Annex H (Field Strength Measurement)

If fitted with SW option EB200FS (Field Strength) (R&S part no. 4052.9704.02), the EB200 is suitable for field strength measurements.

Note:
A RAM-expansion is prerequisite for this software option for the EB200 (see also TEST on page 3.43, List of modules on page 5.4 and RAM expansion / Li-battery on page 5.7). .

Thanks to this option, field strength measurements can be carried out by using calibrated antennae. Beside the level indication in dBµV the field strength is indicated in dBµV/m. To be able to properly take into account the antenna correction factors, the k-factors of the R&S Antenna HE200 and of a half-wave dipole are firmly stored. User-defined k-factor data sets can be loaded into the unit via remote control.

1. Manual operation

Selecting the antenna

The antenna is selected in submenu ANT. This menu is called by pressing the ANT softkey in the RX-CONF menu.

```
┌─────────┬────────┬─────────┬─────────┬──────────┬─────────┐
│ 30 KHZ  │   FM   │ MGC OFF │ SQU OFF │ TONE OFF │ NUMBER  │
├──────┬──┴────────┴─────────┴─────────┴──────────┴─────────┤
│ AUTO │ ANTENNA NUMBER:            1                        │
├──────┤ ANTENNA CODE:         HE200 HF                      │
│ AFC  │ AUX OUTPUT:           ANT + CTRL                    │
├──────┤                                       ┌────────────┐│
│ AVG  │                                       │  RX-CONF   ││
├──────┤                                       ├────────────┤│
│  0   │                                       │    ANT     ││
├──────┴───────┬──────────┬──────────┬─────────┴────────────┤
│              │          │ ANT PAS  │ ANT ACT │            │
└──────────────┴──────────┴──────────┴─────────┴────────────┘
```

Displayed parameters

ANTENNA NUMBER: antenna numbers 0 to 99

With each antenna number there is the possibility of storing two k-factor tables. The associated data set can be selected by using softkey **ANT PAS** or **ANT ACT**, respectively.

If only one of the data sets is filled, this data set will be selected in any case, irrespective of which softkey has been actuated.

To antenna numbers 1 to 5 the following data sets are assigned ex works:

Antenna number	Designation	Data PASSIVE	Data ACTIVE	Frequency range
1	HE200 HF	yes	yes	9 kHz to 30 MHz
2	HE200 20-200M	yes	yes	20 MHz to 200 MHz
3	HE200 .2-0.5G	yes	yes	50 MHz to 500 MHz
4	HE200 .5-3GHZ	yes	yes	500 MHz to 3000 MHz
5	HALFWAVE DIP.	yes	no	9 kHz to 3000 MHz

The k-factors of the half-wave dipoles are calculated as follows:

k-factor = 20* log (2.53 * FREQ / 100 MHz)

ANTENNA CODE: 13-digit antenna name

When the **ANTENNA CODE** parameter is selected, always one letter of the antenna name can be set at a time by using softkey <- or ->, and stepping through the alphabet is possible by turning the spinwheel.

AUX OUTPUT: FREQ or ANT + CTRL (switchover by means of spinwheel)

Softkeys

The following two softkeys will only appear if the SW option EB200FS (Field Strength) is fitted.
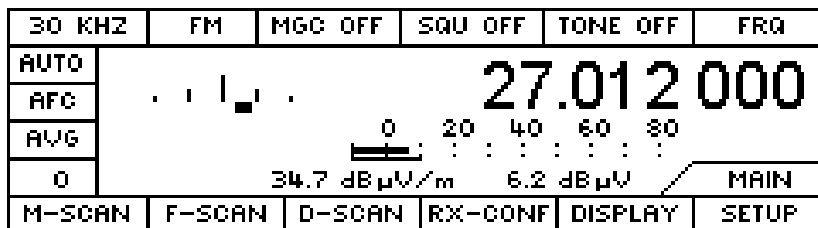
ANT PAS   k-factor table for passive antennae (e.g. HE200 without amplifier)

ANT AKT   k-factor table for active antennae (e.g. HE200 with amplifier)
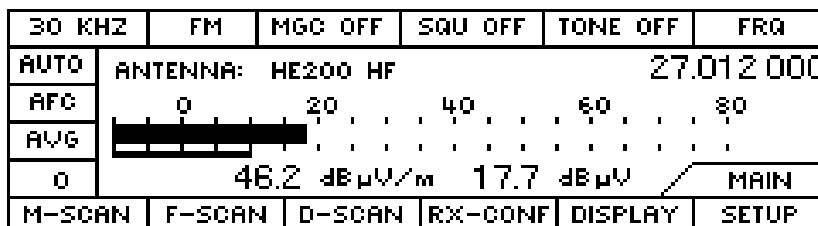
Numerical field strength display

When an antenna number was selected for which a k-factor data set is available, the field strength will be displayed in dBμV/m left of the numerical level indication. This implies that the receive frequency is within the range for which the k-factor data set was defined.

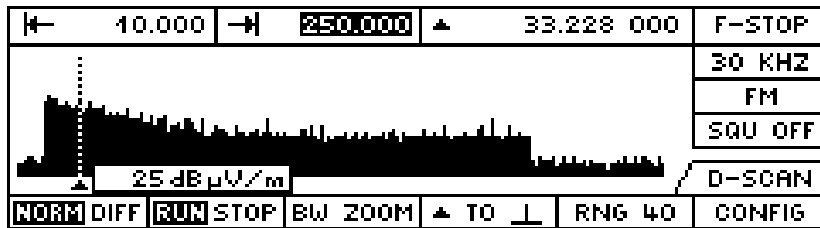Field strength indication in the DISPAY-DEFAULT screen:

30 KHZ	FM	MGC OFF	SQU OFF	TONE OFF	FRQ
AUTO					
AFC			27.012 000		
AVG		0 20 40 60 80			
O	34.7 dBμV/m 6.2 dBμV			MAIN	
M-SCAN	F-SCAN	D-SCAN	RX-CONF	DISPLAY	SETUP

Field strength indication in the DISPAY-LEVEL screen:

30 KHZ	FM	MGC OFF	SQU OFF	TONE OFF	FRQ
AUTO	ANTENNA: HE200 HF			27.012 000	
AFC	0 20 40 60 80				
AVG					
O	46.2 dBμV/m 17.7 dBμV			MAIN	
M-SCAN	F-SCAN	D-SCAN	RX-CONF	DISPLAY	SETUP

Field strength display in DSCAN

DSCAN screen with antenna number 02 (HE200 20 MHz to 200 MHz):

```
|←    10.000  |→|  250.000  | ▲    33.228 000 | F-STOP  |
|                                             | 30 KHZ  |
|                                             |   FM    |
|                                             | SQU OFF |
|      25 dBµV/m                           /  | D-SCAN  |
|NORM DIFF|RUN STOP| BW ZOOM | ▲ TO ⊥ | RNG 40 | CONFIG  |
```

In the DSCAN screen the corrected level values are displayed in dB.

The marker position is set off by a dotted line. Right or left of the marker, the level value measured at the marker position is shown in dBµV in a travelling window. When the marker is on a frequency for which a k-factor data set is defined and active, this window will show the field strength in dBµV/m instead of the level.

Note:
The squelch threshold and all associated functions such "Marker to Peak" and "Signal > Threshold" still only refer to level values in dBµV.

In the DSCAN-CONFIG submenu the parameter DISPLAY LIMITS can be set.

DISPLAY LIMITS   spectrum display range: eg −20 dB to 60 dB

The upper value of the DISPLAY LIMIT can be configured independent of the reference level. It is adjustable in the range from 0 to 250 dB in increments of 10 dB. Shifting the display range to values near 250 dB is only necessary if the SW option EB200FS (Field Strength Measurement) is fitted and very high antenna k-factors are to be taken into account.

The lower value is calculated from the upper value of the DISPLAY limits minus the current RNG.

2. Remote control

2.1 Sensor functions

In remote control the field strength measurement is configured in just the same way as the level and offset measurements. When the field strength sensor function has been activated by using command `FUNCtion "FSTRength"`, measured field strength values in dBµV/m can be queried with `SENSe:DATA?`

2.2 Data output

A single data query is made using command `SENSe:DATA?`.

As with level output, block data are output via the trace buffers by using command `TRACE? MTRACE`. The sensor function and the data paths for MTRACE have to be configured beforehand.

`MTRACE` obtains its data from the `SENSe:FUNCtion` block. All activated sensor functions signal their respective measured values to `MTRACE` to be stored.

When the path to the buffer `MTRACE` is enabled using command `TRACE:FEED:CONTrol MTRACE,` `ALWays`, a measured value can be stored in `MTRACE` via command `INITiate:CONM`.

The output format can be configured by using command `FORMat:DATA ASCii` or `FORMat:DATA` `PACKed`.

`ASCii ->`   normal ASCII output: level in 1/10 dBµV/m (eg 45.3)

`PACKed ->`   `<Definite Length Block>:`   level in 1/10 dBµV/m (2 bytes)

When no k-factor is defined on the current frequency, ie no antenna with a frequency range covering the current frequency is selected, the NINF value will be output:

`ASCii ->`   −9.9E37

`PACKed ->`   0x7FFE   (coded in PACKed format)

3. Tool for handling antenna factors

3.1 Starting up the tool

The application for handling of antenna factors was realized by using a Java applet. That means a web browser is needed to run the program. The browser is required to support the Java 2 standard. As this is not the case with conventional products, they must be upgraded accordingly. See chapter 3.3 at the end of this Annex H.

Note:
Prerequisite is that the port number of the receiver is set to the value 5555 (default value). The IP address is optional.

In the URL field of the browser enter the IP-address of the receiver:

eg: http://89.10.11.23/

Alternatively, the name may be entered instead of the 4-part number, provided that an appropriate name service is available in the network which is able to resolve this name.

Also think of proxy settings which may have been made in the browser.

In the browser a welcome screen comes up. Click on the link

Click here to start the Antenna Factor Application

and the antenna factor applet is loaded and started.

Note:
Depending on the Java plugin version (from JRE 1.3.10 up), a safety message appears after the start of the applet. The safety certificate can be granted without objections since it comes from the Rohde & Schwarz receiver.
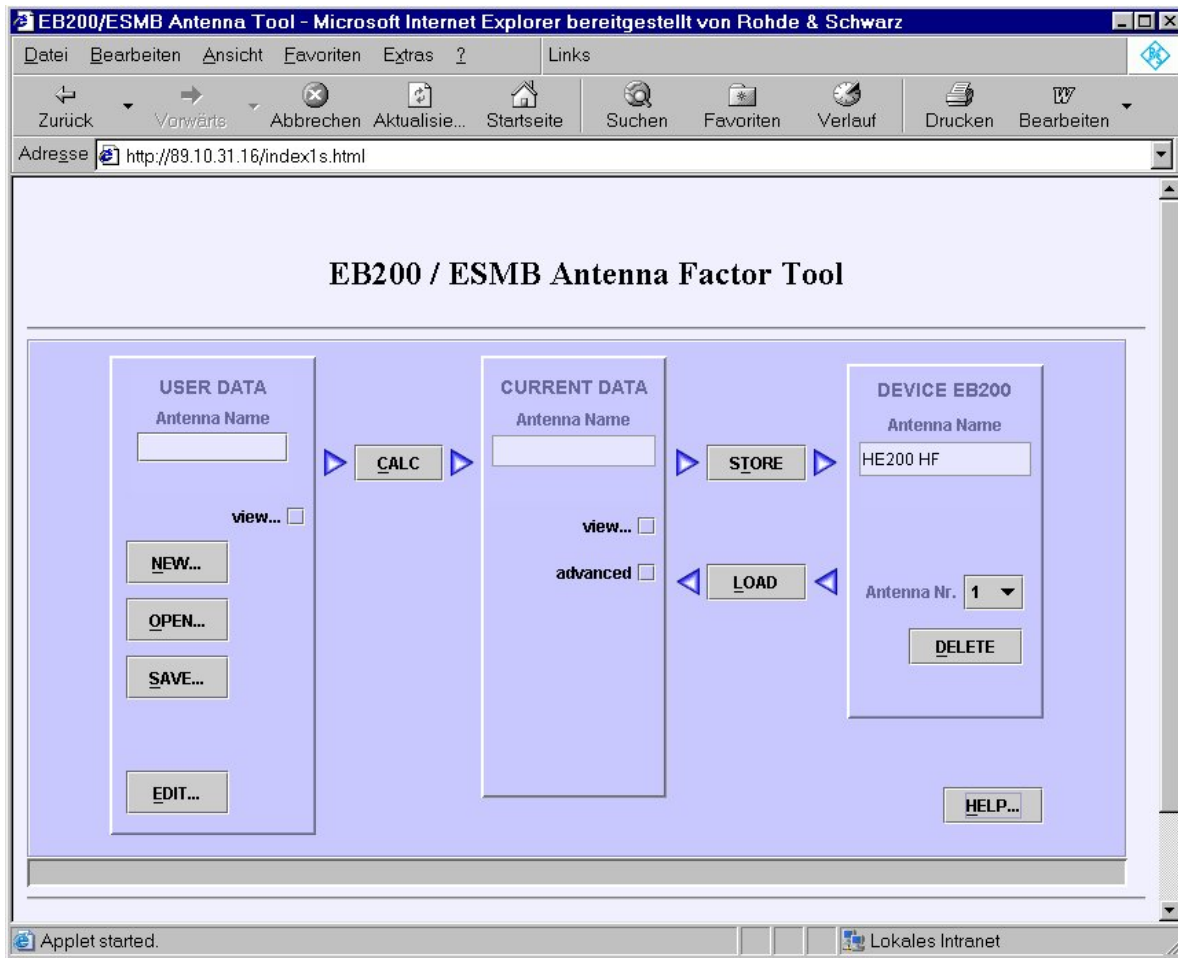
Fig. 1: Antenna factor tool within the browser, start window

3.2 Description of functions

General functioning

Right after starting up the tool does not yet have any current antenna set. The current antenna set is the set currently handled by the tool and can be created as follows:

- Create manually with NEW
- Load from device with **LOAD**
- Load from host with OPEN

This current antenna set can only be displayed / edited (see **EDIT**) or saved (see **SAVE** and STORE).

Creating a characteristic data set

By clicking on NEW the submenu for manual creation of characteristic data can be called up. In a table field manually enter the single frequency – k-factor points of the characteristic or insert them with copy and paste from eg an EXCEL table. The interpolation method used can be selected to be either linear

or logarithmic. To save the data the entire characteristic may be saved together with the antenna name in an ASCII file by using the SAVE function. When input has been completed with **OK**, several partial characteristic sections are created by CALC from the overall characteristic, the frequency stepwidth within these sections being constant. From this standardized ASCII format a corresponding binary format is generated before the data are stored in the device with STORE.

Importing and exporting the antenna data - with OPEN and SAVE

With **OPEN** antenna factors can be imported from the host - for instance a PC – and with **SAVE** the current antenna data can be exported. However, this implies that a "certification procedure for signed Java applets" is carried out. A description of how to proceed and the files required for this are contained on the supplied Utility Disk in the "JavaZert" directory. The current version of the Utility Disk is loaded in the R&S EB200 Download Area.

Loading and saving the antenna data – with LOAD and STORE

With **LOAD** the antenna data corresponding to the selected antenna number, if available in the device, are loaded, forming the **current antenna set**.

With **STORE** a current antenna set is written to the device in accordance with the selected antenna number. Please note that the device is delivered with a certain number of fix antenna sets (antenna numbers 1 to 5) which are stored in the ROM. When one of these numbers is selected the associated predefined antenna set will be overwritten, i.e. the new data will be superimposed, and for the time being the original contents can only be restored by a cold start.

Integrated help.

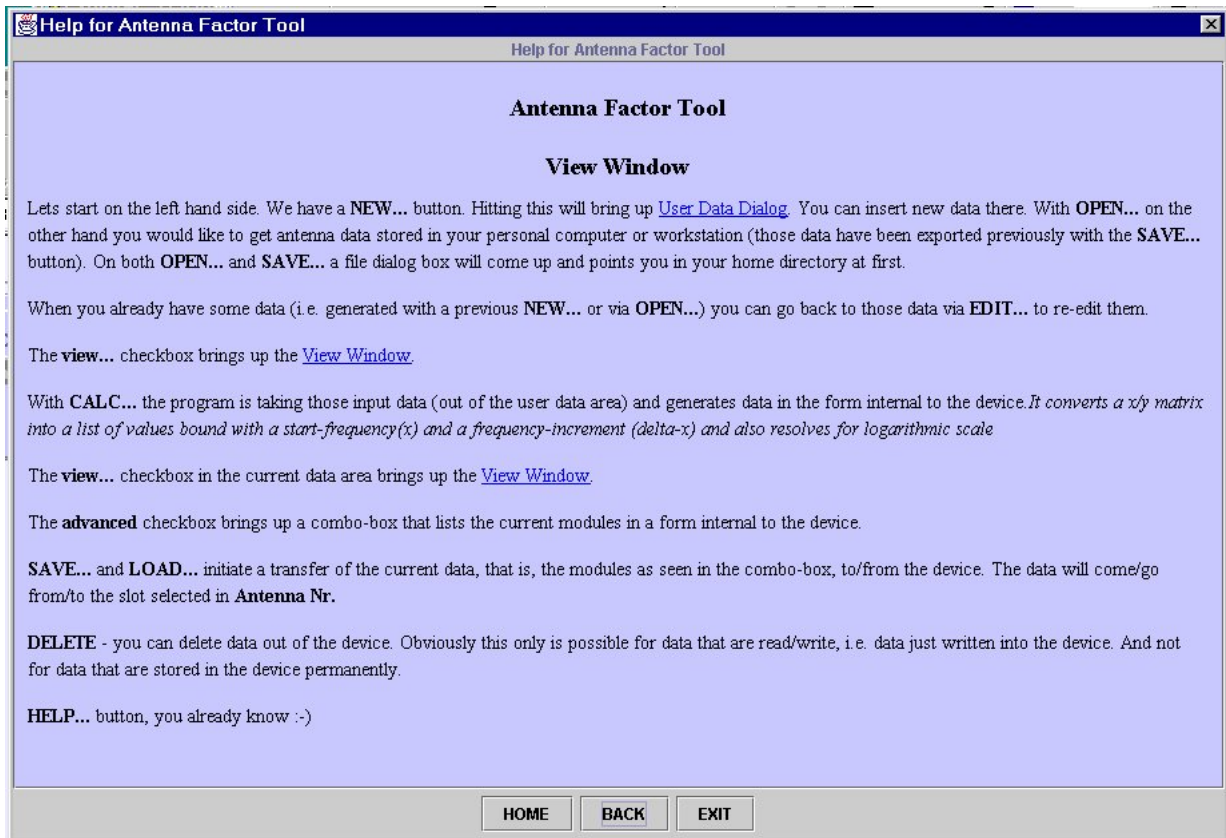With HELP an extensive help menu with various cross references can be started.

Fig. 2: Depiction of the help window with explanation of the buttons

Generation of characteristic-lines data in the user-data dialog.

In a field in the form of a table, the individual frequency-K-factor tags of a characteristic line can be entered manually or they can be entered via copy and paste for example from an EXCEL table.
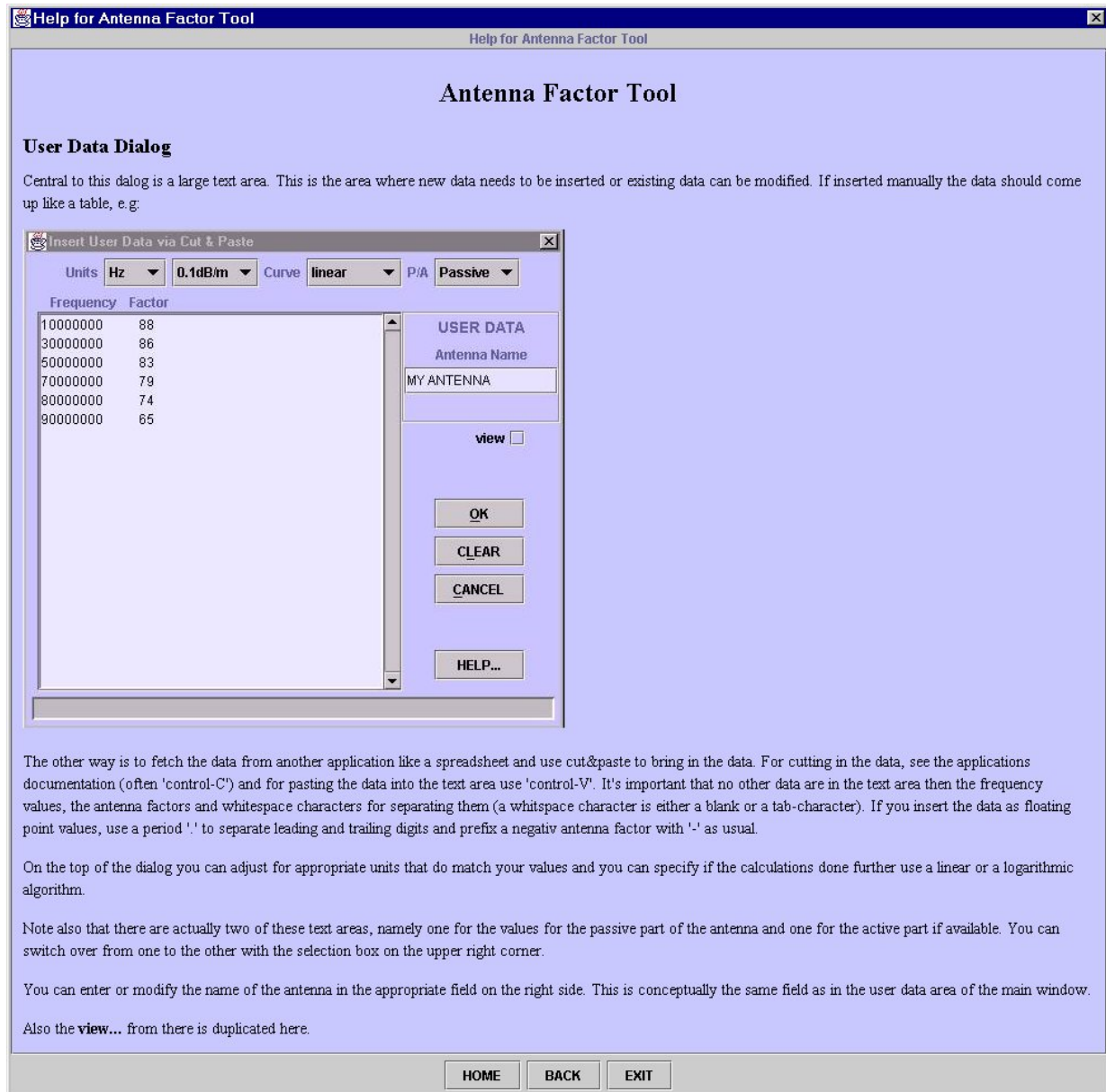

Fig. 3: Depiction of the help window with explanation of the input of characteristic lines
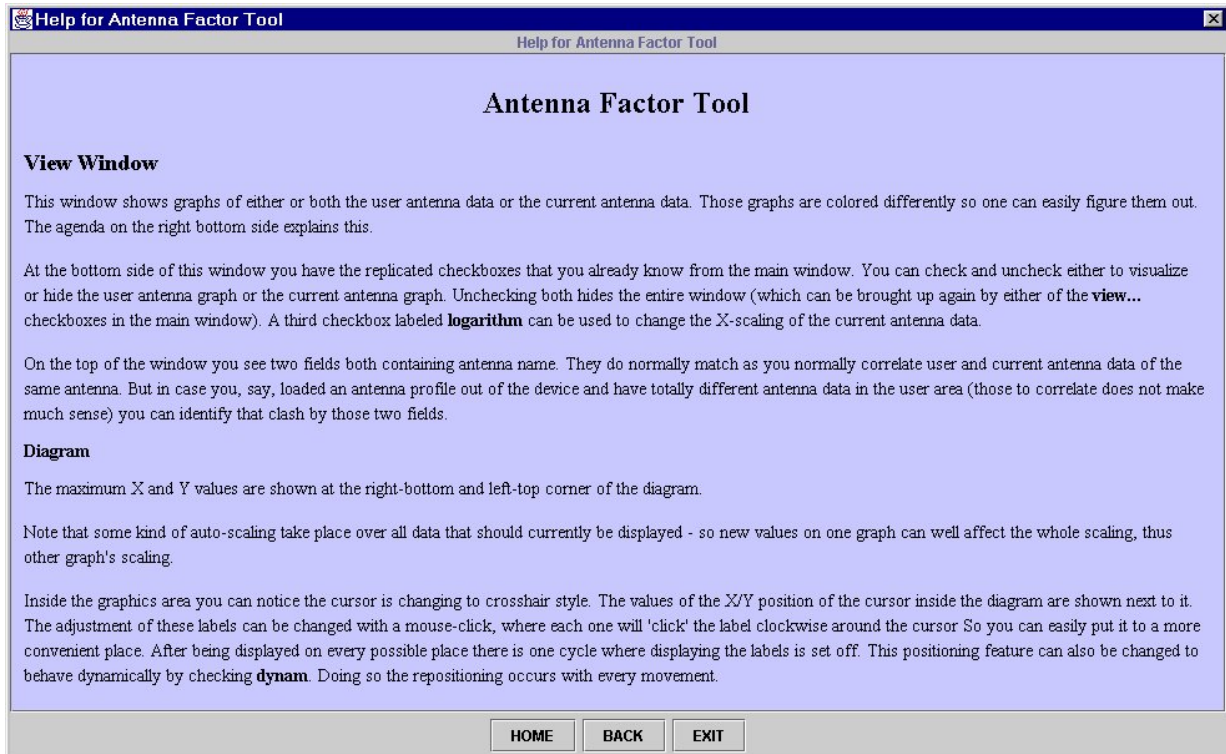
Graphical representation in the view Window

Fig. 4: Representation of the antenna-factor tool in the browser, help window, graphics area

Graphical representation of the K-factors of the antenna HE200.

Both the ones stored in the EB200 read-only memory, as also the characteristic-line data entered by the operator can be represented with linear or logarithmic scaling.
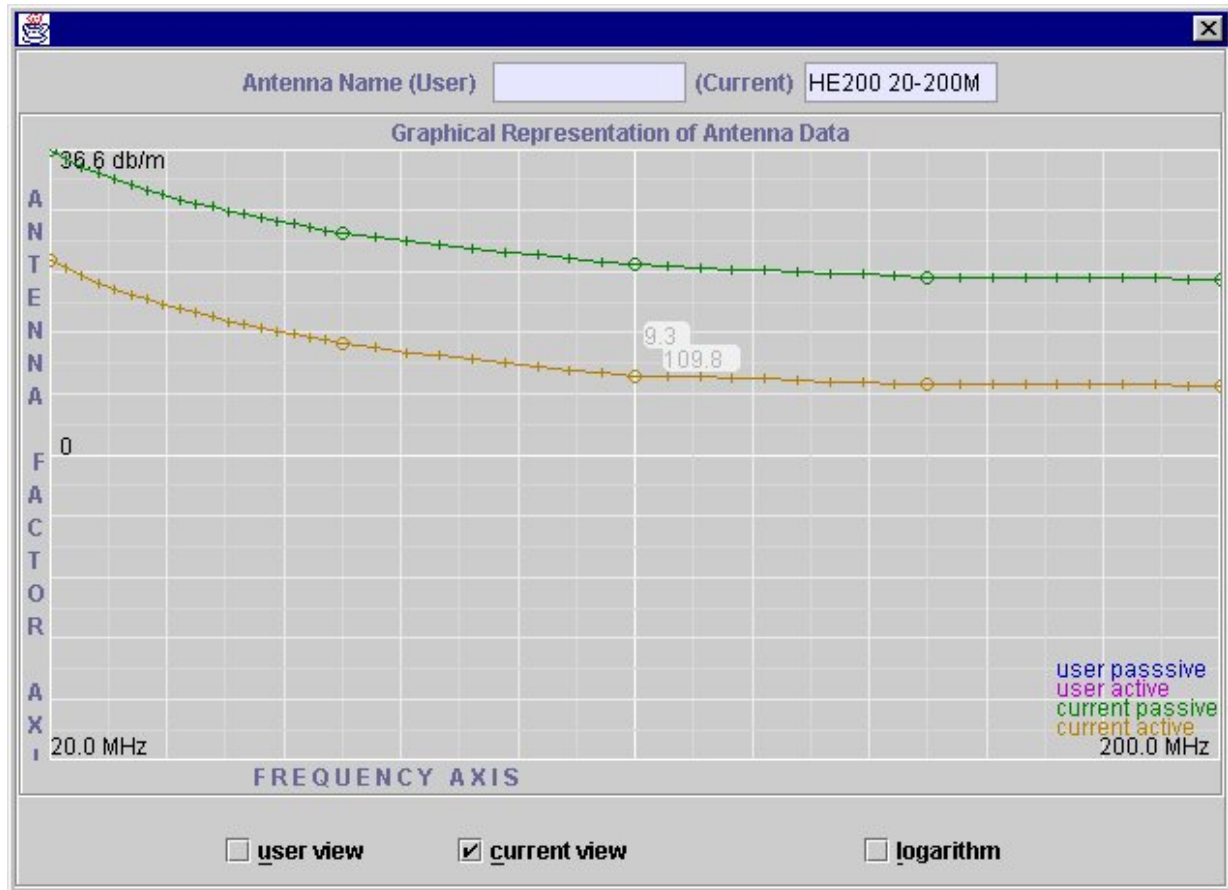

Fig. 5: Graphical representation of the K-factors of the antenna HE200

3.3 Upgrading the browser to Java 2 standard

The Netscape browser from Version 6 onwards already contains Java 2, provided that the entire package has been installed. With other browsers such as Netscape Communicator Version 4 and inferior or Internet Explorer a Java-capable plug-in must be installed. For details on how to proceed and for downloading please visit

http://java.sun.com/products/plugin/.