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**FIG 1** Efficiently testing and repairing a large number of mobile phones from a wide variety of manufacturers: This is accomplished by the R&S®CMU 200, assisted by the R&S®CMU-Z10 antenna coupler, the R&S®CMU-Z11 shielding cover and the free R&S®CMUgo software.

## R&S®CMU 200 Universal Radio Communication Tester

# New software increases throughput in service

The new version of the R&S®CMUgo software offers important new functions and speeds up the repair of mobile phones – and ensures even more accurate test results.

### Emphasis on automatic functions

Achieving high throughput in service when repairing and testing mobile phones requires not only a fast mobile radio tester from the R&S®CMU family (R&S®CMU 200 V02 / V10, [1]) but also a speed-optimized final test. For

the final test makes up a major portion of the overall repair process and therefore presents the greatest potential for optimization. Whereas manufacturer-specific software is usually necessary for such tasks as calibration, for example, the final test requires universal test-sequence tools that can be used to test mobile phones of all manufactur-

ers. This is exactly what version 1.8 of the R&S®CMUgo software is optimized for, as it offers important new automatic functions for recognizing telephones and assigning test sequences and can thus increase repair volumes. Moreover, it now provides even more accurate measurement results with tests performed using the R&S®CMU-Z10 antenna coupler [2].

### Automatic assignment of test sequences

A test sequence can be assigned to a specific telephone in an initialization file or conventionally by means of a bar code. Any desired bar code character string can be specified; the only important thing is that it be uniquely assignable to a telephone type. This can be done, for example, by reading in the type approval code (TAC). The TAC is the first eight digits of the international mobile equipment ID (IMEI), with which every mobile telephone is uniquely identifiable. Using the TAC is advantageous, since with most repair procedures the IMEI has already been read in and printed out as a bar code in a work order.

In the bar code scanner mode, the R&S®CMUgo software operates in a loop; the scanned bar code serves as a selection criterion for the test sequence and confirms the start of the test. After the first telephone has been tested, the software waits for the next bar code and then handles each telephone in succession. The user therefore need not worry about selecting the appropriate test sequence and can efficiently and quickly repair a large number of different telephones from a variety of manufacturers.

### Automatic compensation of attenuation values

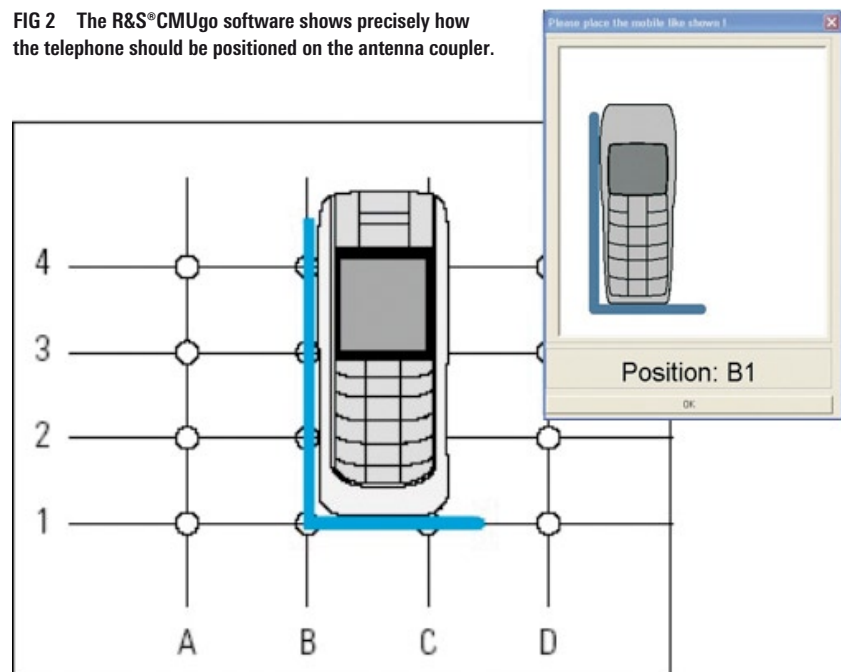
For the final test, the telephone is usually linked to the mobile radio tester via the R&S®CMU-Z10 antenna coupler and is thus driven under real conditions by signaling messages via the air interface (FIG 1). The near-field characteristics of the air interface depend on the telephone, producing different attenuation values that have to be compensated to ensure the accuracy of the test results. The individual attenuation values of previously measured mobile phones are stored – detached from the test sequences – in a separate database. As a result, the test sequences are purely standard-referenced and can be used in the same functionality for each telephone type.

With GSM/WCDMA mobile phones, the attenuation values can be linked to the corresponding TAC or are connected to a selection list in the shortcut mode of the

software. The CDMA2000® and 1xEV-DO standards specify no unique recognition characteristics for mobile phones, which is why only the shortcut mode can be used for these devices.

After recognizing the type of telephone, the R&S®CMUgo software shows the user the position coordinates on which the telephone is to be placed (FIG 2). The optimal position was determined with reference telephones. A database containing the attenuation values of conventional mobile phones from a wide range of manufacturers is available for downloading. The innovative positioning system of the R&S®CMU-Z10 antenna coupler and the clear information provided by the software allow the user to position each telephone quickly and exactly. The telephones' positioning coordinates and attenuation values stored in the database are selected in such a way that the measurements with all mobile radio standards and frequencies are made using minimum attenuation values. ▶

**FIG 2** The R&S®CMUgo software shows precisely how the telephone should be positioned on the antenna coupler.



### ▶ Linking the test sequences with the TAC

In this mode, which is only practical for GSM and WCDMA mobile phones, at first only standard attenuation values are set at the start of a test sequence, i. e. when a telephone is initialized and registered (FIG 3). For this purpose, the telephone must be positioned in the center of the antenna coupler. After an initial connection has been set up for the registration, the R&S®CMUgo software queries the IMEI of the telephone, from which it determines the TAC. Subsequently it finds an attenuation value assigned to the TAC in the database, loads it and continues the test sequence as soon as the user has acknowledged the positioning prompt. The test now runs using the telephone-specific attenuation values.

### Shortcut mode

This mode provides a quick means of manually selecting test sequences, but also makes it possible to link them to sets of attenuation values in a separate database (FIG 4). This means of indexing test sequences and attenuation values is designed primarily for CDMA2000® and 1xEV-DO mobile phones, since such phones have no unique characteristics for automatic recognition. In special cases, however, this mode is also useful for GSM and WCDMA mobile phones, for it allows correct attenuation values to be manually assigned when the TAC is not enough for automatically determining the physical characteristic, e. g. with models that feature more than one antenna configuration or if telephones are to be tested without their housing.

To configure a shortcut list, the R&S®CMUgo software provides a straightforward menu containing the available test sequences. Each sequence can be assigned a user-defined abbreviation and a set of attenuation values (see pointers #1 and #2 in FIG 5). First, the sequence to be used is selected.

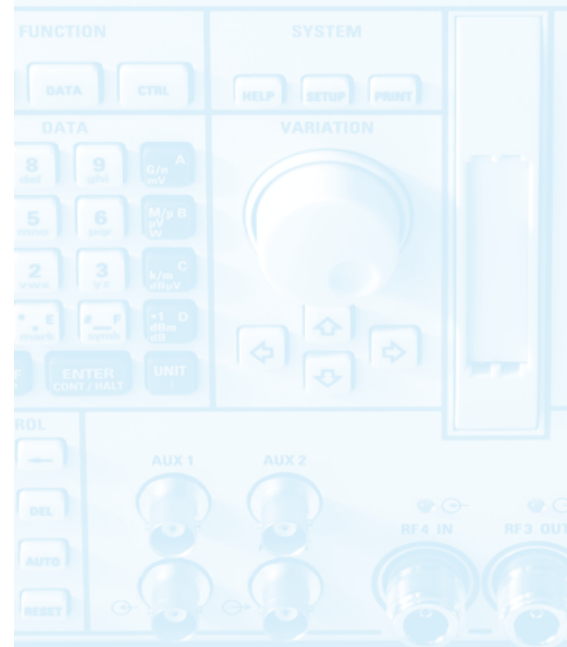
Then the attenuation values to be used are defined within the "initialization / registration" procedure of a selected test sequence. If an entry in the database is available, the information indicating the position of the telephone on the antenna coupler and the corresponding attenuation values are transferred. Now the test runs using the telephone-specific attenuation values.

### Other software features

Although the R&S®CMUgo software not only provides powerful functions for servicing mobile phones but also fulfills requirements in research and development, it is very straightforward. Test sequences for every mobile radio standard supported by the R&S®CMU 200 are put together with just a few mouse clicks. Input fields are available for configuring all essential RF parameters; tolerances for the individual measurements can be changed. If no special requirements for tolerances exist, the software uses the tolerances defined in the specification.

The graphical, user-friendly display makes it easy to work with the test configuration, even without in-depth technical knowledge. The contents of the test protocol can be configured in a great variety of ways. Display modes with the output of tolerance values or only with the display of measured values are available. If desired, only a summary of the test is output. The R&S®CMUgo software can be configured to automatically save test reports on a file server with a possible database link or to export the test reports to other conventional data formats such as XML.

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More information and data sheet at  
[www.rohde-schwarz.com](http://www.rohde-schwarz.com)  
 (search term: CMUgo)

#### REFERENCES

- [1] Universal Radio Communication Tester R&S®CMU 200: Cost-efficient models for service and production. News from Rohde & Schwarz (2006) No. 189, pp. 14–15
- [2] Antenna Coupler R&S®CMU-Z10 / Shielding Cover R&S®CMU-Z11: Practical and indispensable accessories for testing mobile phones. News from Rohde & Schwarz (2002) No. 175, pp. 18–19

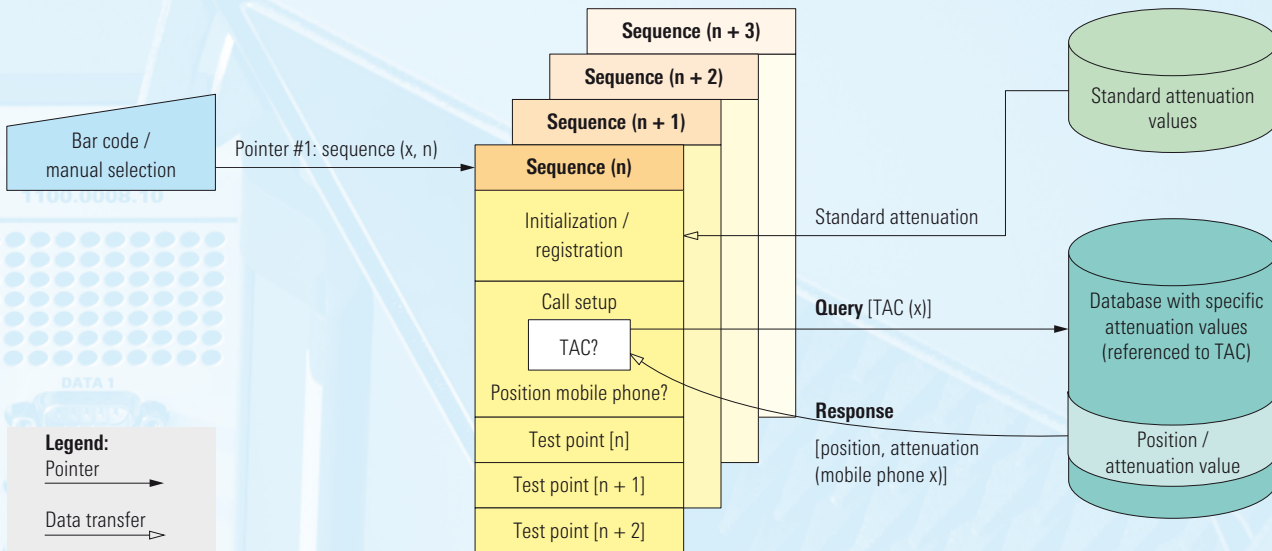


FIG 3 Flowchart of the mode in which the attenuation values are automatically set as a function of the TAC.

FIG 4 Database containing attenuation values that are selected by means of shortcuts.

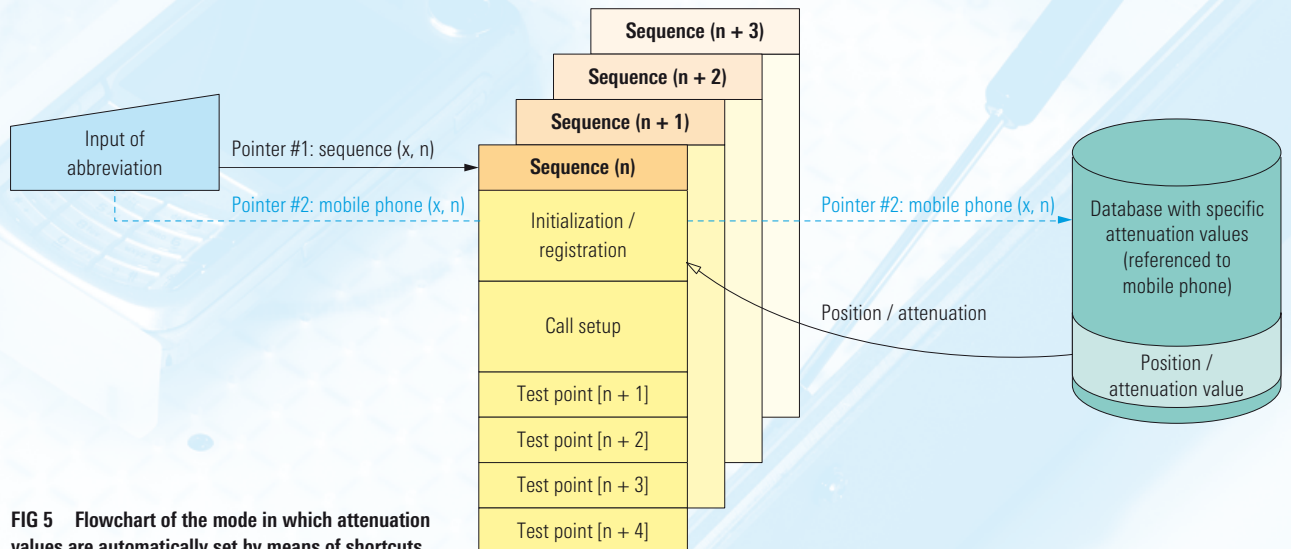
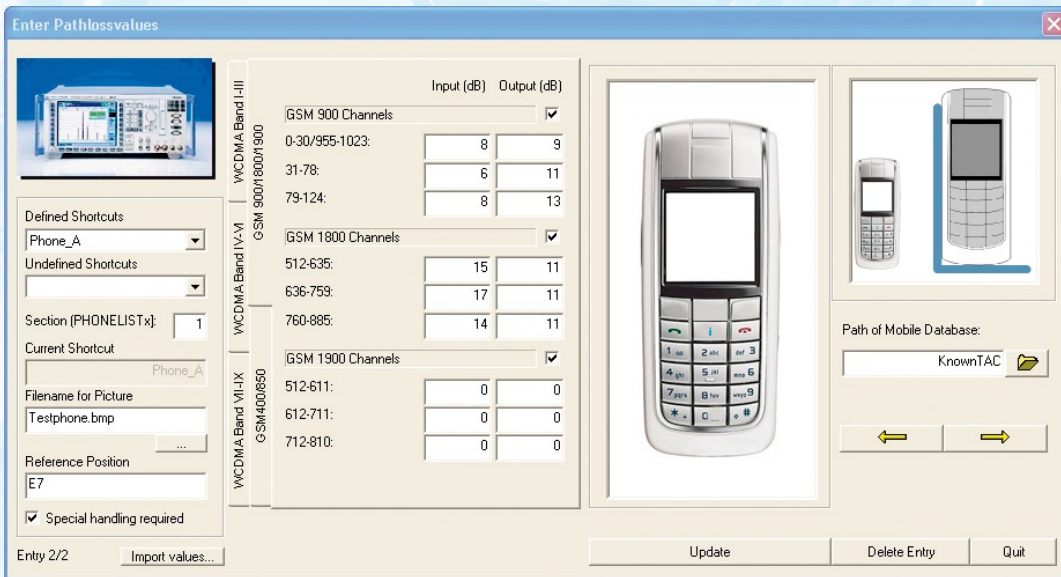


FIG 5 Flowchart of the mode in which attenuation values are automatically set by means of shortcuts.