Product Data

Telephone Conformance Test System — Type 9655

USES:

- ❍ Conformance testing
- ❍ Certification
- ❍ Quality assurance
- ❍ Testing during development
- ❍ Acoustic tests on ISDN telephones

FEATURES:

- ❍ Software specifiable tests
- ❍ CTR8 tests pre-programmed
- ❍ Presentation report generated automatically
- ❍ Tests can be run individually or as a sequence
- ❍ System hardware prepared for hands-free and intelligent terminals
- ❍ Fully automated test rig
- ❍ Option to test analogue telephones
- ❍ Optional ringer-level determination without use of anechoic chamber

General

The Conformance Test System for ISDN Telephones Type 9655 is a complete test system for telephone terminals that are to be used on an ISDN network. The system is based on measuring instruments that can be software controlled, allowing measurements to be made consistently and with little operator intervention. Tests can be carried out from predefined sequences, allowing complex measurements to be made, for example those required by international standards. Included in the Type 9655 package are pre-defined tests for the NET33 and CTR8 European standards.

CTR8

CTR8 is a standard concerning the voice transmission aspects of the 3.1kHz basic rate access Integrated Services Digital Network (ISDN) telephony service. It has been developed by the European Telecommunication Standards Institute (ETSI) which has national European telecommunications authorities as well as many telecommunications corporations as its members.

With a few minor modifications, the Commission of the European Community has decided to adopt the requirements of ETS 300 085 for its Common Technical Regulation #8 (CTR8). This implies that a single certification referring to CTR8 will replace the present need for individual type approval in each of the member countries of the European Community.

The Telephone Conformance Test System can test telephone terminals to these standards and provide the required documentation for certification.

The CTR8 together with CTR3 (present NET3/CTR3 bridging measures) is the basis for the European approval of ISDN telephones.

System Configuration

The system consists of an instrumentation rack, a test rig and a test system controller (see Fig.1).

The instrumentation rack contains signal generators, signal analyzers, a signal router, power amplifiers and an ISDN telephone interface.

The test rig is a mechanical assembly which allows the telephone terminal under test to be accurately positioned as required for the various specific tests in CTR8. It includes a Telephone Test Head and a special diffuse field simulation facility.

The Test System Controller controls, via an IEEE–488 network, the generators, analyzers and test rig. The test system controller has been specially selected to run the system in a predictable and synchronous way, giving more confidence to the test results.

The test system controller also post-processes the results of the measurements to produce a graphical

display (see Fig.2). Subsequently, the results and displays are integrated into a wordprocessor document with text and graphics, giving a final report of the telephone terminal's performance.

The system is completely software driven, which allows straightforward test selection and helps reduce operator error. Higher level users may, however, use the instruments interactively to develop their own tests, or copy and modify the pre-programmed test sequences as desired. This makes it easy to perform diagnostic tests for research and development purposes, or to adapt the system to new requirements.

The system uses a physical codec which is software compensated for its non-ideal response characteristics. This approach makes it possible to extend the full measurement capacity of the system to analogue telephones by adding only the appropriate feeding bridge and line simulator circuitry.

Accurate and reliable measurement results are ensured by the autocalibration procedures included in the system. To further enhance the operation of the system, a voice level verification microphone is also included. This allows the drift of the Mouth Simulator Type 4227, the most variable element in the system, to be frequently monitored during a complex test sequence.

The system also supports the use of the ITU-T Rec. P.57 Type 3.2 Ear, which can be used for some CTR8 test cases.

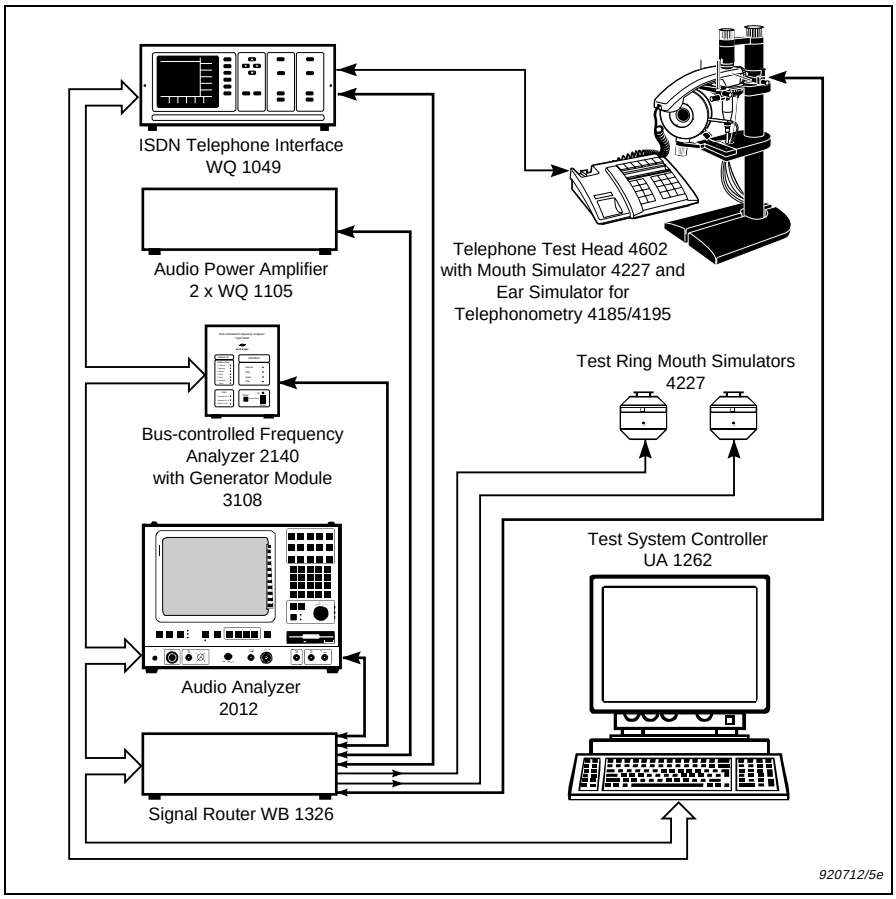

Fig.1 Type 9655 main system components and their interconnection, excluding the mechanical test rig

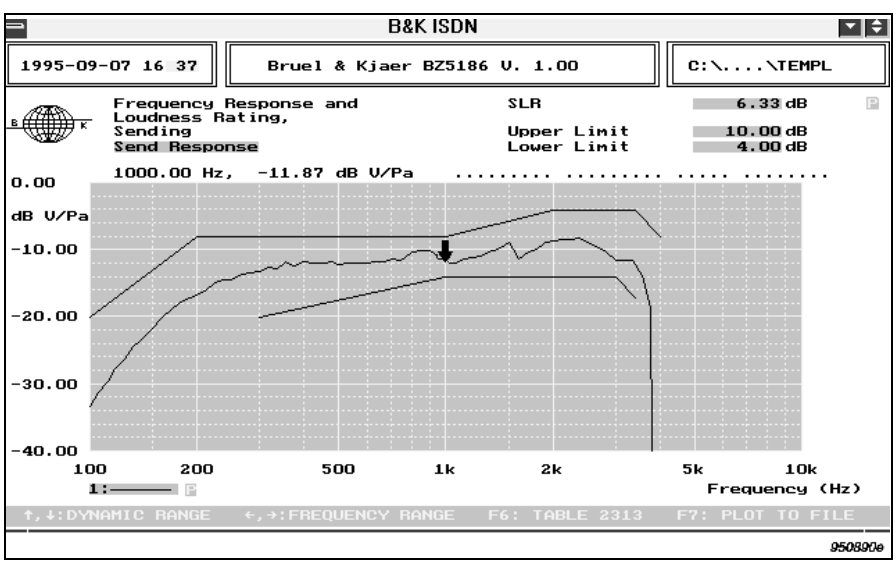

Fig.2 Example screen result of Sending sensitivity test (A.2.1.1) and Sending Loudness Rating (A.2.2.1)

CTR8 Tests

All tests in CTR8 are pre-programmed into the software and can be made on a complete system.

The diffuse field for the Listener Sidetone Test (A.2.3.2) is obtained using two independent sound sources and automatically rotating the test head around the Mouth Reference Point (MRP) on a mechanical turntable. The test rig ensures the repeated accuracy of listener sidetone and alerting module (i.e. the ringer) measurements.

Optional Performance

CTR8 specifies an anechoic environment for testing the alerting module. This facility is seldom available. In such cases measurements based on acoustic intensity can provide an accurate estimate of the average free-field sound pressure level. For this purpose an intensity measurement package is available.

Specific CTR8 Performance

The following CTR8 tests are fully implemented by the system. The tests are pre-programmed sequences of measurements. Sequences can also be user-defined to create new tests for other standards or future revisions

Test	Title
A.2.1.1	Sending sensitivity/frequency response
A.2.1.2	Receiving sensitivity/frequency response
A.2.2.1	Sending Loudness Rating (SLR)
A.2.2.2	Receiving Loudness Rating (RLR)
A.2.3.1	Talker sidetone
A.2.3.2	Listener sidetone
A.2.4.1	Weighted terminal coupling loss
A.2.4.2	Stability loss
A.2.5.1.1	Sending distortion (noise method)
A.2.5.1.2	Sending distortion (sine method)
A.2.5.2.1	Receiving distortion (noise method)
A.2.5.2.2	Receiving distortion (sine method)
A.2.5.3	Sidetone distortion
A.2.6.1	Variation of sending gain with input level
A.2.6.2	Variation of receiving gain with level
A.2.7.1	Discrimination against out-of-band input signal
A.2.7.2	Spurious out-of-band signals
A.2.8.1	Sending noise
A.2.8.2	Receiving noise
A.2.8.3	Level of sampling frequency (receiving)
A.2.9.1	Acoustic shock, continuous signal
A.2.10	Delay
A.3.1	Alerting module sound pressure level (including adjustment of loudness)

Specifications 9655

General Performance:

The system comprises individual measuring instruments and software packages which have the following general performance. For more detailed specifications please refer to the Product Data for the individual components. (A list of the individual components is contained in “Ordering Information” overleaf)

Generators:
- Precision single- and dual-tone sine generators
- Composite source signals for consecutive or simultaneous application of signals for conditioning and analysis (optional)
- Large signal memory allows the application of speech-like signals, for example CCITT Rec.P.50, Artificial Voices (Optional)

Analysis:
- Adaptive Narrow Band Filtering including selective Harmonic, Intermodulation and Difference Frequency Distortion
- TSR (Time Selective Response) for simulating anechoic response measurements in an ordinary room for accurate detection of signal energy delay
- Single-channel FFT for recording time signals and spectra
- Dual-channel real-time constant percentage bandwidth analysis
- Dual-channel FFT with cross functions for transfer function measurement (optional)

Block Arithmetic:
- Complex compensation for measurement transducers
- Calculation of complex functions, for example electrical impedance and return loss from a single voltage and current measurement

Curve Presentation:
- Time or frequency representation of complex data in terms of magnitude (linear and logarithmic), phase (real and imaginary parts), group delay (versus frequency), and instantaneous frequency (versus time)
- Third-octave from narrow band spectrum or response data
- Variation of a function, for example gain or distortion versus level, line length or any other independent variable

Parameter Calculation:
- Calculation of Loudness Rating (CCITT Rec.P.79, IEEE 269/661), as well as the Zwicker method (ISO 532B)
- Calculation of other overall spectral levels, for example A, B, C, D, Psophometric (CCITT Rec.O.41), or C-message (IEEE 743) weighted
- Automatic Pass/Fail evaluation based upon comparison with a tolerance mask. The mask can be aligned, fixed (the curve passes through a reference point), or floating (the mask is positioned optimally around the curve)
- Exact calculation of the spectral characteristics of Multi-Frequency Push Button (MFPB) signals and information tones derived from FFT spectra
- The temporal characteristics of MFPB signals and information tones can be extracted directly from the envelope of the time signal

Telephone Interface (WQ 1049):

Codec:
- Fulfils CCITT Rec.P.66 for the system as a whole:
- Frequency response: Fully compensated
- Other parameters: Better than CCITT Rec. G.714

Telephone Power Supply:
- Normal mode: 40V
- Restricted Mode: 40V (reversed polarity)

Call Control Functions:
- Layers 1 and 2 of the ISDN protocol are handled automatically by the telephone interface. Layer 3 is controlled by a user-programmable simulator program
- The simulator program contains all the CCITT-defined states. In each state the user can define what is to be sent when receiving different messages. It is possible to break the protocol to check the reaction from the terminal.
- The complete D-channel communication is stored in a buffer, which can be monitored in full or via versatile search and sort functions

Access Channel Selection:
- B1 or B2

Interface Options (not included):
- 2Mbit/s Primary Access Interface
- 1.5Mbit/s Primary Rate Access Interface
- ISDN U 2B1Q Interface (US subscriber line)

ISDN Protocol Options (not included):
A lager number of national protocols are available on request from GN Nettest (former GN Elmi). Below a number of the national protocols are listed

Australia	BA and PRI ISDN
France	VN 2 ISDN and VN 3 ISDN
Germany	1TR6: BA and PRI ISDN
Italy	Pilot project and CCITT Blue Book with Italian help text
Japan	INS–NET 64
Norway	ISDN
USA	ISDN AT&T, ISDN NT BA and ISDN NT PRI

It is possible for the user to create simulator programs (layer 3 control programs) for the individual protocols. Simulator programs can also be ordered from Brüel & Kjær as customised products

Power Supply Requirements:

Voltage: 100–120V or 200–240VAC (specify when ordering)
Frequency: 50–60Hz

Environmental:

Storage:
Temperature: –25°C to 70°C (–13°F to 158°F)
Humidity: 0 to 90%, non-condensing at 30%
Under Test Conditions:
Ambient temperature: 15°C to 35°C (59°F to 95°F)
Humidity: 25% – 75%
Air Pressure: 860–1060millibars

Dimensions:

Instrumentation rack:
Height: 1670mm
Width: 550mm
Depth: 600mm
Minimum Space required for test rig:
Height: 1.5m
Width: 2m
Depth: 2m

Ordering Information

Main System

Type 9655: Telephone Conformance Test System

includes the following components:

Type 2012:	Audio Analyzer with Type 7661 Special Calculation Software
KS 0027:	Rack mounting flanges for 2012
Type 2140:	Bus-controlled Frequency Analyzer
Type 3108:	Generator Module for Analyzers Type 2140, 2141, 2143 and 2144
WQ 1049:	ISDN Telephone Interface
WB 1326:	Signal Router for Type 9655
2×WQ 1105:	Audio Power Amplifier (dual channel)
Type 4602:	Telephone Test Head
WA 0699:	Test Rig for Telephonometry
3×Type 4227:	Mouth Simulator
Type 4185:	Ear Simulator for Telephonometry
Type 4195:	Wideband Ear Simulator for Telephonometry
2×Type 4231:	Microphone Calibrator
Type 2633:	Microphone Preamplifier
Type 4135:	Condenser Microphone Cartridge
Type 2669B:	Microphone Preamplifier
Type 4133:	Condenser Microphone Cartridge
Type 9640B:	Turntable System
UA 1262:	Test System Controller
WQ 0625:	IEEE–488 Interface for PC/AT
BZ 5186:	Conformance Test Software for ISDN Standard – CTR8 Standard
WQ 1116:	ISDN Telephone
WT 9383:	WordPerfect for DOS
EF 8001:	Rack
3×AO 0028:	Brüel&Kjær Mic. Preamp. Extension Cable 7-Core, double screen (10m)
WL 1102:	8-pin FCC 68 Digital Telephone Extension Cable (15m)
WL 0147:	10-32″ UNF to 10-32″ UNF Coaxial Cable (15m)
3×AO 0447:	2×Banana to 2×Banana Cable (15 m)

Additional cables for rackmounting

Intensity Probe Package for Type 9655

Type 9685	Sound Intensity Probe Package for Type 9655

Analogue Telephone Testing Package

The system can be expanded to include Conformance Test System for PSTN Telephones — Multinational Standards Type 6711

Option

WH 3036:	2 Mbit/s Primary Access Interface

Support and Delivery Information

The Type 9655 System is offered as a complete 'turnkey' solution for telephone conformance testing. The whole system is assembled and tested in Denmark before shipment. This testing includes a full performance test on a digital telephone, which is shipped with the system together with its test results.
The system is then dismantled and shipped in standard instrument packages. At site the system is re-assembled and checked by a Type 9655 accredited support engineer. Training of up to three persons for two days following the installation is included free of charge

Integration of existing equipment previously purchased by the customer is accepted by prior agreement only. Such equipment must be shipped to Denmark at the owner's expense. It will then be integrated into a system, where checking and shipment will be carried out as detailed before

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

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

Brüel & Kjær

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