

## Key Features

- Generates both On Hook and Off Hook (Type I/II) Caller ID signals
- Supports both FSK and DTMF Signalling Methods
- Supports all Caller ID Standards such as Bellcore, ETSI, Australian, China, UK, Japan, and others.
- Supports new Caller ID Standards via user programming
- Standalone design for easy portability
- Powered from AC mains with universal input (90 to 264 Vrms)
- Ability to download programs, change settings, modify existing program via a COM port
- Ability to perform telephone signal analysis such as DTMF Dialing and Distortion, Pulse Dialing, Flash Timing, Type 2.5 Signallings, ...
- Ability to generate user programmable network tones such as dial, stutter, busy, ringback, reorder, ...
- Simulates Line Impairments such as OSI and line reversals
- Supports Line Impedances of 600 Ohms and 900 Ohms
- Advanced Instruments Programming Development Tool for development of user defined testing applications
- Built-in and User Programmable Library for ease of programming and building advanced applications
- PC Window Control Software for generation basic Caller ID signalings
- Optional Complex and External Source Impedance Network and Line Length Impairment Network
- Optional Analog and Digital I/O Module for expanded capabilities in Automated Testing Environment



## Applications

AI-80 is a low cost standalone Caller ID Simulator which is specially designed to automate production testing of Caller ID CPEs. Test scripts or sequences are user programmable and can be downloaded to the AI-80 via a computer RS-232 interface.

The AI-80 is a high performance Caller ID Signal Generator designed primarily for production environments. Built around a flexible signal processing engine, the AI-80 supports all Caller ID signaling protocols and data transmission formats. This includes both the Bell 202 and V.23 FSK data transmission standards, as well as the various DTMF based standards. The AI-80 can generate the Caller ID signals specified by the various standards in use today, such as:

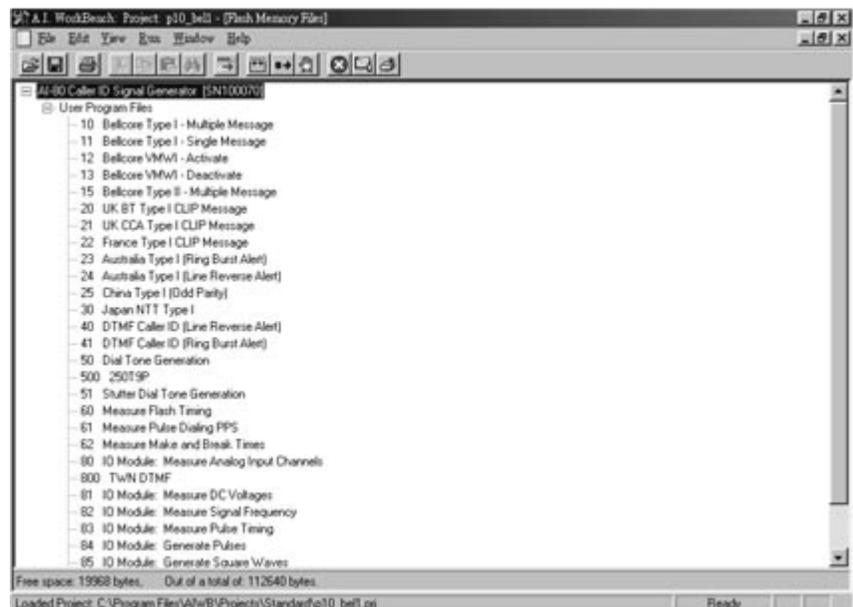
- Bellcore (Telcordia)
- TIA (Telecommunications Industry Association)
- ETSI (European Telecommunications Standards Institute)
- BT (British Telecom)
- CCA (Cable Communication Association)

In addition to providing Caller ID testing capabilities, the AI-80 can be programmed to perform other standard telephone tests, such as:

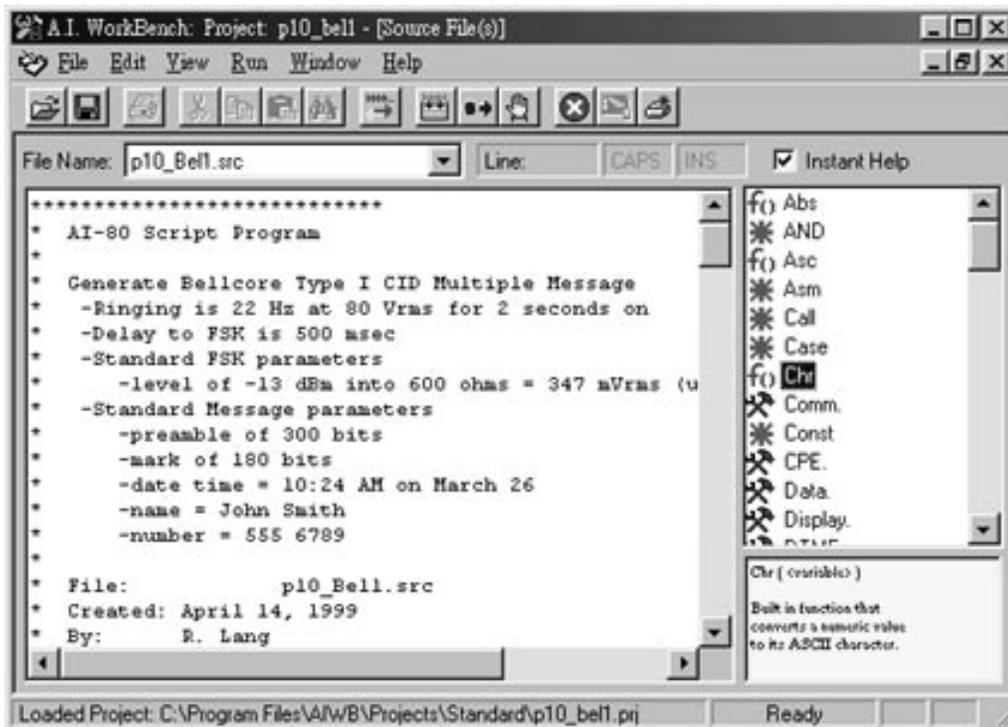
- Pulse dialing
- DTMF dialing
- Flash timing
- Network tone detection

Designed to be rugged and compact for use in manufacturing environments, the AI-80 can operate by itself for simple testing applications without any other equipment. It presents a simple user interface for ease of operation, along with a sophisticated degree of programmability to accommodate a wide range of test requirements. An optional I/O module can expand the AI-80s capabilities by providing DC measurement capabilities, audio I/O ports, and digital I/O ports for creating small self contained ATE (Automated Testing Environment) systems.

Standard factory installed testing programs (as shown on the right) for Caller ID and telephone testings are built in the AI-80 for immediate use. User can select the program to be executed on the front panel and then press the [PLAY] button or an external push button switch which is connected to the RS-232 port at the back panel. These programs are stored in the on-board Flash Ram which allows for reprogramming for other test applications.

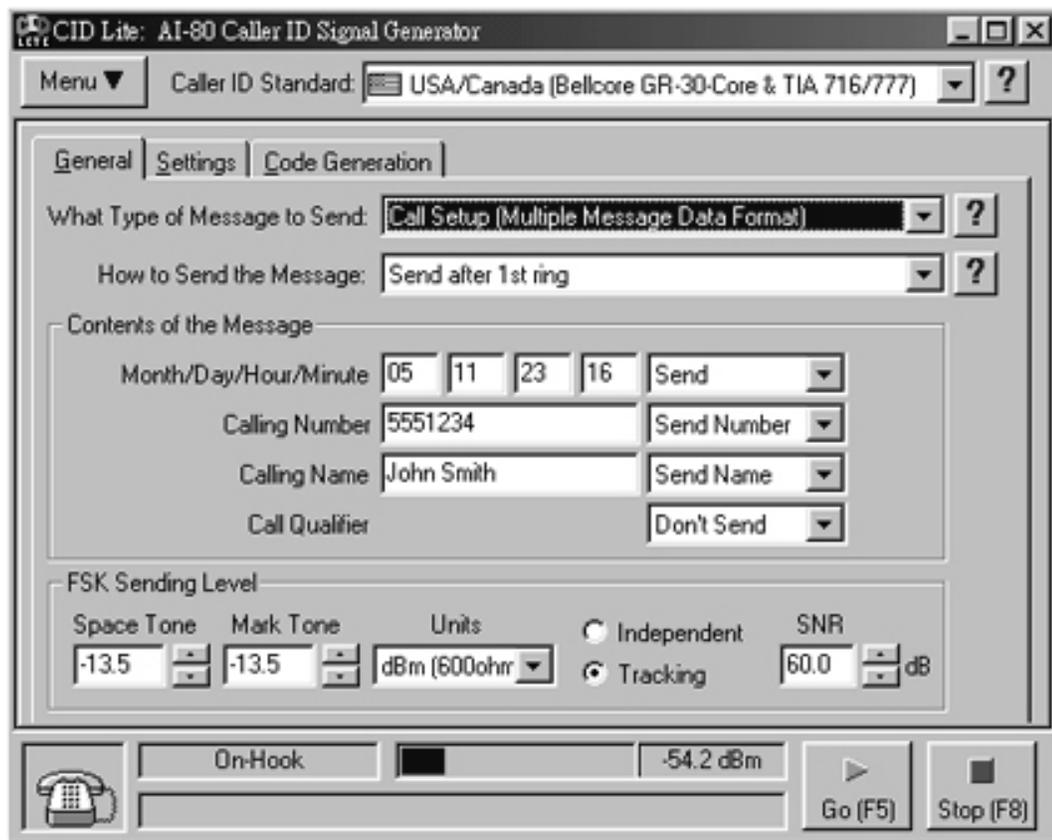


The **A.I. WorkBench** software, included with the AI-80, provides a development environment in which existing AI-80 programs, or new programs may be modified or created. Programming the AI-80 is accomplished via a high level language and built-in library utilities for ease of use. Once compiled, programs can be downloaded and stored into the non-volatile flash memory of the AI-80 via a common RS-232 serial port. The flexible nature of the AI-80 software system allows for easy field upgrades along with a wide range of capabilities. As program enhancements become available, the AI-80 can be updated by simply connecting a PC and executing the accompanying software.



The AI-80 is entirely controlled by programs executing via a built-in command interpreter. These programs manage the user interface (keypad and display), along with controlling the hardware of the AI-80 during testing sequences. Since the interpretive language is very simplistic and difficult to program, the A.I. WorkBench software compiles high level language statements into the low level interpretive language used by the AI-80. All the program files stored in the AI-80's non-volatile flash memory are in the interpretive format. Since even the system level programs are constructed using the A.I. WorkBench compiler, the entire user interface of the AI-80 can be altered and customized for a wide variety of applications.

An important feature of the AI-80 interpreter is the ability to execute up to 4 processes independently. Each process can execute a different program, or a single program can use up to four different processes. Each process has its own local data space and operates completely independently from the other three. Using multiple processes can greatly simplify complex tasks, by breaking a program in logical operations that operate in exclusion of other operations.



The CidLite program works in conjunction with the AI-80 Caller ID Signal Generator to provide a simple means for generating the caller ID signals specified by various standards and specifications in use today. This includes both the Bell 202 and V.23 FSK data transmission standards, as well as the DTMF based standards. The CidLite provides an easy to use software interface for the AI-80 so that it is not necessary to develop an application program for the most common Caller ID Standards.

Operating under the Windows 95 or 98 (NT version also available) operating systems, the CidLite program uses a serial RS-232 communications port to control an AI-80 Caller ID Signal Generator. For each standard supported, both the format and contents of the caller ID messages are easily changed. In all cases, type I (on-hook) caller ID messages are supported, though some standards do not support Type II (off-hook) caller ID. The CidLite program includes a large degree of flexibility for testing various caller ID devices, while retaining an easy to use user interface.

The CidLite Main Panel allows user to access the various functions directly. They are **Program Options Menu, Caller ID Standard Selection, Control Panel View Settings, Message Format Selection, Message Signaling Selection, Message Contents Selection(s), Caller ID Transmission Level Setting(s), Status of the Connected Telephone, Hint Line Information, Signal Level Meter, Go Command Button, and Stop Command Button.**

The AI-80 can include a number of factory installed options. These optional modules provide additional capabilities that may be required for some applications.

## Complex & External Line Impedances Option

This option extends the selection of telephone line impedances to include two fixed complex impedances and an externally programmable impedance. The source impedance for the telephone line may be selected as follows:

- 600 Ohms (standard)
- 900 Ohms (standard)
- Complex #1: 220 ohm + (820 ohm || 115 nF)
- Complex #2: (impedance to be determined)
- External Impedance

## Analog & Digital I/O Option

The Analog & Digital I/O module provides a number of expanded capabilities to the AI-80. Applications include utilizing the AI-80 in small scale ATE systems, where by the AI-80 can interface and control other circuitry in order to create a basic automated testing environment. Closed loop CPE testing may also be possible via the digital I/O, provided an interface to the CPE is available. The optional module provides the following functionality:

- Audio Input Port
- Audio Output Port
- Digital Output Port(s)
- Digital Input Ports(s)
- Parallel Bus Interface Port
- Asynchronous Serial Communications Port
- Pulse Generation and Timing Port
- DC Voltage Measurement

The audio input can be used to either measure externally generated signals, or mix any signals present with the AI-80's internally generated tones and route them to the telephone interface port. The output port can be used to monitor the signals present at either the telephone interface, CPE load interface, or internal tone generators. The digital I/O port includes a fixed 8 bit output port, 11 bit input/output port that can be configured as either input signals or output signals or as a parallel bus interface port. In this mode of operation, devices that use an 8 bit parallel interface for communication can be attached to the AI-80. In addition to a 5 bit input/output port, the module supports an asynchronous serial communications port at various baud rates and 2 signals for pulse generation and pulse timing measurement applications. Finally, DC voltages, in the range of +/- 200 volts, are measured by the I/O module via the two banana jacks.

## Telephone Line Lengths Option

The line length module allows for simulated telephone line lengths between the CO simulation circuitry and any CPE under test. The measurement point for the level meter can be set to either before or after the line lengths. This gives the option to measure any signal levels as seen by the CO simulation circuitry, or the CPE under test. The line length module contains up to eight different segment lengths.

## Telephone Line Interface

### Tone Generator

Output Level	0 to 4.0 Vrms (Unterminated) +/- 0.5 dB
Frequency Range	50 Hz to 10 kHz
Flatness	+/- 0.5 dB
THD+N	0.09% C-message (KHz)
Harmonic Distortion	> 65 dBc
Frequency Accuracy	0.015%

### FSK Caller ID Generator

Output Level	0 to 4.0 Vrms (Unterminated) +/-0.5 dB
Frequency Range	100 to 5 KHz
Flatness	+/- 0.2 dB

### Telephone Line

Output Impedance	600 or 900 +/-5% (200 Hz to 4 KHz)
Loop Voltage	48 Volts +/- 2V
Loop Current	26 or 45 mA +/- 15%

### Ring Generator

Output Level	0 to 80 Vrms
Frequency Range	10 Hz to 100 Hz
Flatness	+/-0.3dB
THD+N	<0.1% (22Hz)
Frequency Accuracy	0.015%
Ringer Load	5REN

### Noise Generator

Output Impedance	0 to 1 Vrms (Unterminated) +/-0.5 dB
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### Level Meter

Level Accuracy	+/- 0.3 dB @ 1KHz
Frequency Range	10 Hz to 10 kHz
Flatness 100 Hz to 5KHz	+/- 0.2 dB
Maximum Input	4 Vrms
Residual Noise	<-60dBc

## CPE Load Interface

### DC Characteristics

On-hook Impedance	> 1 Meg-ohm (0 to 200 Volts)
Off-hook Impedance	230 ohms +/- 10% (at 26 mA)
Maximum Loop Current	100 mA

### AC Characteristics

On-hook Impedance	> 0.5 Meg-ohm (0 to 200 Volts, to 5 kHz)
Off-hook Impedance	600 ohms +/- 10% (1 kHz)

### Level Meter

Level Accuracy	+/- 0.5 dB
Frequency Range	10 Hz to 10 kHz
Flatness 100 Hz to 5 kHz	+/- 0.2 dB
Maximum Input	4.0 Vrms (normal gain) 150 Vrms (low gain)
Residual Noise	<-60 dBmC

## Optional Complex & External Impedance

### Telephone Line Impedance

Complex #1	220 ohm + (820 ohm    115 nF) +/- 5%
Complex #2	(to be determined)
External Selection	0.1 x (external network) +/- 10% (100 to 1000 ohm line impedance)

*Note: Specifications are subject to change without notice.*

## Optional I/O Module

### Analog Output

Output Level 0 to 2.0 Vrms (Unterminated) +/- 0.5 dB  
 Output Impedance 600 ohms +/- 5%  
 THD+N 0.09% C-message (1 kHz)  
 Signal Source Internal Tone Generators, or  
 Telephone Interface Monitor, or  
 CPE Load Monitor

### Analog Input

Maximum Input 0 to 2.0 Vrms  
 Input Impedance 100 kohms +/- 10%  
 Level Accuracy +/- 0.5 dB  
 Flatness 100 Hz to 5 kHz +/- 0.3 dB  
 Residual Noise <-60 dBmC

### DC Voltage Measurement

Max. Differential Input +/-200 VDC  
 Max. Common Mode +/-200 VDC (w.r.t. earth ground)  
 Accuracy +/- 0.5%  
 Input Impedance > 1 Meg Ohm  
 Resolution 0.1% at Full Scale

### Digital I/O

Digital Output A 8 Bits (4 mA drive, 5 volts)  
 Digital Output B 8 Bits (Bus Interface, 4 mA drive, 5 volts)  
 Digital Output C 5 Bits (Output or Input)  
 3 Bits Bus Interface Control (4 mA drive, 5 volts)  
 Serial Data Format 8 bits, no parity, 1 stop  
 Serial Data Baud 1200, 2400, or 9600

*Note: Specifications are subject to change without notice.*

## Related Products

### AI-100: Telephone Caller ID Signal Simulator Series

The AI-150 simulator has the capability to test both the FSK, Bell 202 or V.23, signalling or the Dual Tone Multiple Frequency, DTMF, based signalling systems. Designed for product development, production verification, and product demonstrations.

### AI-240: CAS Evaluation System

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. AI-240 also supports fully automatic testing via script language for programmable test sequences and interface for controlling audio CD player. Both talk-down and talk-off test results can be tabulated either manually or automatically to calculate the performance of a CAS detector.

### AI-330: Telephone Signal and Analyzer and Simulator

The AI-330 is a computer based telephone signal analyzer which allows automated testing and data logging of telephone network signalling and timings. It provides more flexibility and features than a conventional telephone signal analyzer.

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