PRODUCT DATA

Voice Testing System for Mobile Phones — Type 6712

Voice Testing System Type 6712 for mobile phones provides a new approach to voice testing of mobile phones in a fast, reliable and efficient way. By using noise excitation, the speech codec can be included in the measurement path. This means that the antenna is used as the access point. Accordingly, the full receive and transmit signal paths are measured, giving realistic measurements of phone performance.

Type 6712 is a powerful tool in the development and production process of mobile phones. Besides being a solid foundation for Type 6712 applications, the PULSE™ platform also provides a wide range of analysis capabilities for the verification of the acoustic design during development, and is a versatile platform for objective as well as subjective evaluation of specific components such as noise suppressors, echo chancellors, etc.

Uses and Features

Uses

- Voice testing of mobile phones according to specific standards
- Measurement of the complete transmit and receive signal path using the air interface
- Research and development of mobile phones with focus on voice testing using advanced test signals
- Quality assurance and sample testing of mobile phones
- Inspection and validation of mobile phones
- Voice testing of headsets used in connection with mobile phones
- Voice testing of mobile phones with hands-free capabilities

Features

- Pre-programmed test suites according to commonly used standards and recommendations for mobile phone testing
- Test suites that allow individual or complete sequences of tests with minimum operator interaction
- Flexible user-interface enabling high-level users to modify parameters and tolerances in the individual test cases
- Sound level measurements (IEC 651) for noise and speech signal analyses and real-time filters (IEC 225)
- Supports the use of Type 1, Type 3.2 and Type 3.3 (HATS) ear simulators
- Automatic report generation

Introduction

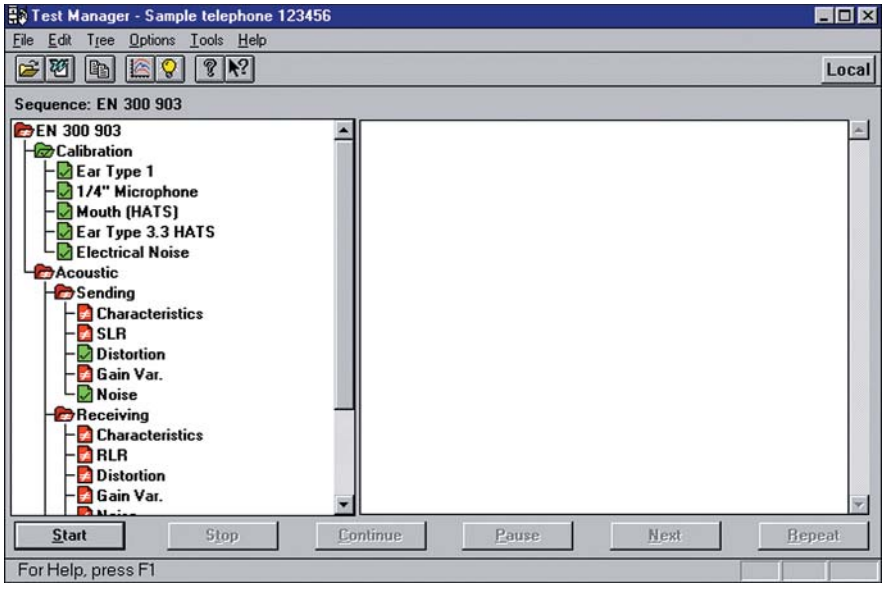
Voice Testing System Type 6712 for mobile phones is a comprehensive system for testing the acoustical transmission performance of mobile phones according to different standards. Furthermore, the system is designed to accommodate the needs for quality assurance testing, sample testing, incoming inspection and validation of mobile telephones.

The test system is based on software-controlled instruments that allow measurements to be made consistently and with a minimum of operator interaction. Test suites delivered with the system allow tests to be run individually or as a sequence constituting the different standards. Higher-level users can use the PULSE platform software interactively to develop their own tests and measurements to determine audio parameters not covered by standard test cases. This makes it easy to perform tests for research and development purposes.

All Type 6712's control, measurement and report functions are software-based. The software is optimised to run under Windows®, its familiar interface making the system intuitive and efficient for inexperienced and experienced operators alike.

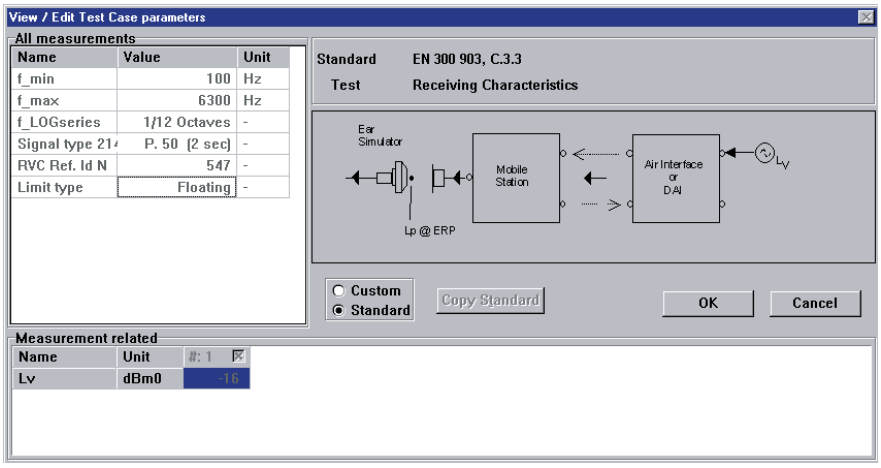
Performing Measurements

Fig. 1
Test Manager window for controlling the calibration procedures and test cases



To control the actual measurements, the Test Manager (see Fig. 1) is used to start, pause and stop the testing of a specific telephone. The testing is performed in accordance with the selected session profile corresponding to a specific test suite or standard. When a session has been selected, the operator is presented with a hierarchical tree showing all the tests included in the session. By selecting the root of the tree, all tests are performed consecutively. It is also possible to select individual branches of the tree to do a limited range of tests, for example only sending characteristics. Test results are clearly indicated on the screen, making pass/fail judgements immediately obvious. Each test within a session can be performed according to the standard set down by the issuing authority. Alternatively, the operator can select different parameters and tolerances within the range of the hardware and software, allowing research and development testing to be conducted (see Fig. 2). As each test is performed, an information window shows the current state of the system and the results of the test in numeric form. Using the Data Browser, it is also possible to see the results of tests graphically during or after a test is performed.

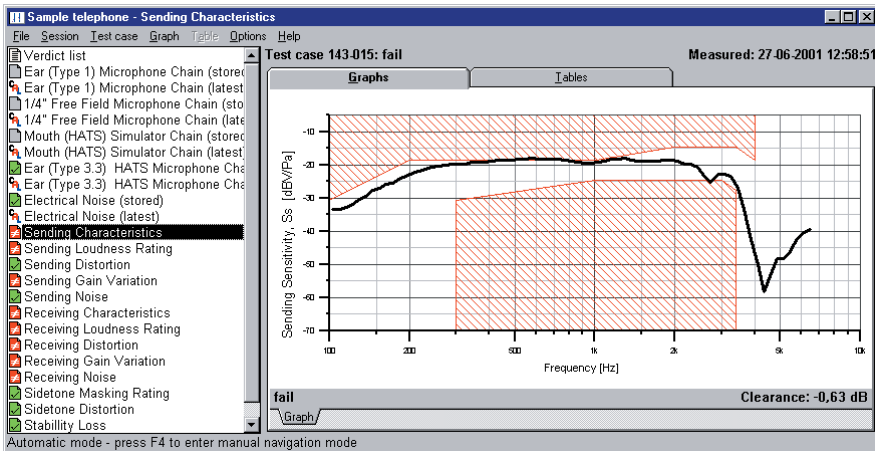
Fig. 2
The software allows customisation of all relevant test-case parameters and requirements



Viewing, Storing and Retrieving Measurements

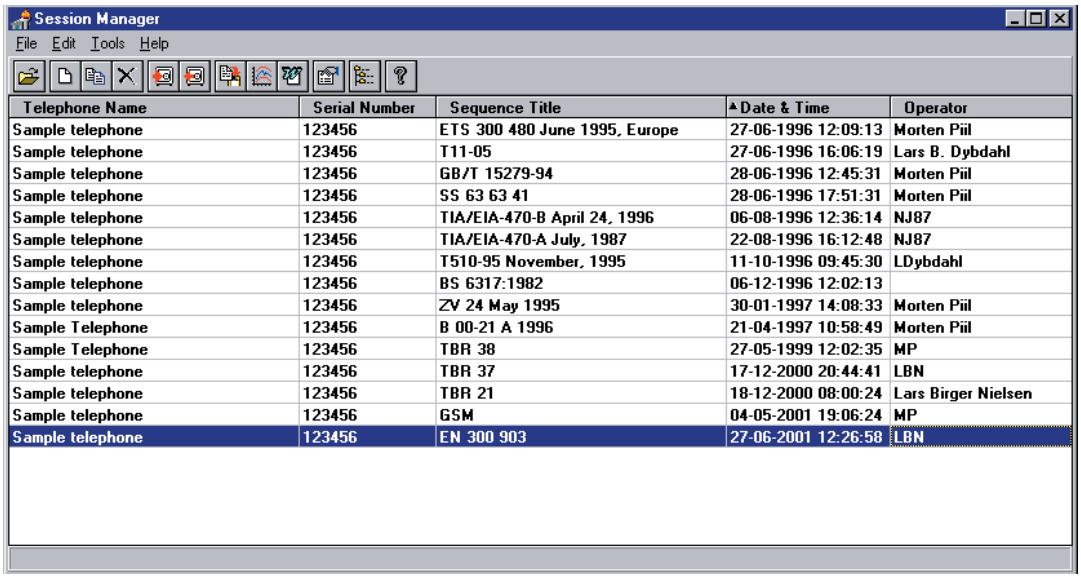
The Data Browser (see Fig. 3) is a versatile display for viewing measurements. Combined, the Data Browser and the Test Manager constitute a tool for instantly displaying the results of the current test or for viewing the previous tests. Several Data Browser windows can be opened at once, allowing direct comparisons to be made on-screen. Using the Windows® cut-and-paste facility, results can be copied to word-processing packages or spreadsheets.

Fig. 3
Speed and versatility are the main features of the Data Browser. The Data Browser displays the measurement results in graphical or tabular format



Using the Session Manager (see Fig. 4), the operator can gain access to the different sessions that hold the measurements. A session is a set of tests conducted on a telephone according to a specific standard and related measurement data produced during the test of the telephone. The Session Manager supports facilities to quickly find previous sessions and simple procedures to create new sessions. Commonly used sessions containing recurrent information, for example, the name of the test house or telephone manufacturer, are easily copied into new sessions, considerably reducing the time needed for test of similar telephones. Measurement results of stored sessions can be examined using the Data Browser and reports of stored sessions are easily produced with the report generator.

Fig. 4
The Session Manager supports viewing, storing and retrieving measurements

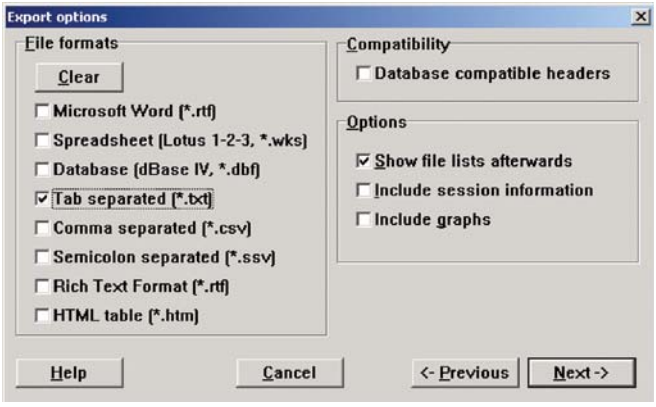


Telephone Name	Serial Number	Sequence Title	Date & Time	Operator
Sample telephone	123456	ETS 300 480 June 1995, Europe	27-06-1996 12:09:13	Morten Piil
Sample telephone	123456	T11-05	27-06-1996 16:06:19	Lars B. Dybdahl
Sample telephone	123456	GB/T 15279-94	28-06-1996 12:45:31	Morten Piil
Sample telephone	123456	SS 63 63 41	28-06-1996 17:51:31	Morten Piil
Sample telephone	123456	TIA/EIA-470-B April 24, 1996	06-08-1996 12:36:14	NJ87
Sample telephone	123456	TIA/EIA-470-A July, 1987	22-08-1996 16:12:48	NJ87
Sample telephone	123456	T510-95 November, 1995	11-10-1996 09:45:30	LDybdahl
Sample telephone	123456	BS 6317:1982	06-12-1996 12:02:13	
Sample telephone	123456	ZV 24 May 1995	30-01-1997 14:08:33	Morten Piil
Sample Telephone	123456	B 00-21 A 1996	21-04-1997 10:58:49	Morten Piil
Sample Telephone	123456	TBR 38	27-05-1999 12:02:35	MP
Sample telephone	123456	TBR 37	17-12-2000 20:44:41	LBN
Sample telephone	123456	TBR 21	18-12-2000 08:00:24	Lars Birger Nielsen
Sample telephone	123456	GSM	04-05-2001 19:06:24	MP
Sample telephone	123456	EN 300 903	27-06-2001 12:26:58	LBN

Documenting the Measurements

The Report Generator takes measurement data files, either singly, when selected from the Data Browser, or collectively when selected from the Session Manager or the Test Manager, and rapidly converts the stored results into pre-formatted Microsoft® Word documents. Each test can be presented in short form, showing only a graph and a table of the most important results, or in standard form, where parameters, tolerances and detailed measurement data are given. Once in Microsoft® Word format, the report can be printed, or the page layout modified to suit individual corporate standards.

Fig. 5
The Data Export tool for export of measurement results in different file formats



For customised documentation of measurements, the actual measurement data, etc., can be exported in different file formats. This powerful export facility takes the measurement data and formats them into files that can be imported into a wide variety of standard data-processing programs (see Fig. 5). Measurement data can even be dynamically linked to enable automatic referencing and updating. The file formats currently supported are: ASCII (tab, comma, or semicolon separated), spreadsheet (support for Microsoft® Excel®), Rich Text Format (general and Microsoft® Word optimised), HTML table, and database format (Microsoft® Access).

Preparing for Measurements

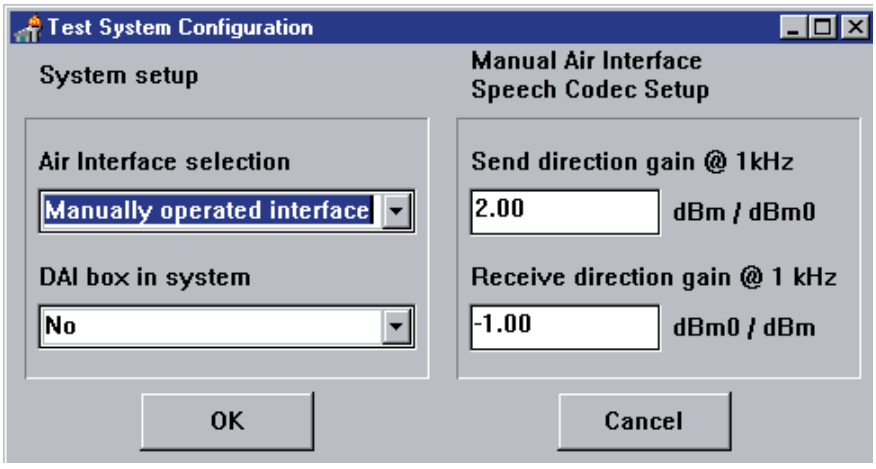
Before making the actual measurements, the test system must be calibrated and the radio link between the air interface and the mobile phone established. The software supports both these tasks.

The system needs to be calibrated at least once a day. During the calibration procedure, the ear simulator, mouth simulator and the electrical signal paths are measured, ensuring that any deviation can be digitally compensated for during the actual measurements. Calibration is valid for one day, i.e., 24 hours.

The radio link between the air interface and the mobile phone can be controlled manually or remotely. In remote mode, the air interface is controlled by the software via the IEEE– 488 interface. The air interfaces that can be controlled remotely are HP-8922, CMD-55 and CMU–200. When controlled manually, the radio

link is established from the front panel of the air interface. In manual mode, the operator must enter the send and receive gains at 1 kHz. Manual mode allows the use of air interfaces not supported by the control software. The manual mode also allows testing of other telephone technologies than the ones currently available for Type 6712.

Fig. 6
Test System Configuration tool. Air interface and DAI settings

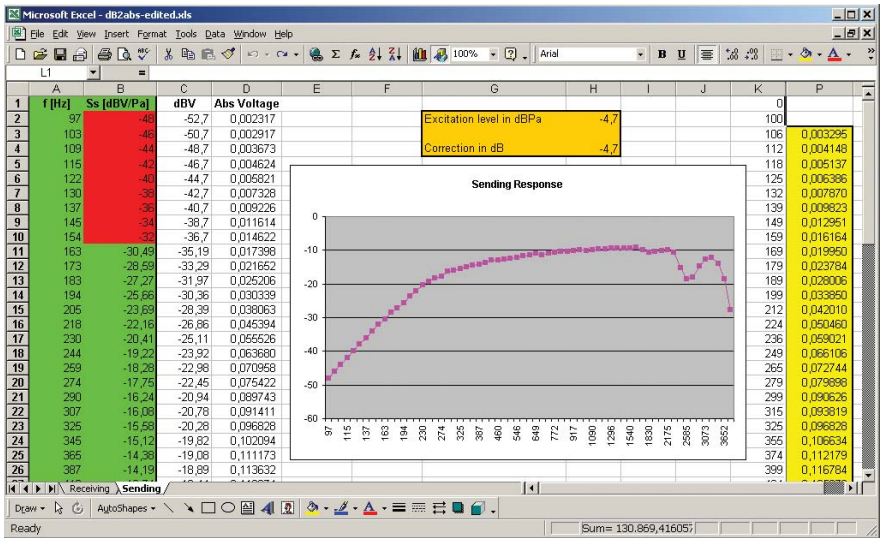


Optimising the Audio Performance of the Mobile Phone

In the process of optimising the audio performance of the mobile phone, an important task is to determine a proper input filter for the microphone in the mobile phone as well as an output filter for the receiver in the mobile phone.

The export feature of Type 6712 makes it very easy to utilise the measurement results in Microsoft® Excel® where further calculations and transformations are easily performed (Fig. 7). The final result can then be exported from Excel® to a format that is required by programs used for designing digital filters in mobile phones.

Fig. 7
Optimising performance using Excel®



System Configurations

Voice Testing System Type 6712 is a modular system. However, its overall structure is very simple and straightforward. The system consists of an Acoustic Interface, an Acquisition and Analysis System, one or more Software Licenses and optional accessories.

Acoustic Interface

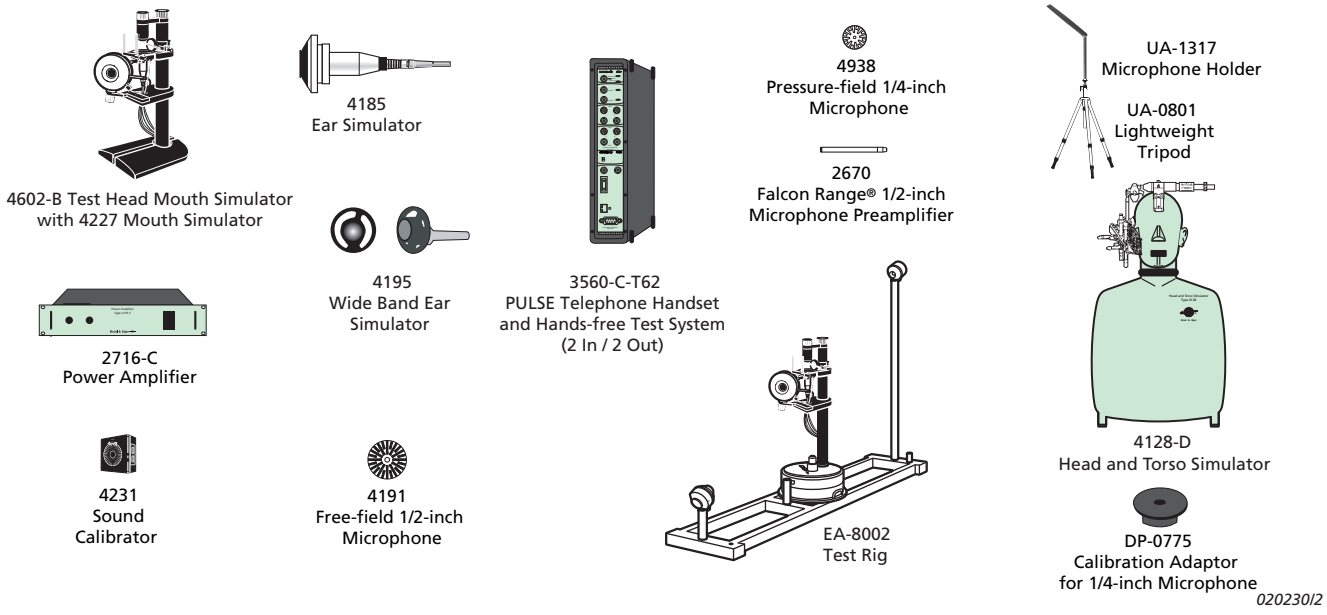
To establish a standardised and suitable acoustical coupling between the mobile phone and the Acquisition and Analysis System, Telephone Test Head Type 4602-B or Head and Torso Simulator (HATS) Type 4128-D should be used. Both Type 4602-B and Type 4128-D are especially suitable for the correct placement of mobile handsets, since both accommodate small handsets, handsets with antennae and non-symmetrical handsets. Type 4602-B incorporates Mouth Simulator Type 4227 and Ear Simulator Type 4185 or Wideband

Ear Simulator Type 4195 allowing tests to be performed in a standardised position according to ITU-T recommendations. Type 4128-C with Handset Positioner Type 4606 is a very realistic test setup for handset testing, using either standardised position according to ITU-T recommendations or user-defined positions.

Acquisition and Analysis System

Type 3560-C PULSE Front-end is the heart of Type 6712 and is used for all tests performed by it. Type 3560-C generates the excitation signal such as the P.50 Artificial Speech Signal and the Pink Noise Signal. Furthermore, it includes CPB (Constant Percentage Bandwidth) and FFT (Fast Fourier Transform). CPB and FFT are used for all response measurements that require a broadband excitation signal such as artificial speech signal or pink noise signal.

Fig. 8 *Items available for system configurations*



Software Licenses

Software licenses fall into three groups – those that support testing of mobile phones according to specific standards, those for testing headsets and in-car hands-free, and those that add analysis capability and features to the PULSE software.

Optional licenses for standards that allow testing according to specific standards:
BZ-5137-017 EN 300 903 (GSM 03.50) for GSM phones
BZ-5137-021 3GPP TS 26.132 for GSM and UMTS phones
BZ-5137-027 3GPP TS 51.010 (GSM 11.10) for GSM phones
BZ-5137-025 CTIA test plan for dual mode AMPS/CDMA phones
BZ-5137-023 Hands-free based on ITU-T Rec. P.342
BZ-5137-029 LSTR and ANR based on GSM and 3GPP specifications
BZ-5137-037 3GPP2 CS 0056-0 for AMPS and CDMA phones
BZ-5137-039 3GPP TS 26.132 for wideband GSM and UMTS phones

Optional licenses for testing headsets and in-car hands-free:
BZ-5137-041 Software for Headset Testing – Generic Requirements
Type 7909-S1 Voice Testing Software for Hands-free Equipment. For more information see the separate Product Data BP 2116

Optional PULSE licenses that add analysis capability to PULSE:
Type 7797 Basic Electroacoustics
Type 7701 Data Recorder
Type 7705 Time Capture
Type 7698 Sound Quality Software
BZ-5265 Zwicker Loudness option for Type 7698
BZ-5301 Psychoacoustic Test Bench option for Type 7698

Optional Accessories

The following optional accessories are available for use with software licenses that support testing of mobile phones according to specific standards – accessories for remote control of Air Interface via IEEE–488, accessories for Stability, LSTR and ANR measurements, and accessories for measurements on the Alerting Module (Ringer Test).

For easy configuration of a complete system, a number of standard system configurations are available from Brüel & Kjær. However, the standard configurations have all been put together by selecting from the full configuration overview shown in Fig. 8. For specific information regarding standard system configurations, please see the ordering information.

Using PULSE as a General Research and Development Tool

PULSE provides access to analyzers, post-processing functions and display facilities for many applications within the area of electroacoustic testing. Using the FFT Analyzer, CPB (1/nth octave) Analyzer, Overall Level Analyzer and Signal Generators included with Type 6712, PULSE can be set up to accommodate the vast amount of different measurements typically required for R&D of new electroacoustic devices. Furthermore, PULSE contains a task-oriented user interface (Fig. 9) that allows the tasks involved in the complete measurement process to be implemented in PULSE as individual tasks that can be performed one after another. This could typically include many different types of analysis that can easily be managed and documented. All the tasks can be stored together with the actual measurements, and reports can be stored as a PULSE project that can be restored in PULSE at a later stage. For displaying the measurements, PULSE has a large variety of different functions such as 3D waterfall display and contour display (Fig. 10). For documenting the measurements PULSE supports the use of either dynamic or static links to Word or Excel® displays.

Additional software that enhances the analysis capability of PULSE and that could be useful during the development of new electroacoustic devices are:

- Type 7797 Basic Electroacoustics for component testing. For more information see the separate Product Data BP 2085
- Type 7701 Data Recorder or Type 7705 Time Capture for recording of acoustical or electrical signals – recordings that can be exported from PULSE as wave files and then be loaded into the generator and replayed

Fig. 9
PULSE software showing task-oriented user interface

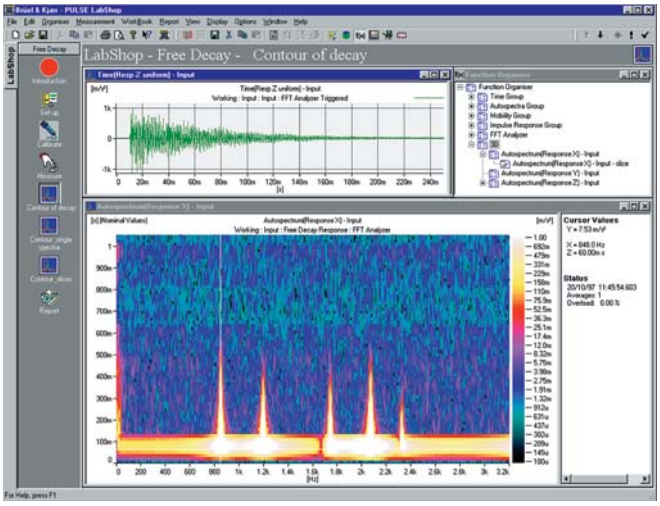
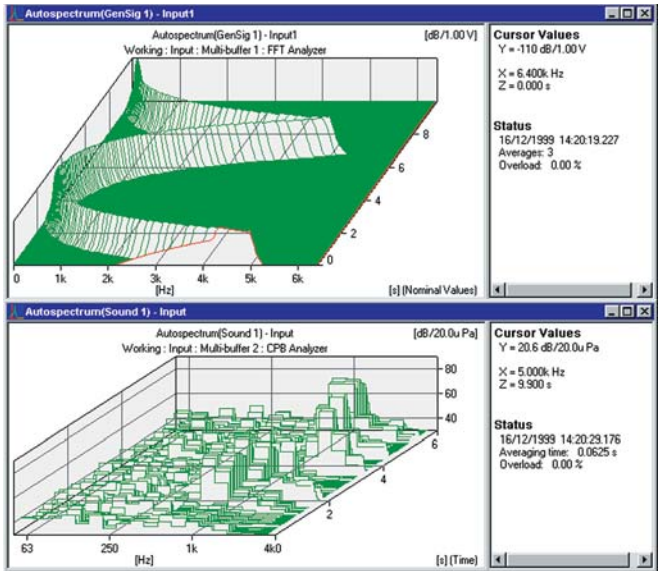


Fig. 10
Waterfalls showing FFT and 1/3-octave acoustic response from multi-analysis using FFT and Real-time Digital Filter (CPB) analyzers



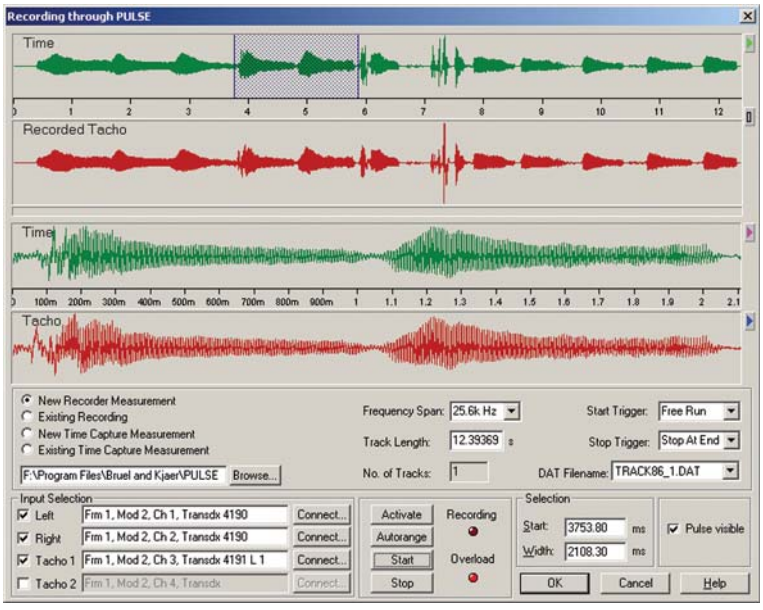
For more information on PULSE software and hardware please refer to System Data Sheets BU 0229 (PULSE Software) and BU 0228 (PULSE Hardware).

Using Sound Quality for Product Sound Evaluation

Using the Brüel & Kjær Sound Quality solution during the development of specific electroacoustic components enables useful sound quality parameters such as loudness, sharpness, fluctuation strength, roughness and related parameters to be determined.

The main features of the sound quality software allow recording, editing and replay of sounds using binaural techniques. It also supports Subjective Listening Tests or jury testing such as Semantic Differential and Paired Comparison. The actual way in which the tests are set up and presented to the person listening can be designed using the Sound Quality software.

Fig. 11
Recording with PULSE



Besides the subjective test, the Sound Quality software also supports a wide range of Objective measurements. Objective measurements using Zwicker Loudness analysis allows the calculation of metrics for both stationary and non-stationary sounds revealing:

- Total Loudness vs. Time
- Specific Loudness
- Instantaneous Loudness vs. Time
- Statistical Instantaneous Loudness
- Sharpness vs. Time
- Specific Roughness
- Specific Fluctuation Strength

The Sound Quality Software available for PULSE are:

- PULSE Sound Quality Software Type 7698
- BZ-5265 Zwicker Loudness Option for Type 7698
- BZ-5301 Psychoacoustic Test Bench Option for Type 7698

For more information on PULSE Sound Quality software and hardware please refer to the Product Data for PULSE Sound Quality Software (BP 1589).

Handset Testing of GSM and UMTS Mobile Phones

The table below shows which test cases from the three GSM testing standards – GSM 03.50 EN 300 903, GSM 11.10 3GPP TS 51.010, and 3GPP TS 26.132 (narrow band or wideband) – are supported by Type 6712. The numbers stated in the table refer to the sections in the relevant standard. N/A means that, although the test case is not required by the specific standard, it is still supported in the software.

	BZ-5137-017	BZ-5137-027	BZ-5137-021	BZ-5137-039
Test Case Title	**GSM 03.50 EN 300 903**	**GSM 11.10 3GPP TS 51.010**	**3GPP TS 26.132 Narrow-band Requirements**	**3GPP TS 26.132 Wideband Requirements**
Sending Response	3.8.1.1	30.1	7.4.1	7.4.1
SLR	3.1.1	30.2	7.2.2.1	7.2.2.1
Sending Distortion	3.9.1	30.7.1	7.8.1	7.8.1
Sending Gain Variation of Input	3.9.1	N/A	N/A	N/A
Discrimination on Out-of-band Signals	3.11.1.1	30.9.1	N/A	N/A
Sending Noise	3.6.1	30.10.1	7.3.1	7.3.1
Receiving Response	3.8.1.2	30.3	7.4.2	7.4.2
RLR	3.1.1	30.4	7.2.2.2	7.2.2.2
Receiving Distortion	3.9.2	30.7.2	7.8.2	7.8.2
Receiving Gain Variation of Input	3.9.2	N/A	N/A	N/A
Spurious Out-of-band Signals	3.11.2.1	30.9.2	N/A	N/A
Receiving Noise	3.6.2	30.10.2	7.3.2	7.3.2
Talker Sidetone (STMR)	3.10.1	30.5.1	7.5.1	7.5.1
Sidetone Distortion	3.10.2	30.8	N/A	N/A
Listener Sidetone (LSTR)	3.10.1	30.5.2	N/A	N/A
Ambient Noise Rejection SFDelSm	3.14	30.11	7.9	7.9
Acoustic Echo Loss	3.4.3.2	30.6.1	7.7.3	7.7.3
Stability Loss	3.2	30.6.2	7.6	7.6

For specific information on software licenses and hardware configurations please see the ordering information.

Handset Testing of Dual Mode AMPS and CDMA Mobile Phones

The table below shows which test cases from the EIA/IS–19–B (Rev. 1.0, November 1994) and CTIA Test Plan (Rev. 1.2, July 1998) as well as the 3GPP2 CS 0056-0 (version 1, July 2005) that are supported by Type 6712. The numbers stated in the table refer to the sections in the relevant standard. References to EIA/IS–19–B ST04 begin with P, whereas references to the CTIA Test Plan begin with 7. N/A means that, although the test case is not required by the specific standard, it is still supported in the software.

	BZ-5137-025	BZ-5137-025	BZ-5137-037
Test Case Title	**CTIA Test Plan AMPS mode**	**CTIA Test Plan CDMA mode**	**3GPP2 CS 0056-0**
Sending Response	P.3.3.2.5	7.3.7	2.2.1.2
SLR	P.3.3.2.5	7.3.8	2.2.2.2
Sending Distortion	N/A	N/A	N/A
Sending Gain Variation of Input	N/A	N/A	N/A
Discrimination on Out-of-band Signals	N/A	N/A	N/A
Sending Noise	N/A	N/A	N/A
Receiving Response	P.2.2.2.6	7.3.4	2.1.1.2
RLR	P.2.2.2.6	7.3.3	2.1.2.2
Receiving Distortion	N/A	N/A	N/A
Receiving Gain Variation of Input	N/A	N/A	N/A
Spurious Out-of-band Signals	N/A	N/A	N/A
Receiving Noise	N/A	N/A	N/A
Talker Sidetone (STMR)	N/A	N/A	N/A
Sidetone Distortion	N/A	N/A	N/A
Acoustic Echo Loss	N/A	N/A	2.2.3.2
Stability Loss	N/A	N/A	N/A
Loudness Contrast	7.3.9	7.3.9	2.3.2
Ear Protection (Acoustic Shock)	P.7.3	7.3.10	N/A
Ear Protection from Alerting Signal	P.7.3	7.3.11	N/A
Alerting Loudness	P. Alerting	7.3.11	N/A

For specific information on software licenses and hardware configurations please see the ordering information.

Testing of Mobile Phones with Handsfree Capabilities

The table below shows the test cases from ITU-T Recommendation P.342 that are supported by Type 6712 and are available in BZ-5137-023.

Test Title	Ref.	Test
SLR	4.1	A.3.2.1
Sending Response	4.2	A.3.1.1
Sending Noise	4.3	A.3.7
Sending Distortion	4.4	A.3.5.1
Sending Out-of-band	4.5	A.3.6.1
RLR max RVC	5.1	A.3.2.2
RLR min RVC	5.1	A.3.2.2
Receiving Response	5.2	A.3.1.2
Receiving Noise	5.3	A.3.7.2
Receiving Distortion	5.4	A.3.5.2
Receiving Out-of-band	5.5	A.3.6.2
TCL	6.1	A.3.3
TCLw	6.1	A.3.3
Stability loss	6.2	A.3.4

For specific information on software licenses and hardware configurations please see the ordering information.

Voice performance testing of Headset used in connection with Mobile Phones

The table below shows the test cases that are supported by Type 6712 when using BZ-5137-041. The test procedure applied for the testing are based on 3GPP TS 26.132, EN 300 903 and ITU-T Rec. 360 test specification. Please note that Nominal RVC setting is assumed for the headset, if not otherwise stated.

A proper test setup requires that the mobile phone is connected to an air interface and the headset is connected directly to the mobile phone – either by wire or by a RF link typically Bluetooth. Testing of Bluetooth Headset (mono) can also be performed using a dedicated Bluetooth Air Interface or similar, provided that the proper gain factors can be supplied.

Test Title	Test Reference	Requirement reference
Sending Characteristics	TS 26.132 7.4.1	TS 26.131 5.4.1
Sending Loudness Rating	TS 26.132 7.2.2.1	TS 26.131 5.2.2
Sending Characteristics, Max RVC	TS 26.132 7.4.1	TS 26.131 5.4.1
Sending Loudness Rating, Max RVC	TS 26.132 7.2.2.1	TS 26.131 5.2.2
Sending Noise	TS 26.132 7.3.1	TS 26.131 5.3.1
Sending Distortion – THD	TS 26.132 7.8.1	TS 26.131 5.8.1
Sending Gain Variation	EN 300 903, C.5.1	EN 300 903, 3.9.1
Discrimination against out of band input signals	EN 300 903, C.8.1	EN 300 903, 3.11.1.1
Receiving Characteristics	TS 26.132 7.4.2	TS 26.131 5.4.2
Receiving Loudness Rating	TS 26.132 7.2.2.2	TS 26.131 5.2.2
Receiving Characteristics, Max RVC	TS 26.132 7.4.2	TS 26.131 5.4.2
Receiving Loudness Rating, Max RVC	TS 26.132 7.2.2.2	TS 26.131 5.2.2
Receiving Loudness Rating, Min RVC	TS 26.132 7.2.2.2	TS 26.131 5.2.2
Receiving Noise	TS 26.132 7.3.2	TS 26.131 5.3.2
Receiving Distortion – THD	TS 26.132 7.8.2	TS 26.131 5.8.2
Receiving Distortion – S/N Ratio	TS 26.132 7.8.2	TS 26.131 5.8.2
Receiving Gain Variation	EN 300 903, C.5.2	EN 300 903, 3.9.1

Volume Control Receive Range	TS 26.132 7.2.2.2	TS 26.131 5.2.2
Volume Control Nom-Min Range	TS 26.132 7.2.2.2	TS 26.131 5.2.2
Ear Protection - Acoustic Shock	ITU-T Rec. P360	ITU-T Rec. P360
Spurious out of band signals	EN 300 903, C.8.3	EN 300 903, 3.11.2.1
Sidetone Masking Rating	TS 26.132 7.5.1	TS 26.131 5.5.1
Sidetone Distortion	EN 300 903, C.7	EN 300 903, 3.10.2
Stability Loss	TS 26.132 7.6	TS 26.131 5.6
Return Loss	TS 51.010-1, 30.17.2.4	TS 51.010-1, 30.17.2.5
Acoustic Echo Loss	TS 26.132 7.7.3	TS 26.131 5.7.4

For specific information on software licenses and hardware configurations please see the ordering information.

Ordering Information

STANDARD SYSTEM CONFIGURATIONS USING TEST HEAD
Type 6712-A-S01 System for Testing using Test Head
for measurements on handsets

STANDARD SYSTEM CONFIGURATIONS USING HATS
Type 6712-A-S02 System for Testing using HATS
for measurements on handsets, headsets and hands-free

STANDARD SYSTEM CONFIGURATIONS USING TEST RIG
Type 6712-A-S03 System for Testing using Test Rig

The following items are included in all standard system configurations:

Type 3560-C	Portable PULSE Acquisition Front-end
Type 2827-C	Power Supply
Type 7536	Controller Module
Type 3109	Generator, 4/2-ch. Input/Output Module
Type 7700-N2	Noise & Vibration Analysis, 2-channel Licence
M1-7700	Maintenance and Upgrade Agreement for Type 7700
Type 2716-C	Power Amplifier
Type 4231	Sound Level Calibrator
BZ-5137	Telephone Test Software
AO-0389	BNC-BNC cable 0.1 m

Items included in Standard System Configuration using Test Head
Type 4602-B, Type 4227
Items included in Standard System Configuration using HATS
Type 4128-D, Type 4938-A-011, DP-0775
Items included in Standard System Configuration using Test Rig
Type 4602-B, Type 4227
Accessories for Stability, LSTR and ANR measurements

REQUIRED ACCESSORIES FOR STANDARD CONFIGURATION USING TEST HEAD OR TEST RIG
Selection of Type 1 Ear Simulator or Type 3.2 Ear Simulator is required for standard system configurations 6712-A-S01 and 6712-A-S03

Type 4185	Ear Simulator for Telephonometry
or	
Type 4195	Wideband Ear Simulator
Type 4191	½″ Free-field Microphone

OPTIONAL ACCESSORIES FOR STANDARD CONFIGURATIONS

UL-0208-GB	Microsoft® Office
7202-B-GB	Dell™ Optiplex GX280 Standard Desktop
UL-0217-GB	Monitor

Accessories for Remote Control of Air Interface and Turntable

WQ-1270	IEEE–488 Interface Card – PCI-GPIB
WQ-1290	IEEE–488 Interface Card – PCMCIA
WQ-2464	IEEE–488 Interface Card – USB
AO-0265	IEEE–488 Cable (2m)
WL-1368	Antenna Cable-BNC to open-end
AO-0530	Air Interface Cable for R&S CMD-55 codec
WL-3162	Air Interface Cable for R&S CMU-200 codec (GSM)
WL-3162-A	Air Interface Cable for R&S CMU-200 codec (CDMA)
2 × AO-0087	Air Interface Cable for HP-8922 codec

The accessories for Remote Control of Air Interface are available for all standard system configurations. Please note that Type 6712 supports Remote Control of Air Interface HP-8922, CMD-55 and CMU-200

Accessories for Stability, LSTR and ANR Measurements

2 × Type 4227	Mouth Simulator
3 × AO-0447	2 × Banana to 2 × Banana (15 m)
Type 9640	Turntable System
AO-0446	IEEE–488 Cable (1 m)
EA-8002	Test Rig for Stability, LSTR and ANR
2 × AO-0415	Microphone Extension Cable (10 m)
BZ-5137-029	Software for LSTR and ANR measurements
WB-3469	Signal Router for LSTR and ANR

The accessories for Stability, LSTR and ANR measurements are available for standard system configuration: 6712-A-S01

Accessories for Alerting Module or Ringer Measurements

UA-0801	Lightweight Tripod
UA-1317	Microphone Preamplifier Holder

The accessories for Alerting Module or Ringer measurements are available for standard system configuration: 6712-A-S01

Optional licenses for standards that allow testing according to specific standards

BZ-5137-017	EN 300 903 (GSM 03.50) for GSM phones
BZ-5137-021	3GPP TS 26.132 for GSM and UMTS phones
BZ-5137-023	Hands-free based on ITU-T Rec. P.342
BZ-5137-025	CTIA test plan for dual mode AMPS/CDMA phones
BZ-5137-027	3GPP TS. 51.010 (GSM 11.10) for GSM phones
BZ-5137-029	LSTR and ANR based on GSM and 3GPP specifications
BZ-5137-037	3GPP2 CS 0056-0 for AMPS and CDMA phones
BZ-5137-039	3GPP TS 26.132 for wideband GSM and UMTS phones
BZ-5137-041	Headset Testing – Generic Requirements

Optional PULSE licenses that add analysis capability to PULSE

Type 7797	Basic Electroacoustics
Type 7701	Data Recorder
Type 7705	Time Capture
Type 7698	Sound Quality Software
BZ-5265	Zwicker Loudness option for Type 7698
BZ-5301	Psychoacoustic Test Bench option for Type 7698

Service and Support Products

2716-TCF	Conformance Test with of Type 2716-C with Certificate
3560-SI1	Installation and Configuration (at Brüel & Kjær)
3560-C-CAF	Portable PULSE Accredited Calibration
3560-C-CAI	Portable PULSE Accredited Initial Calibration
3560-C-EW1	3560-C Extended Warranty, one year extension
3560-C-TCF	Conformance Test of 3560-C with Certificate and Measured Values
3560-HL1	3560 Software and Hardware Support. One year of Helpline Support
4128-CFF	Head and Torso Simulator Type 4128-C (Factory Standard Calibration)
4138-CAI	1/8″ Pressure-field Microphone, 6 Hz to 140 kHz, 200 V Polarization, Initial Open Circ. Sens. Cal. (DANAK) plus Factory Calibration
4185-CAI	Ear simulator for Telephonometry, Accredited Initial Calibration
4191-CAI	1/2″ condenser microphone 200 V pol., free-field, 3 Hz to 40 kHz Falcon, Initial Open Circ. Sens. Cal. (DANAK) plus Factory Calibration
4195-CFF	Wideband Ear Simulator for Telephonometry, Factory Standard Calibration
4227-CAI	Mouth Simulator, Accredited Initial Calibration for 4227
4231-CAI	Sound Level Calibrator, 1 kHz, 94 dB and 114 dB, class 1 BS 7189, Accredited Initial Calibration
4602-CVN	Conformance Test with Measurements Report
4938-CAI	Falcon 1/4″ Condenser Microphone 200 V pol., pressure-field, 4 Hz to 70 kHz, Accredited Initial Calibration

SOFTWARE MAINTENANCE AND SUPPORT AGREEMENTS

M1-5137-017	Software Maintenance and Support Agreement for Type 6712 Software for EN 300 903
M1-5137-021	Software Maintenance and Support Agreement for Type 6712 Software for TS 26.132
M1-5137-023	Software Maintenance and Support Agreement for Type 6712 software for ITU-T Rec. P.342
M1-5137-025	Software Maintenance and Support Agreement for Type 6712 software for CTIA test plan
M1-5137-027	Software Maintenance and Support Agreement for Type 6712 software for TS 51.010
M1-5137-029	Software Maintenance and Support Agreement for Type 6712 software for LSTR and ANR
M1-5137-037	Software Maintenance and Support Agreement for Type 6712 Software for 3GPP2 CS 0056-0
M1-5137-039	Software Maintenance and Support Agreement for Type 6712 Software for 3GPP TS 26.132 Wideband
M1-5137-041	Software Maintenance and Support Agreement for Type 6712 Software for Headset Testing – Generic Requirements

PULSE SOFTWARE UPDATE OF EXPIRED AGREEMENTS

M3-5137-XXX	Update of Expired Agreement M1-5137-XXX

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