

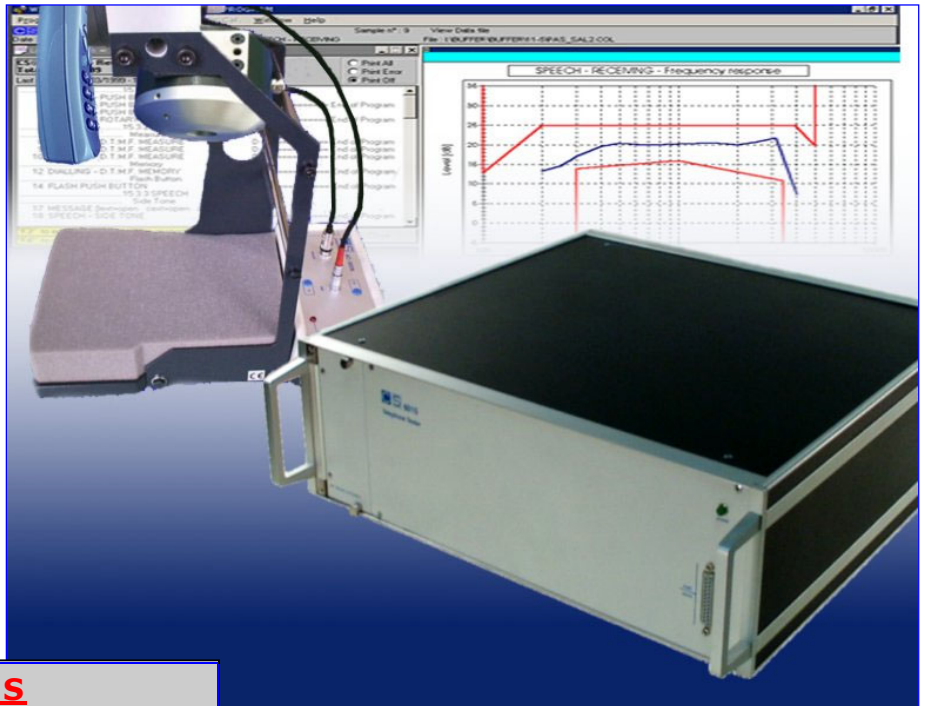
## CS6015 – Ultra low cost, full optional Telephone Test Equipment

This innovative Telephone Test Equipment increases the application fields from final factory testing, as already completely performed by our well-known **CS8014**, for Design, Quality Assurance and Approvals environments.

**CS6015** was designed to strictly meet the ETSI TBR21 and TBR38 Regulations.

It keeps the testing possibilities of the mother equipment **CS8014**, but presents further functions.

On a host PC will be installed the **WIN6015** Application able to drive **CS6015** unit, where are integrated ALL peripherals necessary for test families of Table 1).



### TEST FAMILIES

#### Transmission & Acoustic Measurements

(Using AC-3 or AC-4 Test Heads)

sensitivity:

- **Loudness Rating**
  - ITU P series
  - IEEE 269-661
  - BRITISH Std6317
  - AUSTRALIA
  - B&K 3356/57
  - DIN 44013
  - SR 784.103.12
  - For vocal messages evaluation.
- **OREM A**
- **OREM B**
- **OREM CH**
- **RMS level**

others:

- **Magnetic Field**
  - Hearing Aids - P37, using the HA device.
- **Reflection Factor**
  - High resolution method

#### Dial & Keypad Testing

- **Pulse & Flash key**
- **DTMF**

#### Calling Testing

- **Ringer Generation**
- **Sound level measurement** using PH-18 Sound Level meter

#### Insulation & DC measurements

- **Insulation** up to 250V<sub>dc</sub>
- **V/I characteristic** on-hook & off-hook
- **I/t transients** transients evaluation

#### Network tones

- **Network tones generator**
- **DTMF generator**

#### Caller identifier presentation

- **FSK-V23 generator** on-hook & off-hook
- **DTMF CLI generator**

#### SMS Short Messages Service

- **SM Submit & Delivery** (both ETSI Prot. 1 & 2 ).

**WIN6015** Application, installed on a PC under WINDOWS® operating System, was specially designed to conserve the same graphical interface of the already known **WIN8014** application.

Then the Operators, having familiarity with the above application, don't need further training to start to use **CS6015**.

Now, only one unit will be able to test the entire Standard requirements, but this device halves its price compared to the mother equipment **CS8014** and the needed options.

**CS6015** reduces its cost through a strong integration, by making "optional" only some not fundamental functions, and allowing totally to the host Personal Computer the System Control.

These simplifications have also reduced the circuitry of Test Equipment, then its cost. However, using external components, special requirements of National Country Specifications can be achieved anyway.

**CS6015** System is able to operate in conformity with different Standards or with different telecommunication terminals (as telephone sets, automatic answers, telefax, etc.) by an immediate uploading of the appropriate default program.

**CS Strumentazione Elettronica** supplies a set of libraries, by means of which the Engineer can easily build its own test program, without consulting the applied Standard.

Moreover, **CS Strumentazione Elettronica** offers a **Programming Service**.

TAB. 1)

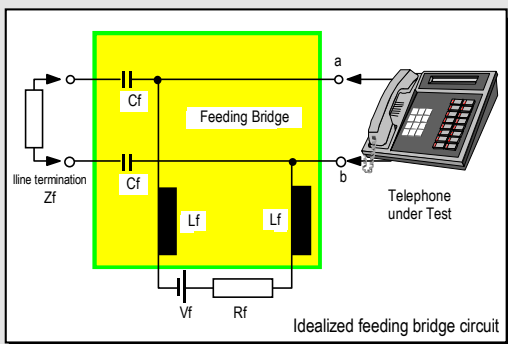
That means that, in case a Customer has some difficulty in order to develop its own test program, our Service can help it, until supplying a complete test program, provided the Customer have sent the telephone terminal basic information, by mail or fax. Samples are required for special telephone terminals only.

On demand, **CS6015** can be equipped with the option "Actuators", a series of relay's contacts, program controlled, useful for driving automated testing fixtures.



**Implemented Functions**

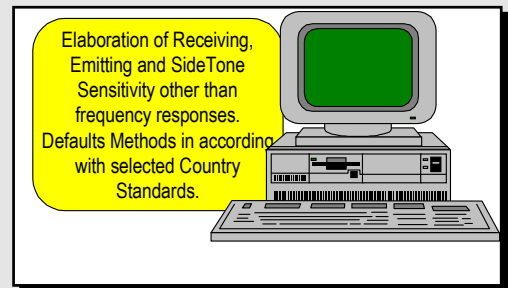
**Feeding Circuit (ETSI TBR-38)**



- Programmable Feeding Bridge:
  - ♣ Inductors equivalent to  $2 \times 5H$  or external, selectable by program;
  - ♣ Capacitors equivalent to  $2 \times 47\mu F$  or external, selectable by program;
  - ♣ Padding resistor  $R_f$  (current limiting) from 300 to 10,240 $\Omega$ ,
  - ♣ Battery voltage programmable from 0 to  $\pm 125V$ ;

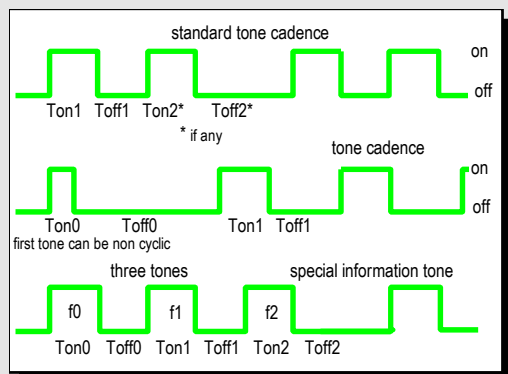
Feeding Bridge characteristics allows the feeding circuits configuration meeting ETSI rules for all the Countries, except United Kingdom and Ireland, which require external devices.
- Constant Current circuit: Programmable from 5 to 99 mA
- Exchange-side line termination:
  - Internal 600 $\Omega$ , or  $Z_a, Z_b, Z_c$  complex impedance or external dipole, program selectable.
- Artificial Line: External box with manual or automatic selectable line length.

**Transmission Measure Methods**



- Loudness Rating
    - CCITT P series
    - IEEE 269-661
    - BRITISH Std6317
    - AUSTRALIA
  - OREM A -B&K 3356/57
  - OREM B -DIN 44013
  - OREM CH -SR 784.103.12 *implemented meeting Swiss Rules*
  - Noise Generation: Useful for OGM and IGM tests on answering machines;
  - RMS level measures: with long time constant, to evaluate vocal or pre-recorded messages;
- This last measuring method allows the RMS level evaluation of the signal injected into the line, or on acoustic devices, by answering machines or similar devices using digitally recorded messages.

**Network Tones**



- Network Tone Generator:
  - ♣ Generates dial, ringing, busy congestion, calling in progress tones. Can be programmed others typical sequences. Selection between predefined tone kind;

It is now possible the network tones generation useful for the functional evaluation of the devices that react with it. The tone is generated during a particular subtest that doesn't modify the preceding feeding conditions.

  - ♣ tones sequences programmed with up to 6 single time elements;
  - ♣ Each active time element of the tone sequence is programmable in frequency (Hz) and level (dBm);

The operation can include bitonal or tritonal sequence (*special information tone*). Sensitivity of tone detector circuit can be also verified.
- DTMF Signal Generator:
  - ♣ Network Tone family includes generation of DTMF signals;

This function enlarges the test capability of **CS6015** tester to the devices, which receive the DTMF signals as remote controls or coded data.

**WHAT THE CHARACTERISTICS OF CS6015 SYSTEM OFFER**

**Speech-Transmission Measurements**

- *Receiving*
- *Sending*
- *Side tone*

Acoustical measurements are made meeting methods of the Standards listed on page 1.

• *Measuring method*

- a composite signal, mix of frequencies ISO 266-1975 in the range 200Hz to 4000Hz, is used as stimulus.
- by a FFT algorithm the amplitudes of each components of the signal returned by the telephone under test is computed.
- after, the *loudness rating* or the *objective reference equivalent* is evaluated. The frequency response is compared with programmable acceptance mask.

• *Typical execution time*

- All methods                    2 Sec;
- BRITISH Std 6317            6 Sec;

• *Check and calibration of AC-3 Test Head (performance verifications)*

- ear      sensitivity and frequency response. Each microphone is electronically linearized. Check of the ear cavity impedance.
- mouth   spectrum processing of the output signal to obtain the correct acoustical pressure in the MRP<sup>3</sup> for all frequencies.

• *din1/din2 electrical input characteristics*

- impedance                    600Ω single ended, ground referred
- measurement range        from -50 to +9 dB<sub>V</sub><sup>1</sup>

• *din1/din2 electrical output characteristics*

- impedance                    600Ω single ended, ground referred
- output level                    from -48 to +6 dB<sub>V</sub> e.m.f.

• *Acoustical input characteristics -AC-3 Ear*

- cavity type                    IEC-R318; NBS-9A; Braun;
- transfer constant            -11.5dB<sub>V</sub>/0dB<sub>Pa</sub><sup>2</sup>; 1 Pa level produces an output level of 266mV on 600Ω
- max sound pressure level                    +20 dB<sub>Pa</sub>

• *Acoustical output characteristics -AC-3 Mouth*

- type                              CCITT-P51
- transfer constant            0 dB<sub>Pa</sub> /-11.5 dB<sub>V</sub>  
266mV input level produces a pressure of 1Pa in the MRP<sup>3</sup>.
- max sound pressure level                    +11.5 dB<sub>Pa</sub>

• *RMS level Measures .*

- electrical                    level evaluation of the vocal signal injected in the line loop by answering machines. Long measure time constant (10S);
- acoustical meas.            level evaluation of the vocal signal on a loudspeaker or handset receiver by means of a Sound Level Meter or artificial ear;

• *Magnetic Field - Hearing Aids (using HA magnetic probe)*

- sensitivity @ 1KHz        evaluation in dB<sub>am</sub><sup>4</sup> for the acoustical pressure programmed into the ear cavity (80 dB<sub>SPL</sub> typical);
- response                    from 300Hz to 4KHz; comparison with programmable acceptance limits;

• *Reflection Factor (impedance return loss)*

- reference impedance      600Ω resistive or Z<sub>a</sub>, Z<sub>b</sub>, Z<sub>c</sub> complex impedance, or external dipole.
- measur. circuit            line loop (bridge + [art.line] + telephone set under test)
- measur. level              programmable from -32 to +6dB<sub>V</sub> e.m.f.
- response                    from 200Hz to 4KHz; comparison with programmable acceptance mask.

**Insulation and Static Measurements**

• *Insulation*

- test voltage                    10 ÷ 250Vdc
- resistance                    upper and lower limits; programmable from 1 to 500MΩ.
- testing points                up to 7
- execution time                15 typical in *auto* mode or programmed delay

• *Static Measure*

*Static characteristic Vdc=f(I)*

- programmable points        up to 5
- programmable current       ±1 ÷ ±99mA
- voltage measured            0 ÷ 40.8V resolution 0.1V

*Dynamic characteristic Idc=f(t)*

- programmable points        up to 5
- programmable times         2 to 30S
- current measured            0÷99,9mA (resol. 0.1mA) (for I <10mA, resol. 0.01mA)

**Dial and Keypad Testing**

• *Pulse<sup>5</sup> type*

- speed, impulse ratio, impulses number;
- impulsive noise (with AC-3 Test Head);
- make-contact drop voltage;
- resistance during impulse;
- keyboard on-to-ready time;
- interdigit pause<sup>6</sup>;
- execution time              real time;

<sup>1</sup> dB<sub>V</sub> = logarithmic voltage measure relative to 1Volt.

<sup>2</sup> dB<sub>Pa</sub>= logarithmic pressure measure relative to 1 Pascal; Pa = acoustic pressure meas. unit – equivalent to 94 dB<sub>SPL</sub> or 10 µbar.

<sup>3</sup> MRP=Mouth Reference Point - is a function of used method.

<sup>4</sup> dB<sub>am</sub> = logarithmic measure relative to 1 Ampere turn/m.

<sup>5</sup> During the test involving time measurements, the feed bridge is only resistive.

<sup>6</sup> Tests not performed on Rotary Dials

- **DTMF type**
  - levels LOW/HIGH group;
  - level ratio LOW/HIGH group;
  - frequencies LOW/HIGH group;
  - numbers and sequences programmed;
  - Comfort-Tone acoustical level;
  - level regulation vs. line current;
- execution time minimum 190 mS/key;
- **Memory test**
  - last dialed number;
  - stored numbers and pauses;
  - memory retention check (with line micro-interruptions) (pulse type only);
  - repetition time check (for a DTMF keypad);

**Ringer Testing**

- **Calling Generator**
  - feeding voltage 0 ÷ ±125 V<sub>dc</sub>
  - calling voltage 0 ÷ 120 V<sub>eff</sub>, step 1V
  - frequencies 5 ÷ 99 Hz, step 1 Hz
  - current limit 1 ÷ 99 mA peak, step 1 mA; (possible skip to next test if exceeded);
  - line resistance 0 ÷ 10240 Ω, step 10Ω
  - timing
    - continuous,
    - timed (programmable),
    - cyclic on/off with up to 6 times programmable
- **Measures**
  - acoustic level eval. by Sound Level Meter PH-18 from 55 to 113 dB<sub>SPL</sub>
  - ac current measure the calling current from 0 to 70 mA<sub>RMS</sub> (calling receiver impedance)
  - execution time as programmed

**Switching & Continuity Testing**

- **Type of test**

All contact types can be tested: gravity switch, ground key, etc...  
The tester checks the correct sequence of *continuity/not-continuity* between different access points.  
A programmable delay makes possible to ignore a transitory state shorter than it (as bounces);
- access points up to 8; organized in up to 3 different configurations;
- continuity trip point programmable from 10 to 9999Ω (±5% or 5Ω from 100 to 3000Ω) or in voltage drop from 0.1 to 15.0V;
- sequence time resolution 0.2mS between two different temporary states of a contact sequence;
- execution time real time;

**Network Tones generator**

- **Predefined tone sequences**
  - dial tone, busy, ringing, congestion tones, etc... program selectable;
- **Tones generator**
  - cycle up to 6 elementary times, where T<sub>on0</sub> e T<sub>off0</sub> can be used as starting elements only.
  - times 0 to 9.9S programmable
  - levels 0 to -35dB<sub>m</sub>, programmable for each sequence element;
  - frequency 100 to 20.000 Hz, programmable for each sequence element;

**Caller Line Identifier Presentation -CLIP**

- **Telephone Condition:**
  - On-hook (ETSI 200 778-1 and other).
  - Off-hook ((ETSI 200 778-2 and other).
- **CLIP Type**
  - FSK-V23 Type
  - DTMF Type for on-hook only
- **TE Alerting Signal**
  - RP-AS & RC (for on-hook only)
  - DT-AS & LR+DT-AS
- **FSK transmission**
  - Seizure Period - bits alternating
  - Mark & Space 0 to 500 (250 couples)
  - Mark Period - Bits of continuous Marks 0 to 255
  - Data Transmission - CCITT-V23 1200 baud modem protocol. Frequency Shift keying method
  - Mark/Space levels (emf) -55dB<sub>v</sub> to 11dB<sub>v</sub>
  - Noise level-60dB<sub>v</sub> to +6dB<sub>v</sub> or none
- **CLIP DTMF generator**
  - Frequencies - CCITT - P37 - Row and Column typical frequencies (16 keys)
- execution time real time;

**SMS-4 Short Message Service**

- **Typical Standard**
  - ETSI Standard ES201 912
  - Protocol 1 & Protocol 2
- **Active Functions**

	Std Version	Developers Opt
① SCtoTE Protocol-1 Deliver	✓	✓
① TEtoSC Protocol-1 Submit	✓	✓
① SCtoTE Protocol-1 Status-Report	✓	✓
① TEtoSC Protocol-1 Command	✓	✓
① SCtoTE Protocol-2 Deliver	✓	✓
① TEtoSC Protocol-2 Submit	✓	✓
① More Blocks function		✓
① Insert Sequences ETSI ES 201 912 - Annex A and B		✓
① DTMF CLIP function		✓
① SMS additional alphabets (BIG5 - Taiwan)		✓
- execution time real time;