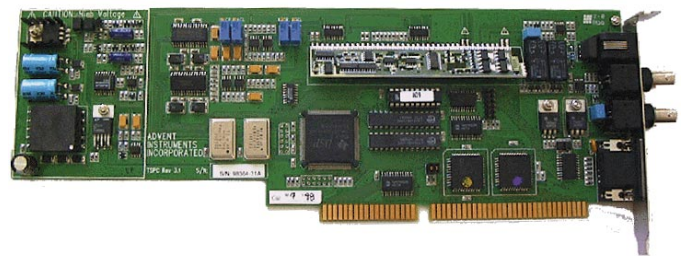
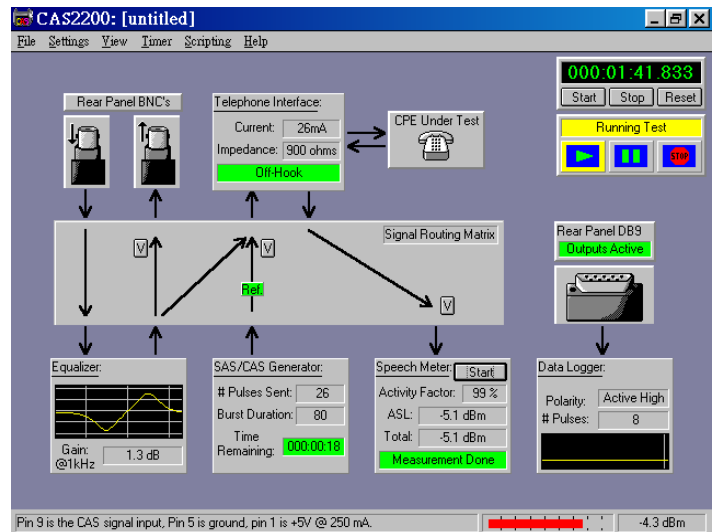


Key Features

- Calculates Derated Talkdown
- Calculates Derated Talkoff
- Supports interleaving Talkdown and Talkoff Testing
- Integrated CCITT P.56 Speech Level Meter
- Selectable Speech Band Filter
- Programmable CAS Generator
- Two Stage Parametric Equalizer
- Programmable Data Logger
- Synchronized Timer for Test Sequences
- CAS Performance Calculator
- Printable CAS Pulse Analysis
- Printable CAS Performance Reports
- Export Pulse Data for spreadsheet Analysis
- Windows 3.1 and 95 Graphical User Interfaces
- Restorable Configuration Files
- Programmable Telephone Line Impedance
- Programmable Loop Voltage
- Programmable Loop Current
- BNC connectors for monitoring and loop through
- Supports Script Language for automatic testing
- Comes with sample script files based on Bellcore SR-TSV-002476
- Interfaces to an external module for CD player control
- Fully automatic test setup



Applications

- CPE designers who need to test the equipment they design
- IC manufactures who need to verify that their design meets the Bellcore requirements
- Service Providers who need to check the claims of the CPE manufactures before endorsing a product

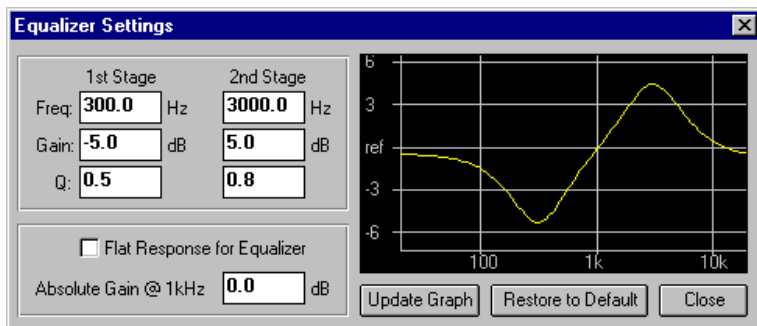
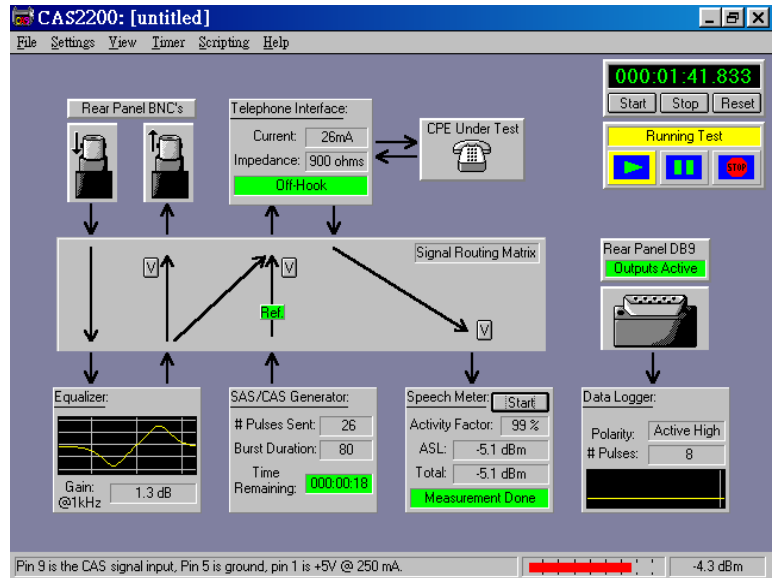
AI-240: CAS Evaluation System - TSPC-CG, CAS2200.

The testing to the Bellcore test plan SR-TSV-002476 is critical to the successful deployment of the CIDCW capable product. The AI 240 brings together all of the equipment required, data logger, equalizer, CAS generator, and P.56 speech level meter, to perform the talk-down and talk-off testing. Included in the software is the CAS performance calculator which calculates the talkdown and talkoff matrices.

CAS 2200 Software

The CAS2200 program is designed to help simplify the complex testing required to quantify the CAS tone detector performance in Caller ID with Call Waiting devices. The performance of the CAS detector is both critical to the operation of the telephone device, and unfortunately, not trivial to determine. An improperly functioning CAS detector can miss Caller ID transmissions, and perhaps more importantly, interrupt conversions for a noticeable duration on a seemingly random basis. To facilitate the determination of a CAS detector's performance, Bellcore has published a document, SR-TSV-002476, which outlines a procedure for testing a CPE's CAS detector. From the data collected in the tests, whether or not the performance meets Bellcore's recommendation is extracted. Unfortunately, the test procedure is quite complex and requires a sophisticated test setup. This program brings together all of the basic instruments required to perform the Bellcore tests and extract the performance results of a

CPE's CAS detector, all under a simple to use Windows graphical interface. This window shows all of the main components of the hardware setup and the signal flow and connections between them. These include a programmable telephone interface to the device under test, a signal equalizer for adjusting the frequency response of signals, a programmable CAS tone generator, an active speech level meter, and a data logger that records and time stamps the CAS detector's output. A flexible signal routing matrix connects all the basic instruments together. The status bar at the bottom of the window includes a hint line, that displays the function of various controls in the program. Also, a true RMS signal meter in a graphical and numeric form is presented on the status bar. This is useful in setting up the various signal levels for the tests. The graphical display is calibrated in dBm with 10 dB steps. The units of the numerical display can be changed by double-clicking the mouse on the numerical value.

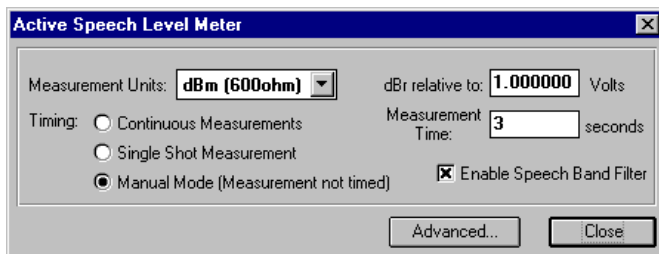
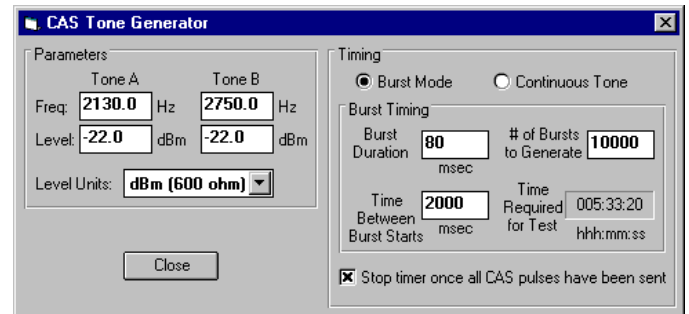


Equalizing The Speech

The Equalizer is used to simulate the spectral shape of near-end speech appearing at the telephone line interface. This equalizer is implemented in two filter stages and for each stage the center frequency, gain and Q can be defined with the result being displayed for verification. By manipulating these parameters a large degree of freedom in control of the spectral shape is allowed. The equalizer can also be configured with gain, relative to 1 kHz, to accommodate varying input levels from external sources. If on the other hand no spectral shaping is required then the equalizer can also be by-passed to remove its affect from the circuit.

Generating CAS Tones

To provide the greatest flexibility in the generation of the CAS tone both the frequency and amplitude of each tone are programmable. This allows the parameters to be set to an extreme value for both tones simultaneously, or one at a time, there are no restrictions. The timing can also be modified to set the burst duration, the number of bursts to send and the burst interval. The sequence timer can also be synchronized to the CAS generator and will stop when all of the CAS tones have been generated. As a convenience the total test duration is also calculated from the timing parameters and displayed.



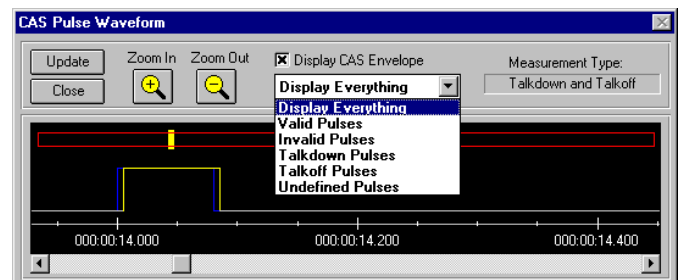
can be selected from a drop down list. The options include the units of dBm, dBV, dBr, and Vrms. A speech band filter is included as part of the level meter and can be enabled and disabled by clicking the mouse on the checkbox in the settings window. The filter is flat in the passband of 200 Hz to 5500 Hz but outside the pass band, the response falls at a rate of approximately 18 dB/octave.

Logging The Results

The output from the external CAS detector is recorded by the data logger and the results can be summarized in either a graphical or numerical format. The graphical format provides a familiar waveform presentation similar to a logic analyzer. The data logger has some distinct advantages for viewing the pulse waveforms that set it apart from a simple logic analyzer. The software can distinguish and display valid, invalid, talkdown, talkoff or even undefined pulses in the pulse stream. This function is enabled by simply selecting the appropriate selection from the pull down box and clicking on the pulse type that should be displayed. This feature greatly simplifies the viewing of the

Measuring The Speech Level

A key piece of test equipment required for testing CAS performance is a P.56 speech level meter. Whether performing talkdown or talkoff tests, it becomes important to determine the speech level that the CAS detector is subjected to. This is the function of the active speech level meter. It will measure signals present at either the tip and ring interface, or at the equalizer output, and return the active speech level (ASL). The measurement method of this level meter is based on Method B of Recommendation P.56 Objective Measurement of Active Speech Level. In the settings window, the measurement units



data by isolating the information you need to see and separating it from the less significant data. The Zoom feature allows even long sequences of data to be viewed in fine detail and is especially helpful when looking for short spurious pulses. The signature characteristics of the talkdown, talkoff and valid pulses are all programmable to provide the greatest flexibility in the analysis. The other form for the CAS pulse results is a numerical analysis which is calculated from the recorded data. The program processes the waveform and provides a summary window as shown to the right. The values for talkdown and talkoff can be read directly from this report. In addition statistics on the pulse duration is presented and can be critical in determining an effective CPE software algorithm. This report can be easily printed to provide a hard copy to document the test results. For custom signal processing requirements the data can also be exported to any common spreadsheet for further analysis.

CAS Pulse Analysis

Update Close Measurement Type: Talkdown and Talkoff

Total number of pulses received: 257

The number of pulses that are considered valid CAS pulses by the CPE: 248

Duration: Mean: 79.8 Std: 0.5 Shortest: 78 Longest: 81 msec

Of Those valid CAS pulses:

- 248 Are considered as Talkdown pulses
- 0 Are considered as Talkoff pulses
- 0 Are considered as suppressed Talkoff pulses
- 0 Are considered as rejected pulses

Talkdown test results:

Number of CAS tones sent: 250 giving a miss rate of: 0.400% (derated)

Of the Talkdown pulses, the delay between the start of CAS tone and the start of the pulse is:

Delay: Mean: 5.0 Std: 0.2 Shortest: 4 Longest: 6 msec

Talkoff test results:

Total test time of: 000:04:10 with a derated Talkoff test time of: 000:03:00

giving a false detect rate of: 0.000 (per hour) per hour.

CAS Performance Calculator

View: Talkdown Results Talkoff Results Talkdown Miss Rate Talkoff Hit Rate Talkdown Test Matrix Talkoff Test Matrix

	-30 dBm	-28 dBm	-26 dBm	-24 dBm	-22 dBm	-20 dBm	-18 dBm	-16 dBm
-7 dBm	35.6638 ^	32.0288 ^	28.3938	24.7588 ~	21.1238	17.0938 ~	12.8981 ~	9.3216 ~
-10 dBm	30.2113 ^	26.5763 ~	22.9413 ~	19.1088 ~	15.0788	10.7175	7.9256 ~	5.1338
-13 dBm	24.7588 ~	21.1238	17.0938 ~	12.8981 ~	9.3216 ~	6.5297 ~	3.9675 ~	1.6350
-16 dBm	19.1088 ~	15.0788	10.7175	7.9256 ~	5.1338	2.8013 ~	1.1833 ~	0.2800
-19 dBm	12.8981 ~	9.3216 ~	6.5297 ~	3.9675 ~	1.6350	0.7317 ~	0.0000 *	0.0000 *
-22 dBm	7.9256 ~	5.1338	2.8013 ~	1.1833 ~	0.2800	0.0000 *	0.0000 *	0.0000 *
-25 dBm	3.9675 ~	1.6350	0.7317 ~	0.0000 *	0.0000 *	0.0000 *	0.0000 *	0.0000 *
-28 dBm	1.1833 ~	0.2800	0.0000 *	0.0000 *	0.0000 *	0.0000 *	0.0000 *	0.0000 *
-31 dBm	0.0000 *	0.0000 *	0.0000 *	0.0000 *	0.0000 *	0.0000 *	0.0000 *	0.0000 *

Condition 1 (nominal) : 98.365 % (requirement >= 99.5 %)
 Condition 2 (worst 1%) : 75.911 % (requirement >= 93.0 %)
 Condition 3 (global) : 96.657 % (requirement >= 99.5 %)

~interpolated ^extrapolated *clamped to min/max

Close

CAS Performance Calculator

The CAS Performance Calculator is used to compute the final talkdown and talkoff results in accordance with the Bellcore SR-TSV-002476 test plan. The various miss rates from the talkdown test and the hit rates from the talkoff test are entered into the calculator. From this information, the talkdown miss matrix and talkoff hit matrix are derived. Finally the three talkdown conditions and the three talkoff conditions can be calculated. These six values are the final result of the process and can be used to compare the performance of the CAS detector to the desired performance level. The calculator consists mainly of six different grids, which can be viewed by pressing the corresponding button at the top of the window. The first two grids, "Talkdown Results" and "Talkoff Results" are used to enter the test data gathered from the various tests outlined in the test plan. These are the only two grids where data can be entered. The following two grids labeled "Talkdown Miss Rate" and "Talkoff Hit Rate" display the miss matrix and hit matrix along with the three talkdown and talkoff conditions. The final two grids show the "Talkdown Test Matrix" and "Talkoff Test Matrix" respectively. These two matrices show the various joint probabilities used in calculating the miss matrix and hit matrix