Supplement to the R&S UPL Manual

**The R&S UPL software version 3.00/3.01 has been upgraded to 3.03.
The modifications are described below.**

Brief Overview

New or extended options:

Previously ...	Now ...
... only AC-3 signals could be generated with the **Option R&S UPL-B23** (Coded Audio Signal Generation, order number 1078.5188.02). The option was supplied on three disks and was installed automatically by means of the installation program provided on disk 1.	... also DTS signals can be generated with the Option R&S UPL-B23. The WAV library for AC-3 was extended by some special signals which can be found in a separate subdirectory "SPEC". The new files allow the "dialog normalization" to be varied, for example. On request, owners of the previous option receive a free upgrade on CD. The required installation disks can be generated based on this CD. To install the complete option, a set of 11 empty disks is required.
... the **measurement function O33** (selectable only via remote or sequence control with **Option R&S UPL-B33** installed) could only be used for measurements according to ITU-T O33 since a fixed length was assumed for the received identification string.	... the O33 measurement function accepts any string length that can optionally be limited by the new command line parameter “–to33l<xxx>”. <xxx> specifies the maximum number of characters to receive.
... the generation and decoding of FSK-signals (with **Option R&S UPL-B33** installed) used a fix assignement of MARK (1650 Hz) and SPACE (1850 Hz).	... the assignement of MARK and SPACE can be inverted by using command line parameter “–to33inv”

GENERATOR panel:

Previously ...	Now ...
... only AC-3 signals were available for the **CODED AUDIO function**.	... additional signals can be output in the audio format DTS via menu item "Format". The designation of the menu items of "Chan Mode" was changed with this extension. Since the bit rates of AC-3 and DTS are not identical, the bit rate is no longer given in the menu items. For AC-3 it continues to be 192 (stereo) or 448 kbit/s. The bit rate for DTS is 192 (stereo) or 754 kbit/s. For manual control see 2.5.4.16..Coded Audio (Codierte Audiosignale) For IEC/IEEE-bus command see 3.10.1.5.14..Coded Audio (Codierte Audiosignale)
... only individual sounds with a fixed "dialog normalization" of -27 dB were available for the **CODED AUDIO function.**	... special signals can be loaded for special tests (e.g. dialog normalization) via the menu item "Chan Mode SPECIAL". A collection of corresponding WAV files is installed in the "SPEC" subdirectory by means of the new Option R&S UPL-B23. This also includes signals with different "dialog normalization". For manual control see 2.5.4.16..Coded Audio (Codierte Audiosignale) For IEC/IEEE-bus commands see 3.10.1.5.14..Coded Audio (Codierte Audiosignale)
... only 3 frequencies (42, 997 and 15000 Hz) were available for the mono signals and the level sweeps of the **CODED AUDIO function**.	... 4 kHz is available as an additional fixed frequency. For manual control see 2.5.4.16..Coded Audio (Codierte Audiosignale) For IEC/IEEE-bus command see 3.10.1.5.14..Coded Audio (Codierte Audiosignale)
... this drive was not used as cache memory for WAV files although a correct RAMDRIVE was installed for the multichannel modes of the **CODED AUDIO function.** As a result, a lot more time was required for the switchover of frequency or level and especially frequency sweeps were extremely slow.	... this error has been eliminated; with the RAMDRIVE installed, the sweep speed (starting from the 2nd run) is far higher.

Previously ...	Now ...
... the “Spacing” of the **RANDOM function** ("Domain FREQUENCY") could only be set to ANLR TRACK if a FFT or post-FFT was selected in the analyzer. A fast frequency response measurement ("Fast Frequency Response") with a stable frequency response and good level accuracy was thus possible (without FFT windowing).	... ANLR TRACK is also possible for third analysis. The frequency resolution is optimized such that a stable frequency response is displayed in the third analysis depending on the selected measurement time and the sampling rates of the generator and analyzer.
... generator signals could only be equalized (in frequency domain) but not filtered. Thus a filtering of (compressed or linear) wave-files in **ARBITRARY function** was not possible.	... a (file defined) generatorfilter can be provided for WAV- and CPR- files in ARBITRARY function by using the new command line parameter "-tgenfilt". This enables a new menu line "FilterFile" in generator function ARBITRARY whenever a valid CPR- or WAV-file is loaded. User can specify the filename of the desired filter in COE, BPZ or BPZ format..
... the 1st sweep frequency was set after termination of a **generator sweep.** This was done to prevent the DUT from settling when a further sweep was started and to allow the 1st measurement to be run without delay.	... the generator can optionally be muted at the end of a sweep. The new behaviour is activated by entering the new command line parameter "-tmute<xxx>". <xxx> specifies the settling time (in ms) of the DUT when the signal is switched on again. ***Example:*** The command line parameter "-tmute200" has the following effect on generator sweeps: • the generator is muted after termination of an (individual) sweep, • the generator is switched on again when a further sweep is started, • the measurement (of the 1st sweep frequency) is started 200 ms later.
... the low-distortion-generator could be selected unaffected by the setting of "Volt Range"; "Volt Range FIX" had been ignored.	... the low-distortion-generator is selectable only if "Volt Range AUTO" is set; otherwise the activation of low-distortion-generator is refused.

ANALYZER panel:

Previously ...	Now ...
... the zoom factor of **FFT** was limited to 128, corresponding to frequency resolution of 46 mHz (in analog analyzer or at 48 kHz in digital analyzer).	... the highest zoom factor of **FFT** is 512 (2 additional binary stages), corresponding to frequency resolution of 11 mHz.
... the automatic offset calibration had to be switched off when **very long single measurements** were performed. This was required since the measurement would otherwise be aborted by cyclical calibration.	... this is no longer required since an offset calibration is delayed as long as the running single measurement is terminated. Terminating the measurement thus has priority over calibrating the DC offset.
... external level triggering ("START COND" SNG TRG CHx and EDG TRG CHx), if used as continuous measurement, could be executed only for measurement functions RMS and RMSSEL. For the other measurement functions, each trigger had to be explicitly started by START (key or IEC/IEEE-bus command).	... this error has been eliminated.
... the above entry limit for the start and stop values of external level sweep and trigger in the analog analyzer was 30 V.	... this value was increased to 100 V.
... the first measurement result after the start of the measurement was supplied by **third analysis** only after all third-octave filters had been settled and the set measurement time had expired. It could thus be ensured that the first spectrum displayed exclusively returned the spectral voltage distribution of the DUT. After the start of the measurement, long settling times (of up to 2 s) occurred especially when low-frequency third octaves had to be represented. Nothing could be represented during this time.	... unsettled intermediate results can also be displayed by third analysis in the continuous mode (measurement is started using the START key) irrespective of the set measurement time. The first (unsettled) spectrum is displayed immediately after pressing the START key. A first coarse assessment of the DUT is possible. The single measurement is not affected by this modification, i.e. once the SINGLE key is pressed, the final result is displayed as usual after the third-octave filters have been settled and after the set measurement time has expired. To recover the old behaviour of continuous measurement the commandline parameter "-o16" has to be entered.
... the **12th-Oktavanalysis** (internaly calculated via FFT) performed a windowing of the input data.	... the windowing can be switched off, if the new command line parameter "-twin12oct" had been used. This enables a new menu line "Meas Mode" which provides the selections of "NARROW" (HANN-window as before) or "WIDE" (no window)

Previously ...	Now ...
... the signal delay of the generator and analyzer was taken into account for **waveform representation** and selected "Trig Src GEN BURST", so that the delay of the DUT could directly be read in the displayed traces. This delay could only be corrected if the 1st measurement channel (Ch1, CH1=2, CH2=1 or CH1&2) was active.	... the delay is also corrected if the measurement is only carried out on channel 2 (CH2).
... the vertical cursors outside the visible range could - under certain conditions - display invalid samples in **waveform representation**. If the cursor was positioned manually via the set trace length or beyond "0 s", the samples displayed in the cursor window could be defective.	... this error has been eliminated.
... the settling could not be executed for the **Quasi Peak measurement function**.	... this error has been eliminated.
... it could happen that all third octaves were visible only after the R&S UPL software was restarted. This usually happened in the third analysis when the "Line Count" was switched over from 32 to 30.	... this error has been eliminated. ***Note:*** *When the frequency range of the third analysis was extended by 2 lines (16 and 20 Hz), the setting "Line Count 30" was introduced as compatibility mode. For newer applications for which a comparison of previous measurements is irrelevant, "Line Count 32" should generally be used and the frequency range limited via "FrqLim low", if required. The frequency range can then very easily be extended. The numbers of the third octaves will not be changed.*

Miscellaneous:

Previously ...	Now ...
... the limit lines in the HPGL printouts were poorly visible since they were displayed with dotted lines.	... the limit lines in the HPGL printouts are displayed as solid lines (one line) which makes them clearly visible.
... the colours of the multiscans in PCX-files and printouts were different from the in the graphic panel.	... this error has been eliminated. During installation of UPL software the existing files "PCX_CL.PLT" and "PRN_CL.PLT" are saved with the extension "301", before they are updated with the modified colour information. To undo the colour correction the "*.301"-files in directory "C:\UPL\REF" simply can be copied back to "*.PLT"-files.
... the serial interface COM2 could be operated up to 56 kbaud.	... the next higher speed (115 kbaud) is also supported; the setting is made in the OPTIONS panel under menu item "Baud Rate".
... the audio monitor could be used to output an *uncalibrated* DC voltage at the phone output by entering a command line parameter ("-tdcl" or "- tdch").	... this DC voltage can be calibrated in the "DIAGNOSTIC" menu of the OPTIONS panel under menu item "Device CAL DC OUT". For this reason • the zero offset has to be entered under "Address 0" and • the linearity factor has to be entered under "Address 1". see 2.6.6 Headphone/Speaker Output
... the horizontal graphics cursor was operational only to a limited extent as far as positioning was concerned. It could happen, for example, that the cursor could not be moved at all within the trace.	... several improvements have been made.
... the graphical representation and all measured traces were deleted (even if a trace was set to "HOLD") when a sweep was switched on or on again.	... the graphical representation (and all measured traces) *is deleted only* if the basic unit of the X axis is changed when a sweep is switched on (again).

Previously ...	Now ...
... invalid measurement values in a sweep trace (NaN values) were considered as limit violations in a running sweep. Such "invalid" measurement values occur at the beginning of a timechart representation, for example, if the time intervals are shorter than the measurement time and no measured values are available at the beginning of recording. In this case, the timechart representation indicates a limit violation after each (re) start.	... invalid measured values are generally ignored during the limit check.
... the limit check of a *running* fast frequency response was only performed in the SPECTRUM display. In the CURVEPLOT representation, during which not all the FFT bins but only the noise spectrum frequencies generated in the internal generator were displayed, the limit check had to be switched on or confirmed *after* the measurement.	... this error has been eliminated.
... the limit check of bargraphs was defective when trace A and B were simultaneously checked for limit line violation.	... this error has been eliminated.

Remote control / Universal sequence controller:

Previously ...	Now ...
... the magnitude bins of an FFT or post-FFT could be accessed via trace buffers #0 to 7.	... further FFT data can be accessed by entering a new command line parameter. "-txfft1" provides the real part of FFT in the trace buffers #8 to 11 for *non-zoomed* FFTs and the imaginary part in trace buffers #12 to 15. "-txfft2" provides the phase in trace buffers #8 to 15 *for all* FFTs.
... the "*IDN?" command supplied information on manufacturer, device, software version and setup version separated by commas: “ROHDE & SCHWARZ, UPL, 3.01, 0.33”	... the "*IDN?" command optionally supplies further information on active command line parameters. The new command line parameter "-techo" must be entered in the command line or configuration string prior to the first parameter to be output. ***Example:*** If the R&S UPL is started with the DOS command line "UPL –o16 –techo –txfft2 –r", the "*IDN?" outputs the following response: "ROHDE & SCHWARZ, UPL, 3.03, 0.33 –txfft2 –r"
... the Switcher R&S UPZ could only be set via manual control, sequence controller and IEC/IEEE-bus remote control. A simultaneous operation of the switcher operated via the serial interface COM1 and a remote control connected to COM2 was not possible.	... the switcher connected to COM1 can also be remote-controlled via the COM2 interface.

Detailed Description of Manual Control

In the following, the new characteristics and functions are described in detail. These pages can be inserted into the manual.

1.4.3 Command line Parameters of R&S UPL Software

The (start) behaviour of the R&S UPL can be customized by means of command line parameters. Moreover, particular command line parameters, called 't-switches', allow the R&S UPL to be configured for very special functions.

If the R&S UPL is called using an invalid command line parameter, a list of valid parameters is displayed and the program is terminated.

Some of the command line parameters of the R&S UPL are described in the following. Other parameters, especially those beginning with "-t" should be selected by the user only if the function is well understood since those parameters can, in some cases, cause the R&S UPL's behaviour to deviate significantly from the normal functionality that is described.

The complete list with all command line parameters is displayed on the R&S UPL when the R&S UPL software is called using the parameter "-t?".

Display settings:

parameter	Value	Description
-c		Coloured display on LCD *and* external monitor.
-m		Monochrome display on LCD *and* external monitor.
-i		Monochrome display on LCD, only; external monitor is *not* addressed.

Setup used:

parameter	Value	Description
-d		The R&S UPL always starts with the default setting.
-s<filename.xxx>		The R&S UPL always starts with the setting of the given setup "filename.xxx". "filename.xxx" must be a "complete" setup.

Configuration of universal sequence controller (BASIC options):

parameter	Value	Description
-bp<x>	<x>= 8 to 64	Explicit indication of BASIC program memory capacity in kbyte. The default setting is 32 or 64 kbyte depending on the configuration selected.
-bd<x>	<x>= 4 to 64	Explicit indication of BASIC data memory capacity in kbyte. The default setting is 32 or 64 kbyte depending on the configuration selected.
-bn<filename>		BASIC program (macro) to be loaded and started automatically upon program start.
-r		Suppresses the waiting interval for user entries while the R&S UPL is being started. The R&S UPL can be started much more quickly. This parameter is also recommended when the R&S UPL is remote-controlled.

Miscellaneous:

parameter	Value	Description
-a<x>		Analyzer options:
	<x>=1	When the analog channels are switched off, the outputs are switched to high impedance (high Z).
-o<x>		Parameter to ensure compatibility with previous software versions:
	<x>=1	Digital FS is *not* dealt with according to AES-17 standard: A sine signal with the amplitude 1 FS yields an RMS value of 0.7071 FS. A squarewave signal with the amplitude 1 FS yields an RMS value of 1.0 FS.
	<x>=2	During S/N measurements, the wanted signal is also measured using the selected filters.
	<x>=4	Waveform can be represented on a logarithmic scale.
	<x>=5	Modification of rollkey function in the operating panels: The rollkey cannot be used for navigating in the panel. Instead, it opens the selection window at the cursor position in the panel.
	<x>=14	Protocol data is no longer updated when switching over to PROTOCOL PANEL OFF (default behaviour prior to version 3.0).
	<x>=15	Use of previous jitter weighting filter (prior to version 3.0).
	<x>=16	Third analysis does not supply any unsettled (intermediate) result even if running in continuous mode. The first spectrum appears after the settling and measurement time has elapsed (default behaviour prior to version 3.03).
-ramdrive<X>		Definition of drive X as (pseudo) RAM drive.
	<X>=D	Default state; drive D: is used as RAM drive.
	<X>=C	A temporary directory on the hard disk is used as pseudo RAM drive. This is recommended if not enough RAM memory capacity is available to install a RAM drive and the Option R&S UPL-B23 is used.
	<X>=E or higher	The RAM drive used by the Option R&S UPL-B23 is drive E: (or higher); it is recommended if other drives or RAM drives are installed in the R&S UPL.

Hidden command line parameters:

parameter	Value	Description
-tsk		PCX pictures are printed using the softkeys.
-tjit		Jitter mode is selectable (clock or data jitter).
-tdc<x>	<x>=h	The optional audio monitor is reconfigured to operate as DC output. Voltage range -6 V to +6V.
	<x>=l	DC voltage range of reconfigured Audio Monitor: -2 V to +2 V.
-tsync<x>		Behaviour in case of "lock error" (default: no reset, but restart of measurement).
	<x>=1	No reset but measurement is continued.
	<x>=2	No check for "lock error" in digital analyzer.
	<x>=3	Reset of AES receiver; measurement is restarted (default behaviour prior to version 3.0).
-tlog		Activates logging of IEC/IEEE-bus commands as BASIC commands. This allows you to find out (with R&S UPL-B10 installed) which IEC/IEEE-bus commands were sent from the host processor to the R&S UPL.
-trest		Prevents the ongoing measurement from being restarted with generator frequency and level settings.
-tfil<xz>.<yz>		Rub & buzz measurement: modifies the waiting time for filter settling:
	<xz>	xz: divides the settling time of an optional lowpass filter by x.z.
	<yz>	yz: divides the settling time of the standard tracking highpass filter by y.z.
	Examples	99 reduces the settling time by a factor of 1/9.9 = 0.101.

parameter	Value	Description
		10 leaves the settling time unchanged. 04 increases the settling time by a factor of 1/0.4 = 2.5.
-ttimo		Deactivates the timeout test for measurements.
-tthdnwin		THD+N measurement: window for FFT is settable.
-tpanel		Automatically generates a text file of the same name (TXT file) with the contents of all panels when an actual setup (SAC files) is stored.
-tterz<x.y>	<x.y>= 0.1 to 9.9 (s)	Third analysis: sets the decay time constant (in seconds) for the Maxhold function. (Example: -tterz0.1 sets 0.1s)
-twin12oct		12^{th}-analysis: allows selections of "Meas Mode" NARROW (default behaviour; HANN window provided on input data) or WIDE (no window)
-twav<x>		ARBITRARY generator function: selects the channel of WAV files to be played (default: stereo is played in mono).
	<x> = 0	Left mono channel.
	<x> = 1	Right mono channel.
	<x> = 2	Stereo (only possible in digital generator with 8-bit signals).
-tpolar<x>	<x> > 0	Rub & buzz measurement: determines the measurement time of the polarity measurement in µs (-tpolar200 sets a measurement time of 0.2 ms).
-tquot		Allows the vertical line (|) instead of the inverted comma (') in IEC/IEEE-bus commands.
-tappl		Causes the "Working Dir" of the application setups to remain unchanged even in the event of loading from the application level and protects it from being overwritten by the current working directory. This facilitates application setup adaptation with subsequent storage at the same location.
-tkeyb		Allows the connection of an external keyboard even after R&S UPL power-up. Deactivates the virtual keyboard. An external keyboard *must* be connected to enter letters.
-tsinad		SINAD/THDN measurement: the weighting filter also has an effect on the RMS measurement result.
–tanlg		Allows the FFT representation in the 110 kHz analyzer up to 140 kHz; typical level error above 120 kHz: approx. 3 dB.
–tmute<x>	<x>= 0 to 30000 (ms)	Causes muting of the generator at the sweep end. The generator is switched on again automatically when a new sweep is started or when a sweep is switched off. The start of the first measurement is delayed by the value of X (in ms) so that the DUT can settle to the reapplied level.
–txfft<x>	<x> = 1	With the FFT or post-FFT switched on, also the real part is available in scans 8 to 11 and the imaginary part in scans 12 to 15 (is not valid for zoom-FFT) – in addition to the magnitude bins in scans 0 to 7.
	<x> = 2	With the FFT or post-FFT switched on, also the phase data is available in scans 8 to 15 - in addition to the magnitude bins in scan 0 to 7.
–to33l<x>	<x> = 2 to 99	The message length of the ITU-T O33 strings is limited to <x> characters. If <x> characters are received without any delimiter, the message is regarded as invalid.
–to33inv		Inverts the MARK/SPACE-relation of the generated and decoded FSK-Signal (for UPL-B33): Default state: MARK = 1650 Hz; SPACE = 1850 Hz using "–to33inv": MARK = 1850 Hz; SPACE = 1650 Hz
–tgenfilt		Playback of WAV- and CPR- files via generator function "ARBITRARY" opens a menu line to enter the name of a file defined generator filter. If an existing file is specified and the file contains valid filter data generator output is filtered; otherwise "UNFILTERED" is displayed and no filter used.
–techo		In addition to manufacturer, unit, software and setup version, the "*IDN?" IEC/IEEE-bus command supplies information on all activated command line parameters that were entered *after* the "-techo" parameter in the command line or the configuration string.

2.5.4.2 Sweeps

If a running sweep is stopped or switched off, the swept parameters will remain set on the current numeric values.

If a running sweep is completed, the 1st sweep frequency of the next run is set so that the DUT does not have to settle when the next sweep is started and the 1st measurement can be run without delay.

Alternatively, the generator can be muted at the end of the sweep. The R&S UPL software then has to be started with the command line parameter "-tmute<xxx>". <xxx> specifies the settling time (in ms) of the DUT. The first measurement is delayed by this time when the generator is switched on again. The generator is switched on again automatically when a further sweep is started or when a sweep is switched off.

2.5.4.16 Coded Audio (Coded Audio Signals)

The Option R&S UPL-B23 currently (version 2.0) contains digital formats AC-3 (Dolby Digital) and DTS (Digital Theatre Sound).

Notes:

- *In addition to predefined (individual sound) signals, further special signals can be loaded via menu item "Chan Mode SPECIAL". Also user-defined signal files can be entered here.*
- *The "dialog normalization" of predefined AC-3 signals is fixed to -27 dB, i.e. 4 dB under full-scale level. To vary dialog normalization, a packet of SPECIAL files is available (for AC-3) with full-scale 997 Hz sounds and – in 1 dB steps – variable dialog normalization from –1 to –31 dB.*

Format

Coding format.

A separate library of WAV files is installed for each format. If the format selection is extended, an upgraded Option R&S UPL-B23 has to be installed.

AC-3

Dolby Digital: up to 6 sound channels; can be output either individually, as 5.1 multichannel signal or as stereo signal. Frequency and level can also be selected. All other parameters for "Audio Service", "Bitstream Information" and "Preprocessing" are invariable default settings. The dialog normalization is -27 dB.
The AC-3 format is selectable only at a sampling rate of 48 kHz. It contains frames with a length of 1536 samples. Each WAV file contains 1 to 6 frames. The frequency resolution *per frame* is therefore:
48000 Hz / 1536 = 31.25 Hz.

DTS

Digital Theatre Sound:
up to 6 sound channels; can be output either individually, as 5.1 multichannel signal or as stereo signal. Frequency and level can also be selected. All other parameters are invariable default settings. The DTS format is selectable only at a sampling rate of 48 kHz. It contains frames with a length of 512 samples. Each WAV file has 3 to 18 frames to have the same frequency resolution for DTS and AC-3.

Notes:

1. *User-defined AC-3 or DTS signals of any length can be played with the ARBITRARY function. The sequences have to be available as WAV files and compressed to the R&S UPL-internal ACC format by means of the COMPRESS.EXE utility program.*
2. *When measurements are carried out on AC-3 or DTS decoders, their delay has to be taken into account in the analyzer panel. The measurement should be performed with settling switched on to avoid settling problems of the DUT.*

Chan Mode

(Channel mode) selection of signal channels.

2/0

Stereo mode at 192 kb/s. Frequency and level variation or sweep is possible. Coding of samples at 24 bits.
Uses: Frequency response and linearity measurements

5.1

Multichannel sound with all channels at 448 kb/s (AC-3) or 754 kb/s (DTS). Frequency and level variation or sweep is possible.
Coding of samples at 24 bits.
Uses: Frequency response and linearity measurements

L
C
R
LS
RS
LFE

Single channels at 448 kb/s (AC-3) or 754 kb/s (DTS). Limited frequency selection, fixed level (-20 dB). Coding of samples with 16 bits.
Uses: crosstalk measurements.
L: front left; C: front center; R: front right;
LS: rear left; RS: rear right;
LFE: low frequency enhancement

SPECIAL

Special signals available as WAV files can be loaded after setting this selection parameter. This includes:

- full-scale 997 Hz signals with variable "dialog normalization" (00997dxx.WAV where xx=01 to 31),
- full-scale 5.1 signal with 80 Hz on the LFE channel and 999 Hz on the other channels; different dialog normalization of -27 dB (80999000.WAV) to -21 dB (80999006.WAV),
- user-defined signals.

Notes:

1. *For user-defined WAV files, these signals should not exceed a length of 6 frames (AC-3) or 18 frames (DTS).*
2. *To load the SPECIAL files, it is recommended to set the "Working Dir" to the directory containing these special files. For the predefined special signals this is*
   - *"C:\CODED\AC3\48000\SPEC" (for AC-3) or*
   - *"C:\CODED\DTS\48000\SPEC" (for DTS).*

Frequency

Fixed frequency selection for crosstalk measurements and linearity (level) sweeps. Displayed only in single channel modes or when level variation is selected.

42 Hz Exactly 41.7 Hz
997 Hz Exactly 994.8 Hz
4 kHz Exactly 4000.0 Hz
15 kHz Exactly 15000.0 Hz

FREQUENCY

Entry of sine frequency; may be used as sweep parameter. Displayed only in multichannel modes (2/0 or 5.1) with frequency variation selected.
As described under "Format", the frequency resolution per frame is 31.25 Hz. The more frames are coded, the finer the frequency resolution is. The frequency resolution required determines the number of frames and the maximum length of the WAV files. The longer the WAV files, the longer the download times and the total measurement time. To offer a compromise between frequency resolution and measurement speed, the length of the WAV files is limited to 6 frames (AC-3) or 18 frames (DTS). This corresponds to a frequency resolution of 5.21 Hz.
This high frequency resolution is required only for low frequencies since a logarithmic frequency division is normally performed for frequency response sweeps. To avoid obtaining too many frequency values (and WAV files), the frequency resolution towards higher frequencies is limited so that fewer frames are required for coding. This increases the measurement speed at higher frequencies.

Frequency range:	5 Hz to 1 kHz	1 to 3 kHz	3 to 20 kHz
Resolution	5.21 Hz	10.42 Hz	31.25 Hz
Number of AC-3 frames:	1 to 6	1 to 3	1
Number of DTS frames:	3 to 18	3 to 9	3

Value range: 5.21 Hz to 20 kHz (sample rate only 48 kHz)

Units: Hz | kHz | ΔHz | ΔkHz | f/fr | Δ%Hz | Toct | Oct | Dec

Note:

To further increase the measurement speed during sweeps, as many frequency points as possible should be an integer multiple of 31.25 Hz for frequencies below 3 kHz. This can be implemented by a list sweep.

2.5.4.9 Random (Pseudo Noise)

Spacing

USER DEF

Definition of frequency spacing, i.e. the spacing of individual frequency lines: (is displayed only for domain FREQ)

Frequency spacing can be set manually. The value entered is corrected to the next settable value. The limits and the settable frequency values depend on the sampling rate (see 2.5.1 Selecting the Generator) and the selected generator. The lower frequency limit for the digital instrument is the coefficient

system clock rate / 16384

Units: Hz, kHz

ANLR TRACK

The frequency spacing is optimized depending on the selected measurement function. This is done to obtain a stable frequency response in the analyzer function:

- FFT or post-FFT: The value of the FFT analyzer grid is adopted automatically. This value is also displayed in the analyzer panel under "FFT:Resolution" (see 2.6.5.12 FFT). This is the optimum setting for an analysis using the rectangular window.
- Third analysis: the frequency spacing of the generator is optimized taking the selected measurement time as well as sampling rates of the generator and analyzer into consideration. This is done to ensure that the analyzer integrates whole periods in all third-octave bands.
- The setting is rejected for all other measurement functions (error message).

2.6.5.12 FFT (Spectrum)

Zooming

Determines, whether the FFT is calculated from the entire frequency range or from a section only.

OFF

"Normal" FFT, frequency range from 0 to range limit.
Range limit:

- analog: 117/256 * (internal) sampling rate
- digital: 127/256 * sampling rate.

(For the sampling rates of the individual instruments, refer to 2.6.1 Selecting the Analyzer.)

ON (2...512)

Zoom the frequency range about the center frequency (Center) by processing the signal in the time domain before the FFT (see notes below). Zooming is effected with a factor of 2, 4, 8, ... up to 512 (16 in ANLG 110 kHz). The factor is determined by the span. The measuring time is doubled with each zoom step. The maximum zoom factor depends on the selected instrument (see below).

Resolution, measurement time and span

Example: ANLG 22 kHz and DIGITAL: (sampling rate = 48 kHz, 8192 FFT points)

Table 0-1 Resolution, measurement time and span with FFT

	max. SPAN [Hz]	max. resolution [Hz]	Measurement time [ms]
FFT	23807	5.8593	170.71
ZOOM 2:1	21938	2.9296	348.12
ZOOM 4:1	10969	1.4648	696.25
ZOOM 8:1	5485	0.7324	1392.5
ZOOM 16:1	2742	0.3662	2785
ZOOM 32:1	1371	0.1831	5570
ZOOM 64:1	686	0.0915	11140
ZOOM 128:1	343	0,0457	22280
ZOOM 256:1	171	0,0229	44560
ZOOM 512:1	86	0,0114	89120

SPAN and resolution are proportional to, measuring time is reciprocal to the sampling rate.

2.6.5.24 Third Analysis (1/3 OCTAVE)

The pink noise of the generator function "Random", which can also be generated by the R&S UPL, is recommended as the *trigger signal* for the third analysis. Unlike white noise, its level roll-off $\sqrt{1/f}$ compensates for the apparent level increase encountered with third analysis, which results from the absolute bandwidth increasing as the frequency increases.

To display a stable frequency response, the spacing of the random signal should be set to "ANLR TRACK". In this setting, the frequency resolution of the generator is optimized taking the selected measurement time as well as sampling rates of the generator and analyzer into consideration. This is done to ensure that the analyzer integrates whole periods in all third-octave bands.

The single measurement is rated such that the actual measurement is started only if the internal third-octave filters have fully been settled. Nothing is displayed during internal settling and subsequent measurement time. The displayed spectrum exclusively represents the transmission characteristic of the DUT. This operating mode is suitable for all signals (i.e. also stationary individual sounds or noise) but results in an obvious dead period of the instrument, especially when low-frequency third octaves are detected.

To get a coarse overview of the DUT transmission characteristic immediately after the start of the measurement, i.e. during settling of the internal third-octave filter, the *continuous* measurement displays intermediate results with a high update rate immediately after pressing the START key (or the corresponding IEC/IEEE-bus command) irrespective of the selected measurement time. During the next few seconds this result will become more stable since the internal filters settle and the integration time becomes longer. This operating mode is especially recommended for dynamic test signals.

If unsettled spectrums are undesired even if running in continuous measurement intermediate results can be suppressed by using the command line parameter "-o16". This will recover the behaviour prior to version 3.03.

2.6.5.25 12th OCTAVE Analysis (12th OCTAVE)

Meas Mode

available only if command line parameter "-twin12oct" had been provided; allows measurement without windowing input data.

NARROW

input data are weighted by using the HANN-window. This setting corresponce to the default behaviour of the UPLs *without* command line parameter "-twin12oct".

WIDE

input data are *not* weighted (no window used)

2.6.6 Headphone/Speaker Output

Example: *Use of headphone/speaker output as DC source*

The headphone/speaker output can be used as a DC source as an alternative to outputting the measured analog or digital input signal. The R&S UPL therefore has to be equipped with a special command line parameter. The headphone/speaker output can be activated again by omitting the command line parameter.

"–tdcl" generates a DC voltage in the range of +/- 2 V,

"–tdch" generates a DC voltage in the range of +/- 6 V.

This voltage is available at the headphone output and can be levelled in the OPTIONS panel under the menu item "SPK DC VOLTAGE".

The offset and the linearity accuracy of this DC source can be calibrated manually for especially accurate DC levels. This is also done under the menu item “Device CAL DC OUT” in the "DIAGNOSTIC" menu in the OPTIONS panel.

- The zero offset is entered under "address 0".
- The linearity factor is entered under "address 1".

The actual value of the voltage can be performed with the DC measurement function of the R&S UPL.

The following is recommended:

1. Reset the calibration values:
   - Zero offset ("address 0") to 0.000
   - Linearity factor ("address 1") to 1.000
2. Set 0 V in menu item "DC Volt"
3. Measure the offset voltage V_{offs} and enter – V_{offs} (in volt) as offset calibration value under "Address 0".
4. Set the nominal voltage V_{nom} = 2 V (for "–tdcl") or 6 V (for "–tdch") in the menu item "DC Volt".
5. Measure the actual voltage V_{act} and enter the coefficient of V_{nom} / V_{act} as linearity factor under "Address 1".

*Headphone/speaker output as **low-impedance** DC source:*

The internal impedance of the headphone/speaker output is normally approx. 10 ? per channel. This internal impedance can be bypassed on the headphone/speaker output if a voltage source with a low internal impedance is required. This can be ordered or carried out at a later time in a service center.

2.15.1 Selecting the Remote-Control Interface (IEC/IEEE Bus/COM2)

Remote via

IEC BUS

COM2

Defining the interface for the R&S UPL remote control.
The selection only affects the talker/listener mode but not the controller mode (e.g. via Automatic Sequence Controller R&S UPL-B10).

Remote control via the built-in IEC/IEEE-bus interface.

Remote control via the built-in COM2 interface. Interface parameters are defined further down in the COM2 PARAMETER menu.

Note: *The R&S UPL uses 2 serial interfaces (9-pin). They may be used by the instrument software, if required:*

- *COM1 is used to control the switcher (R&S UPZ).*
- *In addition to serial remote control, COM2 is also used for plotter control.*

If an interface is required for user-specific applications (e.g. mouse), make sure to use the other unused interface. Make also sure that the interface is not defined as switcher or remote-control or plotter interface by a device setting, not even for a short period of time.

COM2 PARAMETER

Defining the parameters for the serial COM2 interface. The parameters set here apply to **remote control** and **hardcopy printout on a plotter** on which the COM2 interface is selected. The parameters determined here have to comply with those of the connected instrument (host computer or plotter).

The following interface parameters are standard settings of the R&S UPL COM2 interface:

9600 baud, even parity, 7 data bits, 1 stop bit

These standard parameters are set upon R&S UPL switch-on when the BACKSPACE key is pressed (loading the DEFAULT setup), UPL -d is entered at the DOS level or after (re)installation of a R&S UPL software.

The COM2 parameters set upon R&S UPL start-up or **selected by the user remain unchanged when a setup or the default setup is loaded** thus ensuring that interface parameters having to comply with those of the connected instrument are not inadvertently overwritten.

Note:

- *Interface parameters should not be changed via the COM2 remote control.*
- *COM1 parameters - if not used by the Switcher R&S UPZ - can only be changed with the DOS command MODE at the operating system level. This can be done:*
  - by changing the AUTOEXEC.BAT file (after quitting the R&S UPL via the SYSTEM key)
  - after execution of the SHELL command in the automatic sequence controller (R&S UPL-B10)
- *If the Switcher R&S UPZ is used, the COM1 interface will be reconfigured by the instrument software.*

Baud Rate

Transmission rate in baud (bits/sec).

2400 Baud
3600 Baud
4800 Baud
7200 Baud
9600 Baud
19200 Baud
38400 Baud
56000 Baud
115000 Baud

Default setting: 9600 baud

Further information on **baud rate**, **parity**, **data bits** and **stop bits** can be obtained from the R&S UPL online help or the DOS help at the operating system level with command HELP MODE under section "Configure Serial Port".

2.15.6 Calibration

Calibration ANL

Zero Auto

Dynamic offset calibration.

OFF

The DC offset calibration of the A/D converter or the analog board is switched off. The calibration factors valid last are used.

Note: *Calibration should be switched off for short periods only (e.g. for performing a sweep), as otherwise major measurement errors may occur.*
If autorange is used for the measurement, "Zero Auto ONCE" should be called prior to switching calibration off to make sure that all ranges that may be required are calibrated.

ON

The DC offset of the A/D converter or the analog board are cyclically calibrated for each voltage range. The length of the calibration intervals is 10 minutes at operating temperature; the intervals are shorter when the R&S UPL warms up.

Notes: *A cyclic calibration is not performed while a sweep is running; it is delayed until the sweep is terminated or stopped. This does not apply to precision measurements (Dynamic Mode PRECISION) since the measurement accuracy has priority over the sweep speed.*

A cyclic calibration is not performed while a single measurement is running; it is delayed until the measurement is terminated or stopped. Single measurements with very long measurement times can thus be carried out without having to switch the calibration off.

ONCE

An immediate offset calibration of the A/D converter or of the analog board of all ranges takes place. The setting then returns to the menu item previously selected.

Note: *Only the **currently** selected analyzer is calibrated.*

New or Modified IEC/IEEE-Bus Commands

3.9 Common Commands

***IDN?**

IDENTIFICATION QUERY queries the device identification code.
The device response is: "ROHDE & SCHWARZ, UPL, 3.03, 0.33", for example.
UPL = designation of device; 3.03 = firmware version number; 0.33 = setup version number

If the command line parameter "-techo" appears when the R&S UPL software is started, the device response contains additional information on the activated command line parameters following the "-techo" parameter in the command line or the configuration string.

If the R&S UPL is started with the DOS command line "UPL –o16 –techo –txfft2 –r", for example, "*IDN?" provides the following response:
"ROHDE & SCHWARZ, UPL, 3.03, 0.33 –txfft2 –r"

3.10.1.5.14 Coded Audio (Coded Audio Signals)

Command	Parameter	Basic unit	Meaning	Section
SOURce:**COD**edaudio:**FORM**at	**AC3** **DTS**		Coding format AC-3 (Dolby Digital) Coding format DTS (Digital Theatre Sound)	**2.5.4.16 GEN-Panel** Format → AC-3 → DTS
SOURce**:COD**edaudio**:CHAN**nel	 **CH2** **CH6** **CHL** **CHC** **CHR** **CHLS** **CHRS** **CHLF** **SPEC**		Selection of signal channels. → Stereo mode at 192 kb/s. Frequency and level variation or sweep is possible. → Multichannel audio coding in all channels. Frequency and level variation or sweep is possible. Mono signals: Limited frequency selection 41.7 Hz, 994,8 Hz, 4 kHz or 15 kHz (see next command) at a fixed level of -20 dB. Coding of samples at 16 bits. → Front left → Front center → Front right → Rear left → Rear right → Low frequency enhancement → Loading special signals	**2.5.4.16 GEN-Panel** Chan Mode → 2/0 → 5.1 → L → C → R → LS → RS → LFE → SPECIAL

Command	Parameter	Basic unit	Meaning	Section
SOURce:**COD**edaudio:**FREQ**uency	**F042** **F997** **F4K** **F15K**		Fixed frequency selection for crosstalk measurements and linearity (level) sweeps. → exactly 41.7 Hz → exactly 994.8 Hz → exactly 4000.0 Hz → exactly 15000.0 Hz Only available in • single channel modes (SOUR:COD:CHAN CHL|CHC|CHR|CHLS|CHRS|CHLF) or with • level variation (SOUR:VOLT:MODE FIX) selected.	**2.5.4.16** **GEN-Panel** Frequency → 42 Hz → 997 Hz → 4 kHz → 15 kHz
SOURce:**FREQ**uency	**<nu>** 5.21 Hz to 20 kHz at a sampling rate of 48 kHz	Hz	Entry of sine frequency (can be swept). The frequency step width depends on the number of WAV files in the C:\UPL\AC3\48000\... directory and the frame length per WAV file: Frequency range: 5 Hz to 1 kHz 1 to 3 kHz 3 to 20 kHz Resolution 5.21 Hz 10.42 Hz 31.25 Hz Number of AC-3 frames: max. 6 max. 3 1 Number of DTS frames: max. 18 max. 9 3 Frequency values outside this pattern are adapted to the next possible value. Only available in the multichannel modes 2/0 or 5.1 (SOUR:COD:CHAN CH2|CH6) with frequency variation SOURce:FREQ:MODE FIX selected.	**2.5.4.16** **GEN-Panel** FREQUENCY