ROHDE&SCHWARZ

Instruments
Division

Service Kit for SML

SML-Z2

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1   Service program

1.1 Overview

The SML Service Program is used to support troubleshooting and module testing. It enables operation of the internal control bits and reading out of the available diagnostic points. In addition, the program can be used to transfer basic remote-control commands. The program runs under Windows (95, 98, NT and 2000). The instrument can be remote-controlled via IEC bus or RS232 interface. External level calibration is possible in conjunction with a power meter of the type Rohde & Schwarz NRVD that is connected to the IEC bus.

1.2 Installation

To install the program under Windows (95, 98, NT or 2000) insert the installation disk 1 into your drive and call up the "setup.exe" file. Follow the instructions of the installation program. The service program requires the CVI runtime engine, which will be installed if it is not yet available.

1.3   Program Description

To start the program click on "SML_SERV" in the start menu using the left mouse key (The path within the start menu depends on the entries made during the installation). You may as well call up the "smlserv.exe" file in the program directory.

1.3.1   Selection of the Interface

When the program is started, the user is prompted t to enter the desired type of connection to the SML. It is possible to select between IEC bus (GPIB) and RS232 interface.

For configuration of the IEC-bus interface, all that is needed is to enter the IEC-bus address set on the instrument. Before confirming using "OK" make sure that the connection cable is connected between PC and SML.

Port COM1 is used for communication via the RS232 interface. The SML is connected to the PC via a null modem cable. The configuration values set on the instrument are queried by the program.

1.3.2   Main View

The main view of the service program contains general information on the SML, the firmware, the modules and the options fitted. In addition, the current module temperatures and the error messages of the instrument are displayed.

1.3.3   Module Test

Tests for the individual function modules of the SML are started by selecting the module in question in the "Check" menu. The menu item "Check All" performs all module tests one after the other. During the tests, internal diagnostic points are checked. The upper area of the module check window shows the signal path of the module. During the test, the diagnostic points entered there are colored. Green points represent circuit components that seemed to be okay to the program. Diagnostic points that are out of the test tolerances are colored in red. In the lower part of the window, the tested points are listed in a report. After completion of the test, the report can be opened in an extra window using the "Report" button. The report can then be stored, printed out or copied to the buffer.

1.3.4   Calibration

The menu item "Calibrate" permits to call up the calibration routines of the SML. A distinction is made between internal and external calibrations. No additional measuring instruments are required for the internal calibrations.

1.3.5 Direct Mode

In the Direct Mode, the setting bits of the SML can be manipulated individually. In the left-hand part of the window, the desired programming subaddress can be selected. The middle section of the window will then display the list of bits the values of which can be varied. The "Send" button permits to send the varied bit values to the instrument.

The "Diagnostics" menu of the direct mode window permits to select and display the diagnostic points of the SML. The output value, that is constantly being updated, appears at the right edge of the window.

The menu item "Remote Control" permits to open windows from which the most important operating functions of the complete instrument and the pulse modulator, if installed, can be controlled. The "Direct Control" item permits to send any remote-control commands.

By selecting the menu item "Manual Control", the instrument can as well be manually operated without the need for terminating the service program. The program run is interrupted until the "OK" button is activated in the displayed window.

The display elements for the hardware interrupts of the SML are located at the right-hand edge of the direct mode window.

1.3.6 Help

The menu item "Help" of the main window permits to call up information on the procedures of the module tests. For this purpose, the file type .htm must be linked with an HTML-compatible program (e.g. Internet browser).

2 External Level Calibration

2.1 Overview

To meet the required level precision and linearity, the R&S SML is calibrated externally by using a power meter running the program **smllevco_x.y**.

In the program name, **x.y** represents the latest version, which is currently 3.12 (December 2002); this description refers to this status.

To use the level correction program, you need a PC with Windows 95, 98, NT or 2000, an IEC/IEEE bus interface, the program **smllevco_3.12** and Power Meter R&S NRVD, stock number 0857.8008.02, with a Z51 sensor.

No other power meters are currently supported and no alternatives are planned.

2.2 Installation

To install the program under Windows (95, 98, NT or 2000), insert installation diskette 1 into the diskette drive and call the file **setup.exe**. Alternatively, you can start **setup.exe** from the directory that contains all files of the distribution kit.

Follow the instructions of the installation routine. The service program requires the CVI runtime engine. This engine will be installed if not already present on the system.

2.3 Preparations

- Connect the IEC/IEEE buses of the PC, power meter and the R&S SML with one another. Connect sensor Z51 directly to the RF output of the R&S SML.

- Switch on the R&S SML, power meter and PC. Make sure that the ambient temperature is between +20 and +25°C. This temperature should not vary more than 2 to 3 K during the measurement time (which can be up to 25 minutes depending on whether the R&S SML01/02/03 or R&S SMV is used).

- Let the R&S SML **warm up for at least 30 to 45 minutes** before you start a calibration. Note: The service program easily allows you to check the temperature of all modules. Do not start calibration until these temperatures have stabilized (fluctuations must be < 1 K).

- **Warning**: An external level correction will destroy the current correction data memory of the R&S SML.

2.4 Program Description

To start the program, click LEVEL CALIBRATION in the Start menu with the left mouse button. (The path within the start menu will depend on the specifications provided during installation.) Alternatively, you can call **smllevco_3.12.exe** from the program directory.

2.4.1 Entry of IEC/IEEE Bus Address

After opening the main window, check the preset IEC/IEEE bus addresses for the R&S SML/V (28) and the R&S NRVD (9) in the upper left pane.
If you want to use different addresses, enter them into the input fields.

Once the settings are the way you want them, click the green OK button.
The current configuration as set on the IEC/IEEC bus will now be displayed under the windows for Signal Generator and Power Meter.

2.4.2 Calibration

The center "Calibration" pane lets you choose the calibrations you want. Accepting the preset "Detector Linearity and Frequency Response" is recommended. You can also choose "Frequency Response" by itself, although this should be done only if you are sure that the detector linearity has been correctly adjusted (e.g. via an earlier calibration).

If you want to calibrate an R&S SML with a rear-panel RF connector, click "Option SML-B19" (rear-panel connector).

The default setting is to maintain a log. The log is stored in the start directory of the program and is named **protokoll.dat**. The contents of this file will be described later.

The "Delete SML/V Level Calibration Data" button lets you delete the current calibration data before a new calibration and operate the R&S SML/V with the default data. This is useful in certain situations, e.g. if the mainboard of an R&S SML03 has been installed in an R&S SML01 or vice versa. To delete the data, you must have the password for Protection Level 3. In normal cases, **do not** delete the data.

Now click the green START button at the upper right to start the calibration. Clicking EXIT will immediately terminate the program in this state.

Follow the program instructions.
While the detector linearity is being adjusted, the frequencies and the currently set DIGPOT values are displayed. The message "Transferring Data to SML" indicates that the linearity calibration values are being transferred to the R&S SML.

With the R&S SMV, this occurs twice: once for CW operation and once for IQ operation.

Level correction is then performed for the first six attenuator settings.
The graph shows the correction values in 1/100 dB above the frequency.

When calibration is completed, a device-internal level preset calibration will be carried out automatically and an ALC table learned.

2.4.3   Log File

The **protokoll.dat** log file that is generated is a pure ASCII text file and can be read with any standard editor, e.g. Windows Notepad.

2.4.3.1   Header

The header contains the name of the generating program and its version number. It also contains the serial number of the R&S SML, its implementation of option B3, the current mainboard temperature and the R&S NRVD zero level.

2.4.3.2   Detector Linearity

The next list contains the results of the detector linearity calibration. It contains the reference level in dBm (e.g. 8 dBm) and the nominal reduction in dB (e.g. 23 dB).
Each frequency is accompanied by the measured calibration value (DIGPOT), the measured reference level in dBm, the measured level error at a reduction of 6 dB above the nominal reduction (e.g. 17 dB) and at the nominal reduction (e.g. 23 dB).

In the case of an R&S SMV, the same table is also created for the IQ range.

2.4.3.3   Level Correction Data

The next table contains the CW level correction data. Each frequency is listed with levels that each correspond to an attenuator setting. These levels are different for the R&S SML01 and the R&S SML03.

The table for the IQ range is smaller since only the 0 dB setting of the attenuator (8 dBm) is calibrated.

2.4.3.4   IQ Temperature Correction Data

To compensate for the temperature drift of the IQ modulator, a reference voltage for the detector at defined level values (RFLev) is recorded in addition to the external calibration.
The second column of the table show