PRODUCT DATA

DECT Voice Conformance Test System — Type 6710

Type 6710 provides a complete voice conformance test solution for DECT telephones.

The tests are implemented according to the TBR10 standard. An integrated DECT Air Interface (RePP/ReFP) and Reference Codec allow testing of individual portable parts (handsets) as well as fixed parts for DECT.

In fixed part measurements all the intermediate results are given. This gives essential information throughout the fixed part development process.

DECT Voice Conformance Test System Type 6710 is a powerful tool you can use in the entire development process of DECT telephones.

6710

Brüel & Kjær

Features

- ❍ Pre-programmed tests run individually or as a complete sequence with minimum operator interaction
- ❍ Adaptive test methods for sine excitation ensure highly accurate results - even in noisy environments
- ❍ Real-time filters (IEC 225) and sound level measurements (IEC 651) for noise and speech signal analyses
- ❍ Digital equalization of mouth simulator and diffuse field
- ❍ Digital equalization of system audio paths in the range 100 Hz to 4 kHz
- ❍ Automatic test report generation
- ❍ Several system configurations covering full TBR10 test or parts only

Introduction

DECT Voice Conformance Test System Type 6710 is a comprehensive system for testing the acoustical transmission performance of DECT (Digital Enhanced Cordless Telecommunication) portable parts, and DECT fixed parts. The fixed part testing supports two-wire access, i.e. access to a PSTN (analogue network).

The DECT test system is based on measuring instruments that are software controlled, allowing measurements to be made consistently and with a minimum of operator interaction. Test cases delivered with the system allow individual TBR10 tests to be run as well as selected relevant subtest groups or a complete suite of all tests. Higher level users may, however, use the instruments and software interactively to develop their own tests for parameters not covered by the standard test cases. This makes it easy to perform tests for research and development purposes.

DECT Standards

In addition to TBR10, Type 6710 can be upgraded to support major European national PSTN voice standards, including telephone voice tests as well as selected access tests.

DECT equipment may be approved as integrated systems consisting of one or more portable parts (PP) associated with a fixed part (FP). Alternatively, individual PPs and FPs may be approved.

DECT systems and FPs for PSTN access are subject to approval based on national legislation in addition to CTR6 and TBR10. For most countries this implies a requirement for conformance to the regular national PSTN access and telephone standards.

Type 6710 is based on the draft revised TBR10 (January 1997). Where the TBR10 requirements or test specifications are ambiguous or insufficiently specified, tests will be implemented according to Brüel & Kjær's interpretation based on consultation with relevant standards bodies, notified bodies, and other technical and legal authorities.

System Configuration

The system can be ordered and configured as a Full, Reduced or Basic system, (see Specifications and Ordering Information for further details).

- The Full Type 6710 Test System is shown in Fig. 2. All the test cases, described in this document, can be run on the full system.
- The Reduced System does not contain the test rig or turntable system. Therefore the Listener Sidetone test, TBR10 ref 7.12 LSTR, cannot be run.
- The Basic System is intended for testing PPs only, excluding the LSTR measurement.

Fixed Part Measurements

An important feature of the test system is that the fixed part measurements are implemented so that all the intermediate results are given. This gives essential information throughout the FP development process. This is essential in the design of the echo canceller and the echo suppressor, TBR10 requirement 1 and 2.

Requirement 1

Measurement of echo which is due to mismatch of the telephone line, connected to the FP.

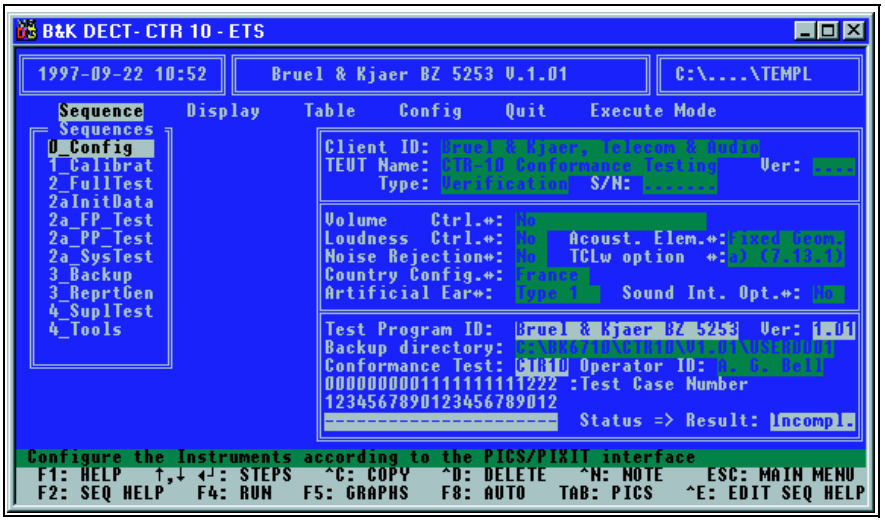
Requirement 2

Measurement of the difference in the strength of the echo with disabled and enabled echo suppressor. The measurements are done through the audio delay line in the test system.

User Interface

Type 6710 application software can be started from either MS-DOS 5.x or above or MS-Windows 3.1, 3.11 or Windows 95.

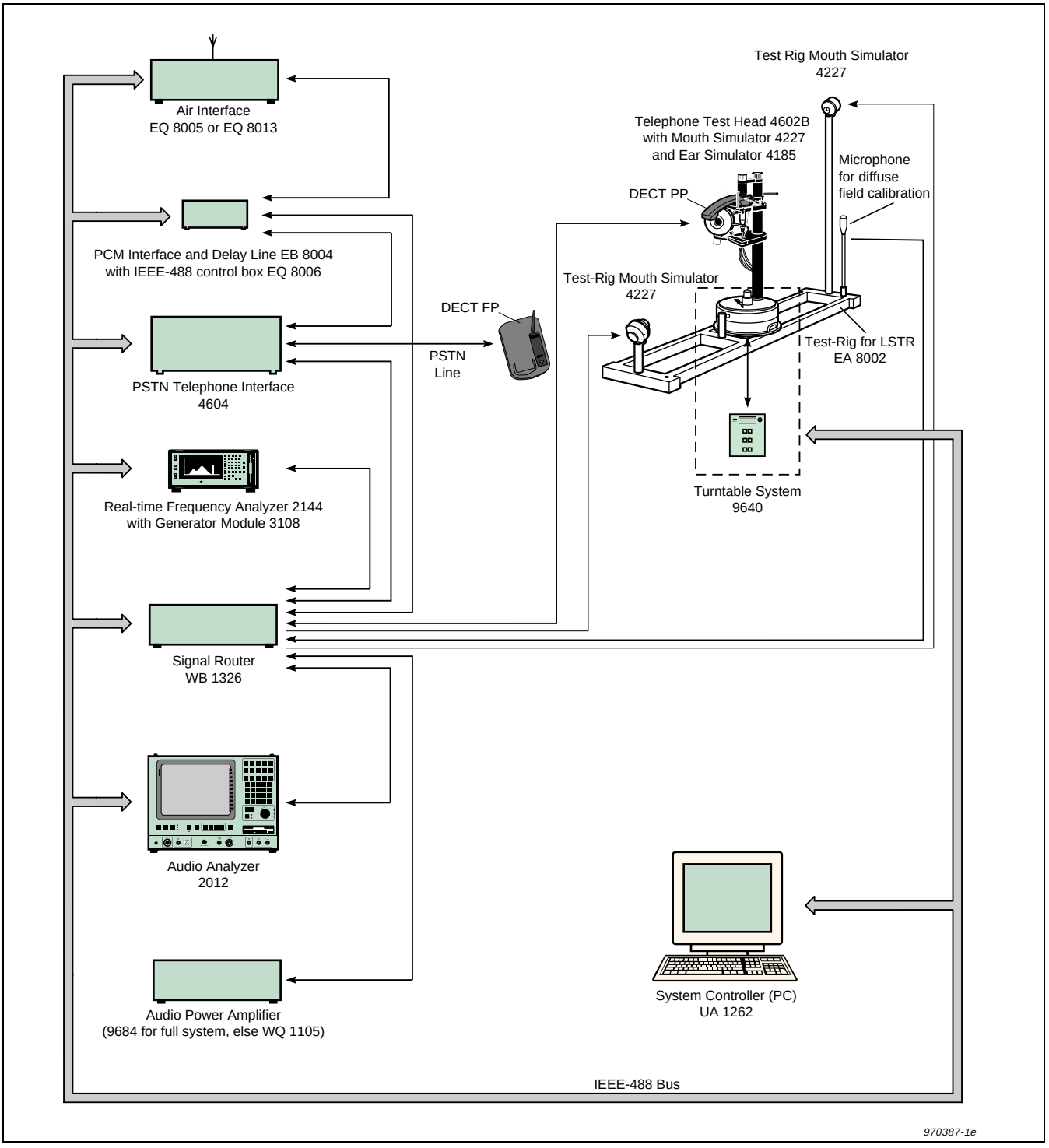
Fig. 1 Type 6710 user interface after the Sequence menu has been chosen



(continued on page 6)

System Interconnection

Fig. 2 Type 6710 system components and their interconnections. The Hewlett Packard HP8923 Air Interface can be used as well as Rohde & Schwarz CMD60/65. A description of the most important components is given on page 5



System Components

Audio Analyzer Type 2012

The heart of the system is Audio Analyzer Type 2012 which is used for all tests where a pure tone is used as the excitation signal. The analyzer incorporates an adaptive sweep algorithm to ensure highly accurate results even in noisy environments.

Test Rig EA 8002

The test rig allows the PPs under test to be accurately positioned as required for the various specific TBR10 tests and national tests with the exception of the terminal coupling loss and stability measurements. For these measurements, some of the standards require the PP to be suspended in free air or to be placed on a table or in a corner.

Turntable System Type 9640

The LSTR test uses two independent noise sources and an automatic rotation of the PP to minimize the influence from standing waves determined by the room dimensions and surface absorption.

Reference Codec and audio delay line EB 8004

The system uses a physical codec which is software compensated for any non-ideal response characteristics, and complies with any other requirements necessary for accurate TBR10 measurement results. The reference codec is necessary because the audio paths in the air interface's codec are band limited by high-order filters and therefore cannot be equalised.

The conversion principle in the 14-bit reference codec is direct linear PCM (ITU Rec. G.726) to analogue conversion and vice versa. The frequency responses between the 14-bit PCM access point and the audio analyzer and generator are 'ideal' (i.e. equalised by software during calibration).

The audio delay line included in EB 8004 is used to test the echo suppressor in the fixed part.

Optional Air Interfaces EQ 8005 and EQ 8013

The air interface is necessary in order to test the portable and the fixed part individually. The interface is the link between the antenna of the telephone (PP or FP) and the 14-bit PCM access point.

Note that in order to activate the audio paths in a DECT PP or FP it is necessary to know the test mode setup procedure for the particular telephone. This must be determined by the user.

For further information about the air interfaces, please see Ordering Information and note the necessary hardware modifications/options for the air interfaces.

Generator Module Type 3108

A Dual Channel Generator Module Type 3108 is incorporated in the DECT test system. It generates the pink noise excitation signals during the listener sidetone measurement for the portable part, and the P.50 noise excitation signals during the echo control measurements in the fixed part tests. The generator module is inserted in the Real-time Frequency Analyzer Type 2144.

Telephone Test Head Type 4602B

Telephone Test Head Type 4602B is an integral part of the DECT test system. This test head is especially suitable for correct placement of mobile handsets since it accommodates small handsets, handsets with antenna and non-symmetrical handsets. The Test Head incorporates Mouth Simulator Type 4227 and Ear Simulator Type 4185.

During normal use only the Parameter Selection Interface (PSI) and the Sequence menus are used. In the PSI, information about the telephone can be entered together with test and telephone parameters. All information in the PSI (see Fig. 1) is automatically transferred to the test report.

Sequence Menu

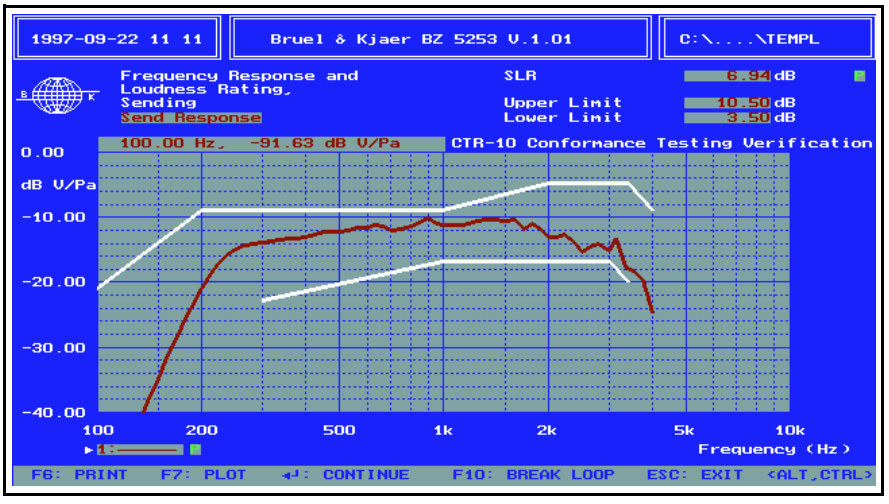
In the Sequence menu (see Fig. 1), the automated test sequences, all controlled by the PC, are shown. The instrument selections/ configurations, for example selection of air interface type, are done in the `Config` sequence.

By running the full test sequence, all test cases are done with minimum interaction by the operator. Alternatively, each test case can be run separately. In the Tools menu, any miscellaneous function to be run as separate sequences are given. This gives the possibility of, for example, testing of the test system, saving the air interface setup, running a sealed check of the artificial ear and measuring the background noise.

On-screen help is available for both the 6710 application and the user interface in general.

During a test case run, the measurement graph and calculated results are displayed on the screen with the limits given in TBR10 (see Fig. 3). A 'failed' indication is shown, if the limits are exceeded.

Fig. 3 Sample graph showing the send response and the calculated SLR



Test Report

When a telephone test has been completed, the results can be documented in pre-defined report formats. The test report is created in WordPerfect and can be imported into MS Word. This gives the user the possibility of customising the page layout before printing. Apart from measurement graphs and tables, the report includes a description of the test conditions and information entered in the PSI of the user interface (see Fig. 1).

Test Case Specifications Type 6710

•		Can be run on the Full Type 6710 System (i.e. full PP and FP test system)			
	•	Can be run on the Reduced Type 6710 System (i.e. PP and FP test system without 'listener side tone', LSTR)			
		• Can be run on the Basic Type 6710 System (i.e. Only PP without 'listener side tone', LSTR)			
	Sequence Number	TBR 10 ref.	Test Title	Test Method (analyzer mode)	Comments
• • •	_02	7.7	Sending Frequency Response	Stepped Sine ISO-R40 (Type 2012 SSR)	Minimum[a]
• • •	_03	7.8	Receiving Frequency Response	Stepped Sine ISO-R40 (Type 2012 SSR)	Maximum*
• • •	_02/03	7.9	Sending and Receiving Loudness Ratings	Stepped Sine ISO-R10 (Type 2012 SSR)	Only if "Receive Volume Control" or "Joint Acting Volume Control" is not implemented
• • •	_03V	7.10	Receiving Frequency Response	Stepped Sine ISO-R10 (Type 2012 SSR)	Only if "Receive Volume Control" or "Joint Acting Volume Control" is implemented
• • •	_04/04V	7.11	Talker Sidetone STMR	Stepped Sine ISO-R10 (Type 2012 SSR)	Nominal*
•	_05/05V	7.12	Listener Sidetone Rating	Noise - 1/3 Oct. Filters (Type 2144 / Type 3108)	Nominal* . Limit depends on declaration of "Ambient Noise Rejection" capability
• • •	_06/06V	7.13	Terminal Coupling Loss	Stepped Sine ISO-R40 (Type 2012 SSR)	Nominal, Maximum, and Minimum*. Limit depends on the declaration of "Full TCLw" capability. PP suspended in free air
• • •	_07	7.15	Stability Loss - Fixed Geometry	Stepped Sine ISO-R40 (Type 2012 SSR)	Maximum and Minimum*. Only if "Variable Geometry" is not implemented. PP placed in acoustic corner
• • •	_07	7.16	Stability Loss - Variable Geometry	Stepped Sine ISO-R40 (Type 2012 SSR)	Maximum and Minimum*. Only if "Variable Geometry" is implemented. PP placed in acoustic corner
• • •	_08	7.17	Sending Distortion	Sine - FFT (Type 2012 FFT)	Minimum*.
• • •	_09	7.18	Receiving Distortion	Sine - FFT (Type 2012 FFT)	Maximum*.
• • •	_10	7.19	Sidetone Distortion	Stepped Sine ISO-R10 (Type 2012 SSR)	Maximum and Minimum*.
• • •	_11	7.20	Out of band - Sending	Sine - FFT (Type 2012 FFT)	Minimum*.
• • •	_12	7.21	Out of band - Receiving	Sine - FFT (Type 2012 FFT)	Maximum*.
• • •	_13	7.22	Sending Noise - Overall	FFT (Type 2012 FFT)	Minimum*.
• • •	_14	7.23	Sending Noise - Narrow Band	Calculated from the same meas. as 7.22	Minimum*.
• • •	_15	7.24	Receiving Noise	FFT (Type 2012 FFT)	Nominal*.
• • •	_15	7.25	Level of Sampling Freq.	FFT (Type 2012 FFT)	Maximum*.
• • •	_16	7.28	Delay	Stepped Sine, Δf=5Hz (Type 2012 SSR)	Maximum*.
• • •	_17	7.31	Variation of Gain with input level - Sending	Stepped Sine-Level (Type 2012 SSR)	Minimum*.
• • •	_18	7.32	Variation of Gain with input level - Receiving	Stepped Sine-Level (Type 2012 SSR)	Maximum*.
	—	—	**FP Tests**	—	**Actual Network Interface Codec Interface of RePP**
• •	_19	7.29	Delay	Stepped Sine, Δf=5Hz (Type 2012 SSR)	—
• •	_20	7.30	Echo Control at the Network Side, Req. 1	P.50 - 1/3 Oct. Filters (Type 2144 / Type 3108)	2-wire interface only
• •	_21	7.30	Echo Control at the Network Side, Req. 2	P.50 - 1/3 Oct. Filters (Type 2144 / Type 3108)	2-wire interface only
	—	—	**System Tests**	—	**Generic 4-wire FP Interface PP Acoustical Interface**
• •	_22	7.27	Delay (repl. 7.28/7.29)	Stepped Sine, Δf=5 Hz (Type 2012 SSR)	Maximum*. Tests to and from actual network interface

a.Volume control settings: Wherever referring to a volume control (receiving or joint acting) the following terminology is used:
Nominal setting: The setting where the RLR is closest to its nominal value
Minimum setting: The setting where the RLR has its maximum value
Maximum setting: The setting where the RLR has its minimum value

Specifications — Type 6710

Measurement uncertainty of input and output levels:
Better than required in TBR10 (sect. 5.3.4) when calibration scheme is followed
Calibration:
The built-in system calibration procedure must be run daily
Codec Implementation:
Direct linear PCM (ITU Rec. G.726) to analogue conversion
System frequency response:
Ideal (software compensated)

Noise level:
Typically less than -75 dBm0
Distortion:
Determined by the ADPCM encoding algorithm
Installation, documentation, and training:
2 days of installation and training is included with the system

Ordering Information

Type 6710 Voice Conformance Test System for DECT Telephones

Components included with Type 6710:

•		Included in the Full Type 6710 System
•		Included in the Reduced Type 6710 System
•		Included in the Basic Type 6710 System
• • •	Type 2012:	Audio Analyzer, Version 4
• •	Type 2144:	Dual Channel Real-time Frequency Analyzer
• •	Type 3108:	Generator Module for Type 2144
• • •	Type 2670:	Microphone Preamplifier (1/4")
• • •	Type 2669B:	Microphone Preamplifier (1/2")
• • •	Type 4135:	Microphone Cartridge (1/4")
• • •	Type 4191:	Microphone Cartridge (1/2")
• • •	Type 4185:	Ear Simulator for Telephonometry
•	3×Type 4227:	Mouth Simulator
• •	1×Type 4227:	Mouth Simulator
•	2×Type 4231:	Sound Level Calibrator
• •	1×Type 4231:	Sound Level Calibrator
• •	Type 4602B:	Telephone Test Head
• •	Type 4604:	Multinational Telephone Interface
•	Type 9684:	Audio Power Amplifier (dual channel)
• •	WQ 1105:	Audio Power Amplifier (single channel)
•	Type 9640:	Turntable System
•	EA 8002:	Test Rig for LSTR
• • •	EQ 8006:	IEEE Master Box for EB8004

•		Included in the Full Type 6710 System
•		Included in the Reduced Type 6710 System
•		Included in the Basic Type 6710 System
• • •	EB 8004:	Reference Codec Facility and Audio Delay Line for 6710
• • •	WB 1326:	Signal Router
• • •	EF 8001:	Instrumentation Rack
• • •	BZ5253:	Software for Type 6710
• • •	WT 9383:	Word Perfect for DOS
• • •	WQ 0625:	IEEE-488 Interface for PC-AT
• • •	UA 1262:	Test System Controller (PC)
• • •		Cables for 6710
• • •		Installation and Training
• • •	BE 1543	User Manual

All supporting literature and software delivered with the system will be in English

Optional Accessories

EQ 8005: Rohde & Schwarz CMD60/65 DECT Air Interface with option CMD-U1DK
EQ 8013: HP 8923 DECT Air Interface with option H06

Brüel & Kjær reserves the right to change specifications and accessories without notice

Compliance with Standards

CE

Those Brüel & Kjær components of the DECT Voice Testing System that are individually CE marked comply with standards as detailed in their respective product data sheets.

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