GRPS parameters for an Austrian mobile phone services provider:

```
GPRSAPNSERV "A1.net"

GPRSAPNUN "ppp@A1plus.at"

GPRSAPNPW "ppp"
```

Configuring the TCP Parameters

The A753 will connect to the A850 only if the following TCP connection parameters are set properly:

GPRSCONNADDR "[*a850-ipaddress*]" "[*portnumber*]"
: where [*a850-ipaddress*] is the IP address of the A850 the A753 has to connect to and

  [*portnumber*] is the port number where the communication with the gateway will occur; the IP address parameter must be in decimal dotted notation, e.g. 198.182.196.56 (required)

GPRSDNS "[*ipaddress*]"

where [*ipaddress*] is the DNS server address of your GPRS network operator (optional)

Note: *When using an Internet firewall in front of the LAN where the A850 Telemetry Gateway resides, be careful to properly configure the firewall and the GPRSCONNADDR parameters* `[a850-ipaddress]` *and* `[portnumber]`. *This is particularly important if you use NAT (network address translation) on your firewall.*

You should also understand that a "home-grade" router may be not sufficient for this application. Adcon strongly recommends that you use professional router equipment.

Configuring the A753 Connection Settings

Use the following commands to define the intervals the A753 will wake up and connect to the A850 Telemetry Gateway:

GPRSCONNALIGN [*align*]

Alignment of calls in seconds (default: 0, i.e. 00:00 = midnight). This parameter is used to spread the connections in time to avoid overloading your router or gateway, which is necessary for large-scale networks.

GPRSCONNINT [*interval*]

Interval in seconds between two connection attempts (default: 3600).

GPRSSECRET [*secret*]

This 32-bit integer (0 -4294967295) has to be set for the A753 and the gateway. The integer is a shared "secret" or password used as a lock-out mechanism to avoid connections to foreign gateways.

GPRSTMOUT [*interval*]

Idle timeout in seconds (default: 3600); connections that are idle this long will be terminated by the A753. This helps to detect silently deceased TCP connections.

After entering all parameters correctly, you can check your settings at any time by entering the **`INFO 2`** command. With the GPRS parameters set, the response will be similar to the following:

```
# INFO 2
42395 INFO
Features:          none
GSM timeout:       40
GPRS timeout:      3600
Access point:      business.adcon.at "" ""
Connect interval: 120 0
Connect to:        172.47.13.153 83 0
```

```
Shared secret:    08154711
0
#
```

Field Installation

Installing a preset A753 in the field is a fairly simple process. By performing a connectivity check using an LED tool (not included in the delivery of a A753, but available from Adcon), you will be able to prove connectivity to the A850 gateway.

The LED tool is shown in Figure 6.

Figure 6. LED tool

Note: *The LED tool is a blind plug to be connected to the SOLAR connector.*

Follow these steps to install an A753 in the field:

1. Review the installation area and choose the best site.

Note: *For the A753 GSM/GPRS, make sure that you have a sufficient RF signal from your cellular service provider. The simplest way to achieve this is to check a cellular phone operated by the same cellular service provider on the site where you want to install the RTU.*

2. Assemble the pole set.
3. Put an Adcon plastic cap into the top of the pole and secure it with a pipe clamp to protect the top of the pole from damage.
4. Using a hammer, drive the 80 cm aluminum rod into the ground.
5. Using the pipe clamp supplied, fasten the solar panel onto the pole. Make sure that the panel is facing south (north if you are located in the southern hemisphere) and out of the way of the A753 RTU.

Note: *The solar panel can be mounted under or behind the A75x RTU, but make sure that the RTU does not shadow the panel.*

6. Fasten the A75x RTU to the top of the pole with a pipe clamp. Adcon recommends that you perform a connectivity test, if you can, to check the positioning of the device.

WARNING *If you turn the fastening screws too tightly, you could damage the connectors.*

7. Attach the sensors to the I/O connectors and the solar panel to the POWER connector by turning the plugs' fastening screws clockwise until secure.
8. If you have SDI-12 sensors, attach the respective sensors.

This completes the installation of your A753. If the SOLAR CELL connector or the DC INPUT connector is left unused, use the cap provided to protect it against moisture and dust. Be sure to keep the following information in a place you can remember:

- Serial number of the A753 (printed on the type plate)
- Location of the A753

Note: *This information will be necessary during the configuration of the device at the A850 Gateway.*

More about the LED Tool

The LED tool allows you to rapidly check the status of an A753. After you insert the LED tool into the SOLAR CELL connector, the unit tries to reconnect to the A850 gateway configured previously on the A753. Table 1 on page 17 describes the LED blinking codes for the A753.

If the A753 is not connected to the A850, the unit flashes rapidly to let you know the unit is alive. These flashes occur every half second.

If the internal battery level drops below 5.6 volts, the unit will enter the *misery* state. In this state the unit reduces its activities to a minimum. The GSM/GPRS module is turned off, the GPRS connection to the A850 gateway is terminated, and communication over the serial communication cable is impossible. Only the internal real-time clock is maintained and the power management functions are performed.

Furthermore, when the internal battery level drops below 5.2 volts, the system switches completely off, effectively decoupling itself from the battery in order to protect it.

Note: *If the LED tool was connected to the A753 when the unit shut down, the LED tool will restart the A753, which will initiate a shutdown again. If this happens to you, disconnect the LED tool and replace/recharge the battery. (This does not apply if a solar panel is connected to the SOLAR connector.)*

Configuring an A753 in the Telemetry Gateway

To configure the A753 with an A850 Telemetry Gateway, refer to the *A850 Telemetry Gateway User's Guide*.

Maintaining and servicing the RTU

An A753 Series 4 addWAVE needs virtually no maintenance. It is waterproof and designed to withstand harsh environmental conditions (-30 to +70 °C, or -22 to 158 °F), high RH values, water, and other non-corrosive liquids. It conforms to the European protection class IP65. This applies also to the connectors, as long as they are mated. Don’t let unmated connectors on either the addWAVE RTU or the sensors be exposed to the environment for extended periods of time as this will seriously degrade their functionality.

The RTU battery

- The internal battery supplies 6.2 volts and consists of a NiMH pack. The internal electronics manage the battery's charging/ discharging process, ensuring it a long life time. This approach, coupled with a remarkably low average power consumption, allows an addWAVE RTU to operate at least two weeks on a fully charged battery, as long as the analog and the counter values are stored in the internal memory every 15 minutes.

Table 1 shows the addWAVE device's expected operation time on a fully charged battery under various conditions.

Table 1. addWAVE Device Operation Time

Mode	Polling Rate	Sampling Rate	Average Consumption (mA)	Estimated Operation (days)
GPRS Power Save Mode	1-4/day	900/15	0.65	199
GPRS with good link quality	4/hour	900/15	81	6
GPRS with bad link quality	4/hour	900/15	20	6

However, if for some reason (wear-out or accident) the battery loses its capacity (noted in the software with repeated "Battery low" messages), it must be replaced. Make sure though, that the problem is really due to the battery and not to a defective or dirty solar panel.

Adcon highly recommends that you frequently check and clean your solar panels. Rain and dust can cover the solar panel's surface with a thin layer of dirt, effectively reducing its power output. Surrounding vegetation can also lower panel efficiency.

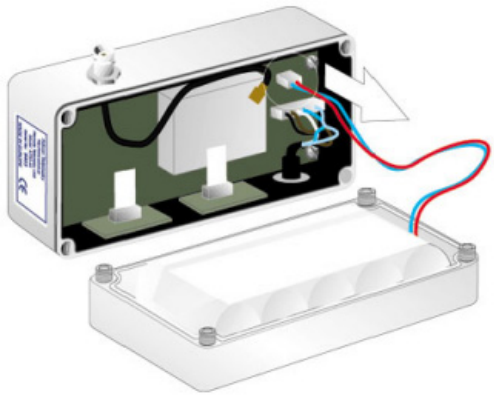
Replacing the battery

If you have verified that the battery needs to be replaced, follow these steps to do so:

1. Open the lid as described in Step 1 on page 9.

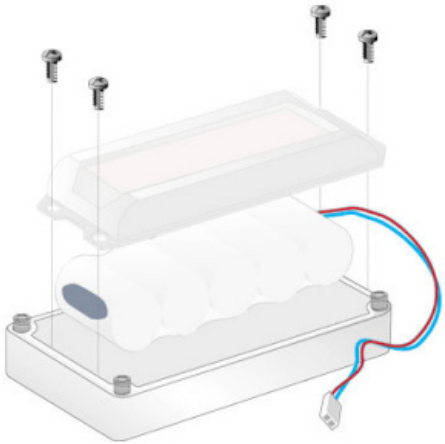
2. The battery pack is connected to the electronics board by means of a PCB connector. Remove the battery pack's plug from the PCB connector, as shown in Figure 7.

Figure 7. Unplugging the PCB Connector



3. Unscrew the four screws of the plastic cover that holds the battery pack in place, then remove the cover. Figure 8 shows this step, revealing the A753 battery pack inside the RTU.

Figure 8. A753 Battery Pack



4. Remove the battery pack and replace it with a new one (obtainable from Adcon).
5. Replace the plastic cover and fasten the two nuts.
6. Insert the battery plug into the PCB connector.

WARNING *Be sure to mount the rubber gasket of the lid properly, so that the unit's IP65 environmental protection is not affected. You must also be sure to not squeeze the battery cable.*

7. Mount the lid back, taking care that the rubber gasket sealing the box is correctly in place and free of dirt and soil.
8. Screw the four cover screws back in, applying a moderate force.

Chapter 3. Performing Advanced Functions

With the appropriate knowledge, you can configure A753 remote wireless modems in the field by using a hyperterminal window. To configure the devices, you will need a special serial cable adapter (not supplied, but available from your Adcon distributor).

CAUTION *Do not try to configure your devices if you are not sure what to do—the unit might not communicate with the remote measuring station or function with the addVANTAGE software.*

WARNING *Tampering with parameters for the devices may void your warranty or damage the device. In general, the commands described in this chapter are intended for technical support staff and users with a great deal of highly technical hardware and software experience.*

In the system architecture, the base station and A753 are both considered to be nodes. The base station is called the master node, or *master*, while the A753 is called the slave node, or *slave*. The A753 includes a base station and a virtual RTU (maintaining only, no sensor data). Thus, to configure the A753, you will need to insert two nodes into your A850 Telemetry Gateway configuration.

Understanding Connectors

The devices have cable attachments called *connectors*. The connector type determines how the device communicates with the sensors or the computer.

The SOLAR CELL Connector

The A753 remote wireless modem has a SOLAR CELL connector used to interact with the device. The connector features the following pins:

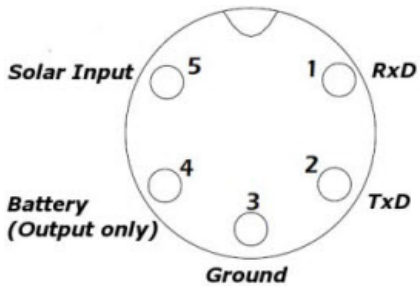
- Solar Input, which enables charging the internal batteries.

CAUTION *To charge the unit without causing damage to the batteries or the charging circuit, the following electrical characteristics must be maintained:*

  - operating input voltage: 9 -10V
  - maximum input current: 100 -300mA

- Battery, which enables powering external circuits. This pin is an output-only pin. The maximum current drawn by the attached circuit must not exceed 500 mA.
- RxD and TxD, which are used for serial communication (19200 baud) with the A753. The pinout of the SOLAR CELL connector is shown in Figure 9.

Figure 9. The SOLAR CELL connector

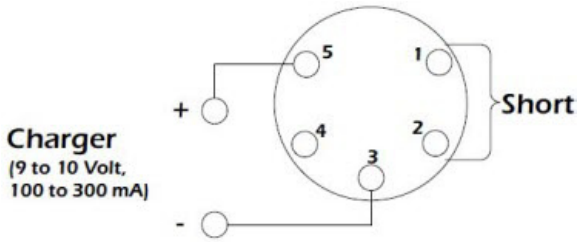


Note: *Unlike the usual power connectors, the A753 SOLAR CELL connector features no external battery power supply. Thus, the unit must be used with an installed internal battery or an external battery connected to the DC INPUT connector.*

WARNING *The serial communication line is 3V CMOS compatible. Therefore, a special adapter cable must be used to reach the RS-232 levels.*

You might want to charge the A753 with something other than the standard solar panel. In this case you must provide the electrical characteristics and configuration shown in Figure 10.

Figure 10. Configuration for charging the A753



Communicating with the RTU

You can use a Windows Hyperterminal window to connect to the A753 remote wireless modem. After you have installed the system, follow these steps to configure the device and set the default parameters:

Note: To configure the A753, you must have a special adapter cable (item number 200.720.540 from your Adcon distributor) and plug it into the SOLAR CELL connector.

1. Open a Hyperterminal window.
2. Select the appropriate serial port and click **OK**.
3. Configure your terminal as follows:
   - 19200 baud
   - 1 stop bit
   - 8 data bits
   - No parity
   - No protocol (neither hardware nor software)
4. Select **OK** to open the terminal window.
5. Press **Enter** to generate a response in the window.

*Note: The A753 has two command line modes, **bootloader** and **firmware**.*

Booting the A753

Note: This section is included for informational purposes. You will rarely need to boot the A753. However, when you do need to do so, you will work within a Windows Hyperterminal window on your computer.

Bootloader Mode

When the A753 starts from a power-up reset (such as when you connect the battery to the unit), it enters the bootloader mode. If you press no keys in the interim, the A753 enters the firmware mode in five seconds.

If you want to work with commands in the bootloader rather than continuing to the firmware mode, press ESC within five seconds after seeing the following sign-on message:

```
A753 Bootloader V1.7

Copyright (C) Adcon Telemetry GmbH 2009

Press <ESC> within 5 seconds to start the commandline
interface...
```

You are in the command line interface of the bootloader. This interface enables you to perform certain commands such as upgrading to a new firmware or rebooting the device.

Note: If you press no keys within 60 seconds, the bootloader command line interface will start firmware mode automatically.

In bootloader mode, the command line interface's prompt is the character >. Therefore, to reboot the A753 type the following after you see the > prompt:

```
reboot
```

An alternative way to boot the unit is to disconnect the battery and after a few seconds reconnect it.

For a list of the available commands, type `Help` at the > prompt.

```
Available commands:


upgrade [baudrate] ... upgrade from Y-modem download
version ... show the version of the bootloader
state ... show the board state
reboot [id] ... reboot the A753
firmware ... start the firmware
help ... display this help text
```

Note: For some commands, such as the reboot command, you can supply the ID of the device.

Firmware Mode

When you enter firmware mode, the following message is displayed in the Hyperterminal window:

```
Checking firmware ... firmware found!
41239 0
#
```

The bootloader scans the program memory for a valid firmware by testing the checksum, which takes a moment. If everything is correct, the "firmware found!" message appears.

After the initialization process is done, which may take a moment, the device's identification number (for example, 41239) and error code (in this example, 0) are displayed. After another moment, the firmware mode's command line interface prompt is displayed (#).

If you need to return to bootloader mode when you're in firmware mode, enter the `Reboot` command at the prompt.

See "Using Terminal Commands" on page 27 for commands available in firmware mode.

Upgrading the Firmware

Note: This section is included for informational purposes. You will rarely need to upgrade the firmware. However, when you do need to do so,

you will work within a Windows HyperTerminal window on your computer.

Before upgrading the firmware, you must reboot the A753 to access the bootloader mode's command line interface. Follow the procedure described under *Booting the A753* to get into the bootloader.

Before you start the upgrade, it is very important that you copy the firmware image to the hard drive of the computer you use in the field.

You also need to know which version of the bootloader you are running. You can determine the version any of the following ways:

- Look at the bootloader's sign-on message when you start it.
- At the bootloader mode's > prompt, enter the `Version` command.
- In firmware mode, enter the `Reboot <ID>` command and look at the sign-on message.
- In firmware mode, enter `ver` at the # prompt.

Now you're ready for the upgrade.

1. At the '>' prompt, enter the following command:

   `upgrade 115200`

   The upgrade process starts.

Note: *For pre-1.7 versions of the bootloader, omit the speed parameter (115200 used to be the default). For 1.7 and later versions, include the 115200 baudrate parameter. If you do not specify a baudrate, the upload runs at the default 19200 baudrate.*

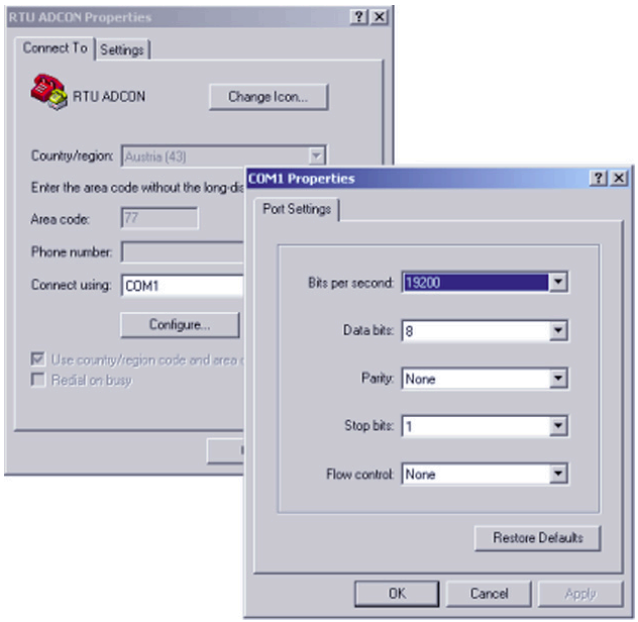
```
Change the baudrate of your terminal to '115200' and
hit <Return> to start flashing.
```

2. Select **File ⏩ Properties** to open the hyperterminal's Properties dialog.
3. Select a com port for the **Connect using** field.

Note: *If your bootloader is version 1.7 or later and you used the* `> update` *command rather than the* `> update 115200` *command, you can skip Step 4 through Step 6. The bootloader will use a baud rate of 19200.*

4. Click the **Configure** button to display the com port's Properties dialog (Figure 11 shows a COM1 com port).

Figure 11. Hyperterminal and com port properties dialogs



5. In the **Bits per second** field, select **115200**.
6. Select **OK** in the com port's Properties dialog to close it.
7. Select **OK** in the hyperterminal's Properties dialog to close it.
8. Back in the hyperterminal window, press `Enter` to continue the upgrade.

```
-------------------------------------------------

The current firmware image must be erased for the
upload.

If you continue now, you *MUST* upload a valid
firmware image for an A753!


Continue? [y/n]:
```

WARNING *When you continue with the upgrade process, any existing firmware image in the A753's flash memory will be erased! You must supply a valid image for upload or the A753 will have only bootloader capabilities (that is, it will have no radio capabilities).*

9. Enter `Y` to continue the upgrade.

   The bootloader starts sending the letter C (for connect)

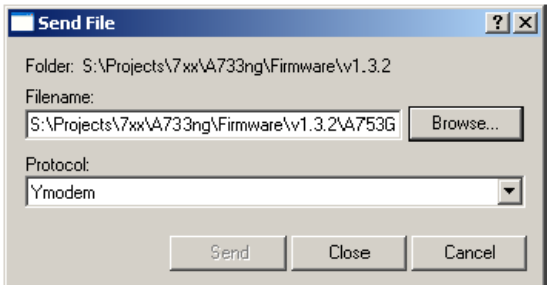
```
Starting flash blankcheck and erase process. . . done
-------------------------------------------------

Start the Y-modem upload now!

Starting CCCCC
```

10. From the hyperterminal window's menu bar, select **Transfer ▸▸ Send File** to display the dialog shown in Figure 12.

Note: You must start the image upload within 60 seconds or a timeout will occur.

11. Browse to and select the firmware image.
12. Select the **Ymodem Protocol** and click **Send**.

Figure 12. Dialog to upload firmware image



13. To start the new firmware, enter the following command:

```
firmware
```

Serial Communication Protocol

This protocol is based on a master sending commands and a node answering. The whole communication is conducted in plain ASCII, as strings, and numbers are represented in decimal format. All commands are terminated with a CR/LF combination. All responses (answers) are terminated with the **#** character.

General Format of a Command

The commands have the following format:

ID Command Param1 Param2 ... ParamN

- `ID` is the destination device. If you include an ID as part of a command, the node checks whether `ID=ownID`. If it does, the node executes the command on itself. If the ID is not the node's ID, the node executes the command on a remote device, if such an ID exists. If the ID is missing, this implies that the command is addressed locally.

Note: Not all the commands can be relayed remotely.

- `Command` is the command proper, which can be composed of a variable string of characters (for example, `SLOT`). Each node can implement a set of commands depending on the functionality of the node itself. However, as a minimum requirement, a node recognizes the `CMDS` command, which returns a list with the commands accepted by the node.
- `Param1 Param2 ... ParamN` represent the parameters, which are command dependent. If you type no parameters when you issue a command, it is the equivalent of querying for information (the **GET** version of a command). If you type parameters, you are issuing the **SET** version of a command and are setting the command to the parameters you typed.

General Format of an Answer

The answers have the following format:

ID Command Result1 Result2 ... ResultN ErrResult `#`

- `ID` is the answering device. If a command was further routed, it is the ID of the end device. The answer must always contain the ID on return.
- `Command` is the string representing the original command. It is supplied so that a master can distinguish between the answers it is waiting for, and out-of-band notifications (which may come, for example, over the radio port of a node). As with the ID, the command name must always be supplied.
- `Result1 Result2 ... ResultN` are the result values returned by the remote node. If the *`ErrResult`* is not zero, all other possible characters and/or strings until the end of the line might be ignored.
- `ErrResult` shows whether the command was successfully executed. If this value is 0, the command was successfully executed. If this value is other than 0, the command failed. The number may further indicate the error type. (See also "Returned Errors List" on page 44.)

The answer string may contain any number of spaces or CR/LF characters between its components. However, after the terminator (#), no other characters are allowed.

Using Terminal Commands

The A753 remote wireless modem firmware is based on the firmware used in the Series 4 RTUs. Therefore the A753's commands are very similar to the Series 4 commands.

Following is a list of available commands and an explanation of their use.

Note: You can type uppercase or lowercase characters because the commands are not case sensitive.

B

NOT AVAILABLE FOR GSM/GPRS-only RTUs

DESCRIPTION Sends a broadcast frame.

PARAMETERS None.

REMARKS After the device has sent the broadcast frame, it will listen for answers. All valid answers will be listed with their IDs.

RETURNS A data block.

REMOTE Yes. A device getting this frame would have to wait for a random time (2 to 10 seconds) before performing the actual broadcast; if no terminal is active, no results will be listed. A list of stations heard, with their RF levels, will be updated in the memory and will be available when the BLST command is issued.

EXAMPLE

```
# B 442
B0
# 42340 BA 0
# 34781 BA 0
#
```

BLST

NOT AVAILABLE FOR GSM/GPRS-only RTUs

DESCRIPTION Lists the stations heard after the last broadcast command was issued.

PARAMETERS None.

REMARKS **GET** only.

RETURNS The date and time the broadcast was performed, the number of stations heard, and a list with the heard stations' IDs and their respective RF levels.

REMOTE Yes. The remote version will list only the first nine stations heard.

EXAMPLE

```
# BLST
442 BLST 08/05/2009 15:56:04 4
42340 235 255
34781 255 255
#
```

CMDS

DESCRIPTION Returns a list of supported commands.

PARAMETERS None.

REMARKS **GET** only.

RETURNS A list of strings separated by spaces.

REMOTE Yes.

EXAMPLE

```
# cmds
42914 cmds ANLG AUTH CALC DPE DYNSLOT FDEV GPRSAPNPW
GPRSAPNSERV GPRSAPNUN GPRSCONN GPRSCONNADDR GPRSCONNALIGN
GPRSCONNINT GPRSDNS GPRSPING GPRSSECRET GPRSTMOUT GSMDIALIN
GSMOPER GSMPIN GSMPOWERSAVE GSMPUK GSMROAM GSMSQ GSMSTAT
GSMTMOUT ID INFO LVA PMP PORT RGE SBAT SBATC SDI SLOT SST
TEDS TIME TYPE VER VERB WPEAK WVEC T XCONF XDATA XIMME 0
#
```

DATA

DESCRIPTION Retrieves data frames from RTUs earlier than Series 4.

PARAMETERS See the manual for the appropriate pre Series 4 RTU.

REMARKS Remote only. Support for pre Series 4 RTUs.

RETURNS A pre Series 4 data frame.

REMOTE Yes.

EXAMPLE

```
# 9999 DATA
9999 DATA
13 9 1999 19 26 36 21 37 255 255 79 0 0 0 0 87 148 149 15 0
0 0 0 0 0 0 0 0 3148 0
#
# 9999 DATA 9999 30/9/1999 14:50:00
9999 DATA 30 9 1999 14 54 55 21 37 255 255 77 0 0 0 0 89
156 126 20 0 0 0 0 0 0 0 0 0 3197 0
#
```

DATASDI

DESCRIPTION Retrieves SDI-12 data frames from RTUs earlier than Series 4.

PARAMETERS See the manual for the appropriate pre Series 4 RTU.

REMARKS Remote only. Support for pre Series 4 RTUs.

RETURNS A pre Series 4 data frame.

REMOTE Yes.

EXAMPLE

```
# 12800 DATASDI
12800 DATASDI
16 5 2003 20 14 49 44 60 255 255 127 87 9 0 9 3 0 0
74.379401 3 0 1 68.117003 3 0 2 58.832397 3 0 3 51.611795 3
0 4 38.346400 3 0 5 19.800799 3 0 6 14.895999 3 0 7 3.553500
```

```
3 0 8 0.037200 2953 0
#
```

FDEV

DESCRIPTION — Formats the internal memory (might destroy all the data).

WARNING — *The chip configuration setting (first parameter of the command) depends on the current hardware version and must not be altered.*

Please contact our support team for further information.

PARAMETERS — If the parameters are missing, the command will show the current settings. To format the internal memory (all data will be lost) with the current settings, use 0 as the first parameter. The storage organization (the index size only), can be optimized for your specific application. The first parameter for this command is the chip configuration and second parameter is the index size. The A753 factory setting is:

- 1st parameter: 256
- 2nd parameter: 10240

REMARKS — **GET/SET**.

RETURNS — Current memory setting.

REMOTE — Yes.

EXAMPLE

```
# 42914 FDEV
42914 FDEV 1 16+0 64..1024 384/383 9216/9192 0
#
# 42914 FDEV 1 384
42914 FDEV 0
#
```

FREQ

CAUTION — *Do not change the frequency of your device without reason. Apart from the fact that it might not communicate in the network anymore, you might also violate the applicable radiocommunications laws in your country. Depending on the destination country, some models may also return an error message.*

NOT AVAILABLE FOR — GSM/GPRS-only RTUs

DESCRIPTION — Sets/returns the operating frequency.

PARAMETERS — The operating frequency and step (Hz), or none in the **GET** version.

REMARKS — **GET/SET**.

RETURNS — The actual frequency and step, in Hz.

REMOTE — Yes, **SET** only.

EXAMPLE

```
# FREQ 433925000 25000
442 FREQ 0
# FREQ
442 FREQ 433925000 25000 0
#
```

GPRSAPNPW

DESCRIPTION Sets/returns the GPRS operator network's access point password.

PARAMETERS None or the GPRS operator network's access point password.

REMARKS **GET/SET**.

RETURNS If no parameter was entered, the current access point password is returned. Otherwise the error code of the operation is returned.

REMOTE No.

EXAMPLE

```
# GPRSAPNPW "t-mobile"
42914 GPRSAPNPW 0
#
# GPRSAPNPW
42914 GPRSAPNPW "t-mobile" 0
#
```

GPRSAPNSERV

DESCRIPTION Sets/returns the GPRS operator network's access point name.

PARAMETERS None or the GPRS operator network's access point name.

REMARKS **GET/SET**.

RETURNS If no parameter was entered, the current access point name is returned. Otherwise the error code of the operation is returned.

REMOTE No.

EXAMPLE

```
# GPRSAPNSERV "apnserv.t-mobile.at"
42914 GPRSAPNSERV 0
#
# GPRSAPNSERV
42914 GPRSAPNSERV "apnserv.t-mobile.at" 0
#
```

GPRSAPNUN

DESCRIPTION Sets/returns the GPRS operator network's access point user name.

PARAMETERS None or the GPRS operator network's access point user name.

REMARKS **GET/SET**.

RETURNS If no parameter was entered, the current access point user name is returned. Otherwise the error code of the operation is returned.

REMOTE No.

EXAMPLE
```
# GPRSAPNUN "t-mobile"
42914 GPRSAPNUN 0
#
# GPRSAPNUN
42914 GPRSAPNUN "t-mobile" 0
#
```

GPRSCONN

DESCRIPTION Enable/Disables the GPRS functionality.

PARAMETERS
- None
- 1 enables GPRS function.
- 0 disables GPRS function.

REMARKS **SET** only.

RETURNS The error code.

REMOTE No.

EXAMPLE
```
# GPRSCONN
42914 GPRSCONN 0
#
```

GPRSCONNADDR

DESCRIPTION Sets/returns the IP address and the port of the A850 Telemetry Gateway.

PARAMETERS None or the IP address and the port of the A850 Gateway and optionally the connection preference. The user may specify by entering a new IP address and port if the new connection is primary or a secondary is used. If the index is left, the connection type will be taken as primary.

REMARKS **GET/SET**.

RETURNS If no parameter was entered, the A850's IP and Port is returned. Otherwise the error code of the operation is returned.

REMOTE No.

EXAMPLE
```
# GPRSCONNADDR "172.17.5.99" 81
42914 GPRSCONNADDR 0
#
# GPRSCONNADDR
42914 GPRSCONNADDR
```

```
172.17.5.99 81 0
0
#
```

GPRSCONNALIGN

DESCRIPTION — Sets/returns the connection setup alignment point, in seconds, from 0:00 (UTC). This value and GPRSCONNINT determine when the device checks the connection to the A850 Telemetry Gateway and eventually reestablishes it.

Note: A value of 3600 seconds means that the alignment point for the first connection check with the A850 Telemetry Gateway is at 1:00 (UTC) in the morning.

PARAMETERS — The connection setup alignment point in time in seconds. The range is limited to 0 to 4294967295.

REMARKS — **GET/SET**.

RETURNS — The current value.

REMOTE — Yes.

EXAMPLE

```
# GPRSCONNALIGN 1800
42914 GPRSCONNALIGN 0
#
# GPRSCONNALIGN
42914 GPRSCONNALIGN 1800 0
#
```

GPRSCONNINT

DESCRIPTION — Sets/returns the connection setup interval in seconds. This value and GPRSCONNALIGN determine when the device checks the connection to the A850 Telemetry Gateway and eventually reestablishes it.

Note: A value of 3600 seconds means that the connection to the A850 Telemetry Gateway will be checked every hour.

PARAMETERS — The connection setup interval in seconds. The range is limited to 0 to 86399.

REMARKS — **GET/SET**.

RETURNS — The current value.

REMOTE — Yes.

EXAMPLE

```
# GPRSCONNINT 900
42914 GPRSCONNINT 0
#
# GPRSCONNINT
```

```
42914 GPRSCONNINT 900 0
#
```

GPRSDNS

DESCRIPTION — Sets/returns the IP address of the GPRS network operator's DNS servers.

Note: *You can enter two different DNS servers that are indexed. If the first DNS server is unreachable, the second one will be contacted.*

PARAMETERS — None or the IP address followed by the index of the DNS server.

REMARKS — **GET/SET**.

RETURNS — If no parameter was entered, the set DNS server IPs are returned. Otherwise the error code of the operation is shown.

REMOTE — No.

EXAMPLE

```
# GPRSDNS "172.17.4.89" 0
42914 GPRSDNS 0
#
# GPRSDNS "172.17.4.90" 1
42914 GPRSDNS 0
#
# GPRSDNS
42914 GPRSDNS
0 172.17.4.89
1 172.17.4.90
0
#
```

GPRSPING

DESCRIPTION — Pins a specific host.

Note: *You can enter two different DNS servers that are indexed. If the first DNS server is unreachable, the second one will be contacted.*

PARAMETERS — The hosts IP the ping count (Range:1 -10), and the ping timeout (Range: 1 -10).

REMARKS — **SET** only.
The command works only if no GPRS connection has been established.

RETURNS — Nothing if failed or the ping number, IP, and response time.

REMOTE — No.

EXAMPLE

```
# GPRSPING "172.17.5.99" 3 5
42914 GPRSPING
1: 172.17.5.99 833ms
2: 172.17.5.99 445ms
```

```
3: 172.17.5.99 398ms
0
#
```

GPRSSECRET

DESCRIPTION — Sets/returns the secret value. This secret is used to authenticate the device at the A850 Telemetry Gateway.

PARAMETERS — The chosen secret. The range is limited to 0 to 4294967295.

REMARKS — **GET/SET**.

RETURNS — The current value.

REMOTE — No.

EXAMPLE

```
# GPRSSECRET 441441
42914 GPRSSECRET 0
#
# GPRSSECRET
42914 GPRSSECRET 441441 0
#
```

GPRSTMOUT

DESCRIPTION — Sets/returns the timeout in seconds, after which the device should assume that the connection to the A850 Telemetry Gateway is broken.

Note: *Adcon recommends that you set the GPRSTMOUT to a value that is at least twice that of GPRSCONNINT.*

PARAMETERS — The timeout in seconds. The range is limited from 0 to 4294967295.

REMARKS — **GET/SET**.

RETURNS — The current value.

REMOTE — Yes.

EXAMPLE

```
# GPRSTMOUT 3600
42914 GPRSTMOUT 0
#
# GPRSTMOUT
42914 GPRSTMOUT 3600 0
#
```

GSMOPER

DESCRIPTION — Returns the currently used cellular network operator.

PARAMETERS — None.

REMARKS **GET** only.
The command works only if no GPRS connection has been established. If a GPRS connection has been established, use GSMSTAT instead.

RETURNS The current network operator.

REMOTE No.

EXAMPLE
```
# GSMOPER
42914 GSMOPER "T-mobile Austria" 0
#
```

GSMPIN

DESCRIPTION Sets the PIN-code of the SIM-card or returns the SIM-card unlock state.

PARAMETERS The new PIN-code, or none (for SIM-card check).

REMARKS **GET/SET**.

RETURNS If no parameter was entered following messages may get displayed:

"Ready"
The used PIN code was accepted.

"PIN required"
No or false PIN was entered. Reenter the correct PIN-code.

"PUK required"
The false PIN was entered too often. The module has locked the SIM-card. To open the lock. enter the PUK-code of the SIM-card. If the new PIN-code was entered as a parameter of the command, returns the error code.

REMOTE No.

EXAMPLE
```
# GSMPIN
42914 GSMPIN Ready 0
#
# GSMPIN 1234
42914 GSMPIN 0
#
```

GSMPUK

DESCRIPTION Sets a new PIN-code for the SIM-card or returns the SIM-card unlock state.

PARAMETERS The PUK-code and the new PIN-code, or none (for SIM-card check).

REMARKS **GET/SET**.

RETURNS Refer to the command GSMPIN.

REMOTE No.

EXAMPLE
```
# GSMPUK
42914 GSMPUK Ready 0
#
# GSMPUK 56789 1234
42914 GSMPUK 0
#
```

GSMSQ

DESCRIPTION Returns the signal quality and the bit error rate of the used cellular network.

PARAMETERS None.

REMARKS **GET** only. The command works only if no GPRS connection has been established. If a GPRS connection has been established, use GSMSTAT instead.

RETURNS The signal quality parameter.

REMOTE No.

EXAMPLE
```
# GSMSQ
42914 GSMSQ 31 99 0
#
```

GSMSTAT

DESCRIPTION Displays the status of the GSM module.

PARAMETERS None.

REMARKS **GET** only.

RETURNS A list of various status information of the current module state.

REMOTE Yes.

EXAMPLE
```
# gsmstat
42914 gsmstat
Power supply on:   yes
DTR on:            yes
DCD on:            no
RI on:             no
RTS on:            yes
CTS on:            no
Modem on:          yes
Modem present:     yes
Modem initialized: yes
SIM card present:  yes
PIN required:      yes
```

```
PIN accepted:      yes
PIN count:         3
PUK required:      no
GSM network:       registered
Operator:          T-mobile Austria
Signal quality:    31 99
Phone call:        no
GPRS network:      registered
IP address:        no
TCP connection:    no
0
#
```

ID

DESCRIPTION Sets/returns the node's ID.

PARAMETERS The node ID.

REMARKS **GET/SET**.

RETURNS The node ID.

REMOTE Yes, **SET** only.

EXAMPLE

```
# ID 445
42914 ID 0
#
# ID
445 ID 445 0
#
```

INFO

DESCRIPTION Returns various status information.

PARAMETERS None.

REMARKS **GET** only.

RETURNS A list of a device's internal variables:

ID INFO rf_in rf_out date time ver clk stack cop batt temp days_uptime hr:min_uptime rssi pmp_low pmp_high type slot samples po err_level
#

The formats for the above parameters are as follows:

- *rf_in* and *rf_out* as a decimal.
- *date* as dd/mm/yyyy.
- *time* as hh:mm:ss.
- *ver* as x.x.

- *clk*, *stack*, and *cop* as decimal. They represent internal housekeeping parameters: the A753 uses *cop* to number watchdog occurrences, but *clk* and *stack* are currently undefined.
- *batt* as battery level, using the standard voltage conversion equation (0 is 0 volts, 255 is 20 volts).
- *temp* as internal temperature in the housing, which is device dependent. The precision of the sensing element is low (±2°C), but it is sufficient for battery power management (charge/discharge). To compute the actual value (in °C), the following equation must be used:

$$Temp_{[^\circ C]} = \frac{internalTemp \cdot 400}{255} - 68$$

- *days_uptime* in days; with *hr:min_uptime*, it represents the amount of time the device is up without a reset or watchdog.
- *hr:min_uptime* in hours:minutes format.
- *rssi* as decimal; it is the programmed value with the RSSI command.
- *pmp_low* and *pmp_high* are the programmed values with the PMP command.
- *type* is used to represent the device type. The following types are assigned currently:
  — 0 for A730MD
  — 1 for A720
  — 2 for A730SD
  — 3 for A720B
  — 4 for A733
  — 5 for A723
  — 6 for A440
  — 7 for A733 GSM
  — 8 for A731
  — 9 for A732
  — 10 for A740
  — 11 for A740 GSM
  — 12 for A724
  — 15 for A723_Series 4
  — 16 for A724_Series 4
  — 21 for A753GSM

- *slot* and *samples* are the actual values programmed by means of the SLOT command.
- po is the relative output power of the device.
- *err_level* is the error value; 0 means no error.

REMOTE

Yes, **GET** only.

EXAMPLE

```
# 42914 info
42914 info 0 31 01/01/1970 00:00:00 1.2 0 0 0 83 60 0 00:40
```

```
0 65 72 24 900 0 0 0
#
```

PMP

DESCRIPTION — Sets/returns the node's Power Management Parameters (switches the battery charge on/off).

PARAMETERS — The lower (switch on) and the higher limit (switch off), both in volts x 10. Standard Values are 65 (for 6.5 volts) for switch on and 72 (for 7.2 volts) for switch off, for a standard 6.2 volt NiMH battery. From these values, other thresholds are internally computed.

REMARKS — **GET/SET**.

RETURNS — The lower (switch on) and the higher limit (switch odd), both in volts x 10.

REMOTE — Yes, **SET** only.

EXAMPLE

```
# PMP 65 72
42914 PMP 0
#
# PMP
42914 PMP 65 72 0
#
```

ROUTE

NOT AVAILABLE FOR — GSM/GPRS-only RTUs

DESCRIPTION — Sets/returns the routing information of a device.

PARAMETERS — None, or a route (with destination) containing up to eight intermediaries. When only the destination ID is given, the route for this device is deleted.

REMARKS — **GET/SET**.

RETURNS — The command's success or error code and the route table.

REMOTE — Yes, but only to an A440 attached to an RA440.

EXAMPLE

```
For MFS:
# ROUTE 445 43
442 ROUTE 0
#
# ROUTE
442 ROUTE 445 43 0
#
```

RSSI

NOT AVAILABLE FOR GSM/GPRS-only RTUs

DESCRIPTION Sets/returns the Relative Signal Strength Indicator threshold at which the RF receiver must wake up.

PARAMETERS The threshold value. For the A440, it can take values from 0 to 255; it is typically factory set to 50.

REMARKS **GET/SET**.

RETURNS The instant RSSI value and the programmed threshold.

REMOTE No.

EXAMPLE

```
# RSSI 50
42914 RSSI 0
#
# RSSI
41239 RSSI 34 50 0
#
```

Note: The values of the RSSI threshold are arbitrary and have no units.

RX

NOT AVAILABLE FOR GSM/GPRS-only RTUs

DESCRIPTION Switches the unit to permanent receive mode (for tuning purposes).

PARAMETERS None.

REMARKS The system stops, and exits the command only when a key is pressed. This command returns no message.

RETURNS Nothing.

REMOTE No.

EXAMPLE

```
# 442 RX
442 RX 0
#
```

TIME

DESCRIPTION Sets/returns the real time clock.

PARAMETERS The actual time, or none in the **GET** version.

REMARKS **GET/SET**.

RETURNS The actual time as *dd/mm/yyyy hh:mm:ss*.

REMOTE Yes.

EXAMPLE

```
# TIME 20/06/2009 12:10:10
42914 TIME 0
#
# TIME
42914 TIME 20/06/2009 12:10:10 0
#
```

TX

NOT AVAILABLE FOR GSM/GPRS-only RTUs

DESCRIPTION Switches the unit to transmit mode (for tuning purposes).

PARAMETERS
- None (sends an unmodulated carrier)
- 1 (sends a 1 kHz modulated carrier)
- 0 (sends a 2 kHz modulated carrier)
- 5 (sends a mixed 1 + 2 kHz modulated carrier)

REMARKS The system stops, and exits the command only when a key is pressed. This command returns no message.

RETURNS Nothing.

REMOTE No.

EXAMPLE

```
# TX
442 TX 0
#
# TX 1
442 TX 0
#
# TX 5
442 TX 0
#
```

TYPE

DESCRIPTION Requests the hardware type information of the device.

PARAMETERS None.

REMARKS **GET** only.

RETURNS The hardware type.

REMOTE Yes.

EXAMPLE

```
# TYPE
42914 TYPE A753 0
#
```

VER

DESCRIPTION Requests the firmware version of the device.

PARAMETERS None.

REMARKS **GET** only.

RETURNS The current version.

REMOTE Yes.

EXAMPLE
```
# VER
42914 VER 1.3.2 0
#
```

VERB

DESCRIPTION Sets the verbosity level of the device. This command is used for debugging only.

WARNING *The device will consume a lot more power when the verbosity level is greater than 0. This could discharge your battery and/or prevent proper operation.*

PARAMETERS A verbosity level (0...255).

REMARKS **SET** only.

RETURNS Error code.

REMOTE No.

EXAMPLE
```
VERB 1 # tx: 'AT'
rx: 'OK'
tx: 'ATE0Q0V1&K3&C1&D2'
rx: 'OK'
tx: 'AT+CMEE=1'
rx: 'OK'
tx: 'AT+CRC=1'
```

XDATA

DESCRIPTION This command requests data for a list of logical channels for given timestamps.

PARAMETERS XDATA requires a lot of parameters for specifying what to retrieve. Please consult the *A740 User Manual* for detailed explanation of this command. The output of the command is not intended to be human readable.

REMARKS **GET** only. (This is a data retrieval command, local as well as remote.)

RETURNS A data block.

REMOTE Yes, for a **GET**, but only one frame at a time.

EXAMPLE
```
# 42914 XDATA 0 8 0 255 1 0
42914 XDATA 0 199 0x18 0x4A4211BC 1 0 0xF6 :8F0384645739
0
#
```

XIMME

DESCRIPTION Samples all inputs and immediately returns the sampled data.

PARAMETERS First parameter specifies the sample mode, which has to be 2 for raw data. The second parameter sets the maximum packet size. If you specify the third parameter, you can select a specific input connector.

REMARKS **GET** only. The command needs a specific delay to execute (for example, for the standard SST setting this delay amounts to two seconds). The delay is necessary to allow for the sensors to settle after applying power to them.

RETURNS A data block of io-port, raw adc and counter values.

REMOTE Yes.

EXAMPLE
```
# ximme 2
42914 ximme
0 0 89 61 0 0
1 15 1024 69 69 153
2 15 67 65 69 0
3 15 68 67 67 0
4 15 67 66 67 0
0
#
```

The first column is the channel number. Channel 0 uses the internal sensors such as temperature and battery voltage. Channels 1- 4 are the connectors IO-A through IO-D. Column 6 of channels 1 - 4 are the counter values. The analog inputs are mapped to columns 3, 4, and 5.

Column 2 of channel 1 or 2 displays the status of the four digital inputs DIG0 through DIG3. In the above example, the first analog input of IO-A (AN0) is 1024 and the IO-A counter (RAIN0) has a value of 153.

Returned Errors List

Following are error messages you might get.

Command Line Interpreter

- 1 — nonexistent command
- 2 — command line buffer overflow (input line too long)
- 3 — internal error

- 4 — reserved
- 5 — missing or false parameters in command
- 6 — operation not implemented
- 7 — remote operation not allowed
- 8 — invalid IMEI Number
- 9 — command not supported in this configuration

Device Descriptor and Storage Handler

- 10 — device not found (attempt to perform a command on a nonexistent device)
- 11 — device already exists
- 12 — reserved
- 13 — no more space for descriptors (too many devices)
- 14 — no more records for the specified device
- 15 — temporary communication break, no more data (the last request was not successful)
- 16 — time-out (the handler blocked or is busy)
- 17 — internal error
- 18 — attempt to insert a reserved device ID number (0 or 65535)

Real-time Clock

- 20 — incorrect time supplied (no conversion to time_t was possible)

Radio Interface (including GSM/GPRS modem)

- 30 — error at receive (CRC, etc.)
- 31 — unexpected frame received
- 32 — wrong length
- 33 — reserved
- 34 — reserved
- 35 — time-out (remote device not responding)
- 36 — receiver busy (for example, currently performing a polling series)
- 37 — time stamp of a frame is too far in the future
- 38 — general modem error
- 39 — “unknown modem” error

Notifications

- 40 — request to read a notification when no notification is pending

Appendix. Specifications

Table 2 shows the main operational parameters of the A753.

Table 2. Operational parameters

Parameter	Min	Typical	Max	Unit
Common				
Supply Voltage (internal battery)	+5.6		+10	V
Operation Temperature	-20		+55	°C
Relative Humidity	10		99	% rH
Class Protection		IP65		
Data Rate (GSM/GPRS modem - GPRS mode)			multislot, class 10	
Receive Mode				
Operating Current (including onboard microcontroller)			32	mA
Receive Mode (GPRS modem)				
Sensitivity EGSM 900 / GSM850	-102			dBm
Sensitivity EGSM 1800 / GSM1900	-102			dBm

Table 2. Operational parameters (Continued)

Parameter	Min	Typical	Max	Unit
Operating Current (DRX mode 9)		3.5		mA
Transmit Mode (GPRS modem)				
Output Power EGSM 900 / GSM850			33dBm (± 2dB)	
Output Power EGSM 1800 / GSM1900			30dBm (± 2dB)	
Operating Current (avg. GPRS Class 10 - 2TX / 3RX)		450		mA
Peak Current (at TX burst)			2.0	A
SIM Interface				
Interface Type	GSM 11.11 & GSM 11.12			
SIM Card Voltage	1.8 / 3			V

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