User Guide & Reference Manual

Release 1
Aug 1999

Overview

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■ Section 1 Installation & Setup

Before You Begin

Verifying the System Requirements

The CID750D Caller ID Simulator requires the following minimum system setup for the target computer.

- Intel 386DX33 PC computer, although a 486DX is highly recommended
- VGA type monitor
- Microsoft Windows 3.1, 3.11, 95 operating system
- Eight Megabytes of RAM
- One full length 16 bit ISA expansion slot

Backup the Software

Make a backup copy of the software disk before beginning the software installation. Keep the original disk in a safe location.

Installing the Telephone Signal Processing Card

Before installing the Telephone Signal Processing Card (TSPC), verify that the correct base I/O address is set. The base I/O address used is determined by the settings of two jumpers shown in figure 1. The factory default settings includes both jumpers, as shown below, for a base I/O address of 0x0380. This address should be free of conflict from most other peripheral cards; however, in case of conflict, change the jumpers to select an alternate base I/O address. The CID750D program will automatically scan all four possible base I/O address for a TSPC. Note: that the TSPC is designed to avoid interrupt and DMA channel conflicts, and as such, these parameters do not need to be configured. The only possible conflict between peripheral cards is with the base I/O address selected.

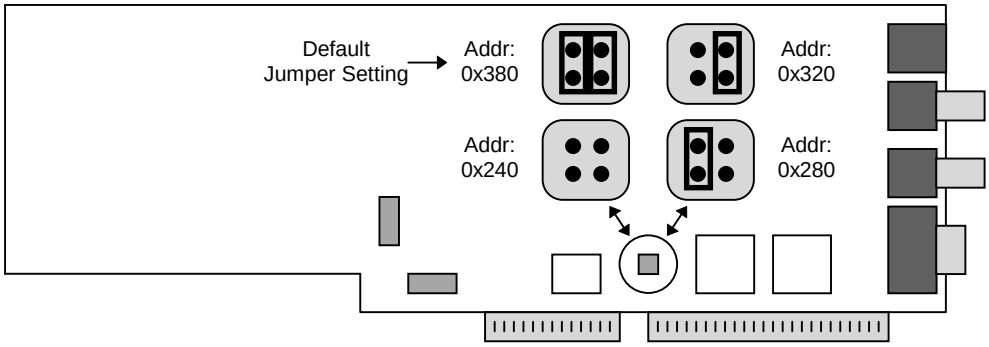

Figure 1. Verifying Base I/O Address

To install the TSPC:

1. Turn off the computer, including all external peripherals
2. Leave the power cable connected to a grounded outlet, so that the system is grounded
3. Remove the cover from the computer
4. Locate an unused 16 bit ISA expansion slot in your system
5. Insert the TPSC into the expansion slot
6. Replace the cover from the computer

Note: The TSPC can create high voltages. Ensure adequate space between the TSPC and other adjacent peripheral cards in the computer. Also, always re-attach the cover to the computer before turning it on in order to insure that no contact can be made to the high voltage portions of the TSPC.

Installing the Windows Software

To install the software package, turn on the system and launch either the Windows 3.1, 3.11, or 95 operating system. Insert the floppy disk into the 3.5 Disc Drive (usually drive A:). For users of Windows 3.1 or 3.11, from the Windows program manager, select menu command [FILE] [RUN]. Type "A:\setup" and press ENTER. For users of Windows 95, press the START button, followed by the RUN selection. Then type "A:\setup" and press ENTER.

The setup program will extract all the necessary files and install them into the directory you select. The default directory is set to "C:\AI\CID750D"; however, alternate directories may be chosen.

The Setup program will automatically create both a program group and program icon within the Windows program manager

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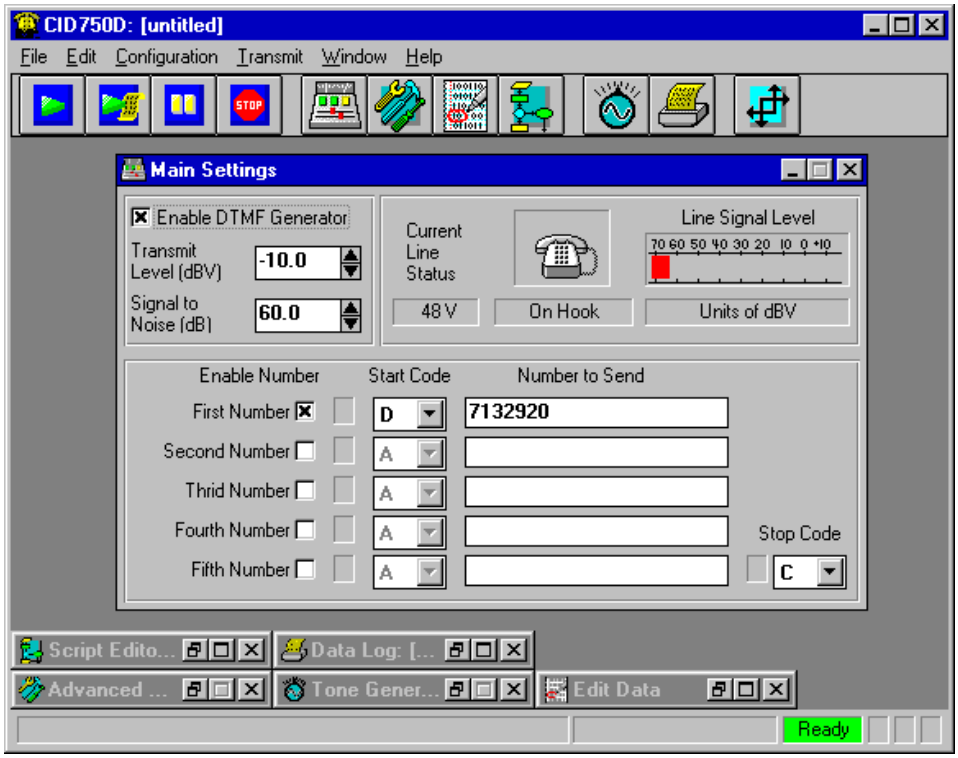
Note: The software does not require any modifications to the AUTOEXEC.bat or CONFIG.sys files. However, the WIN.ini file is modified to contain certain program initialization values.

Testing the Installation

Once you have finished installing the hardware and software, you can verify the correct setup by launching the "CID750D" program from the Window Program Manager. Once the program has finished loading itself in the system, the screen should display the following.



To verify the software version and the TSPC version codes, select the HELP menu by either clicking on HELP or pressing ALT-H. Select the "ABOUT CID750D" option within the HELP menu. The following window will appear until you press the CLOSE button.

The window will display the software version code, TSPC product, revision, and option codes, and the TSPC base I/O address being used. If any problems are encountered in the use of this product, include the above information in any correspondence with technical support.

■ Section 2 Getting Started

Starting Up

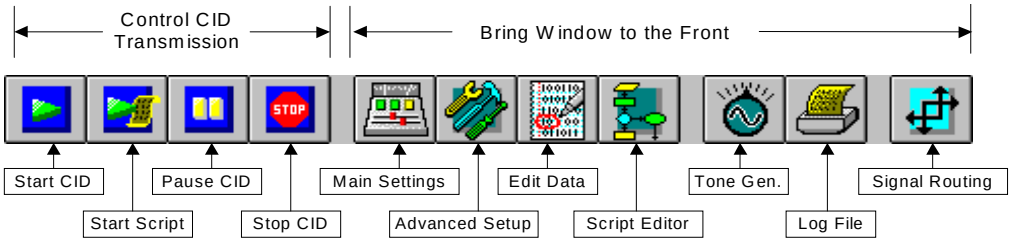
Once the CID750D DTMF Caller ID Simulator program has started, it is ready to begin sending Caller ID data transmissions. Simply connect a telephone up to the telephone jack on the rear of the Telephone Signal Processing Card (TSPC) installed in the computer, and press F5.

While this program is written with a Windows Graphical User Interface for ease of use, the program allows for sophisticated test sequences in order to deal with some of the complex aspects of testing Caller ID products thoroughly.

The program is structured around the use of multiple sub-windows, each which allows you to control various aspects of CID data transmission, all contained within one master window. The master window contains the menu, toolbar, and status line, which allows you to control the CID test sequences and monitor its progress.

The Menu & Toolbar

Use the menu to load/save various files used in the program, send output to the printer, select the Caller ID standard to follow, start/stop/pause Caller ID transmissions, display various sub-windows, show help files, and to exit the program. To speed up selecting common actions that use the menu, a tool bar has been created. Each button in the toolbar is equivalent to its menu selection.

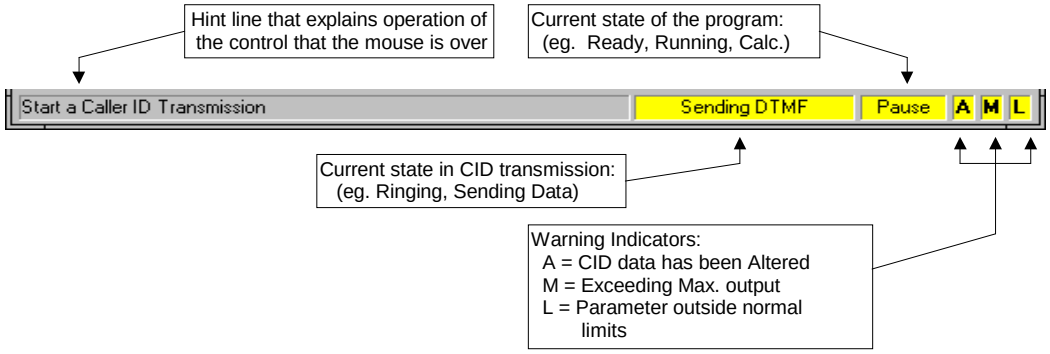


The first four buttons control the transmission of the Caller ID data. Pressing the START button, launches a Caller ID transmission. PAUSE will suspend its state indefinitely, while STOP will terminate it. START SCRIPT will start the execution of scripting programs, which help to automate complex test sequences.

Clicking any of the following ten buttons on the toolbar will cause the program to bring the selected sub-window up to the forefront.

The Status Bar

At the bottom of the master window, is the status line. Here you can instantly determine the current state of the program. The following diagram helps to illustrate some examples.

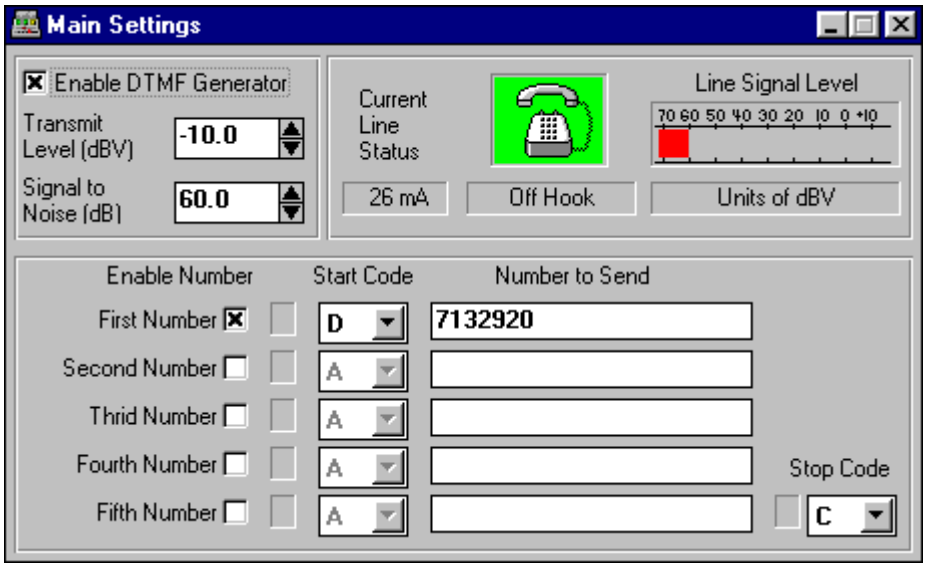


The first frame, the Hint Line, helps to explain the operation of most of the controls in the sub-windows, when the mouse is placed over them. The next frame shows the current state of any Caller ID transmissions taking place. When a transmission is active, it will be highlighted in yellow, with the text indicating the current action being taken. The following frame indicates the status of the program. It may display READY at idle times. During data transmissions, it will display either RUNNING or PAUSE. Also, when performing calculations, it may display CALC. "TONE ON" will be indicated if the tone generator is currently active.

The last three frames are warning indicators. These help remind the user that certain settings have been set to unusual values, or are outside recommended limits. The first indicator will illuminate with an A to signify an altered CID data stream. If the DTMF data has been altered in the editing window, an “A” will appear. The second indicator displays a “M” whenever the TSPC has been asked to generate simultaneous tones at a level that exceeds its output capability. Finally, the third indicator will display a “L” anytime transmission parameters fall outside the normal limits.

The Main Settings Window

The sub-window first displayed when the program starts is called the Main Settings Window. This window is a collection of the most commonly changed parameters, and has been grouped together in one window for convenience. A sample snap shot of the Main Settings window is as follows.



The key areas of the Main Settings sub-window are the Telephone Line Status, DTMF Generator Parameters, and Caller ID Data to be sent.

The Telephone Line Status area of the Main Settings sub-window shows the current status of the telephone line. Indicated are the hook switch status, line voltage or loop current levels, and the signal level present on the telephone line.

The signal level and signal-to-noise ratio of the DTMF generator is adjusted by either selecting the desired text field, and typing a new value, or using the spin buttons with a mouse to increment or decrement the current value. The DTMF generator can be enabled or disabled by clicking on the checkbox. If disabled, the signal level value has no effect on the Caller ID transmission, as no DTMF signal is generated.

The Caller ID data sent to the CPE under test is composed of up to five DTMF numbers, and a stop code DTMF digit. Each DTMF number can be either enabled or disabled via the checkbox. If enabled, the number and its start code are part of the Caller ID transmission, otherwise that number will not be sent. The DTMF numbers and start code are sent in numerical order from first to fifth; however, if a number is disabled, that number and its start code is skipped. The stop code is sent after the last DTMF digit of the last number. The value of the stop code can be selected from the drop-down list box to be any one of the 16 DTMF digits, or "null". If "null" is selected, then no stop code is sent with the Caller ID transmission.

In the example shown above, only one DTMF number (7132920) will be sent as part of the Caller ID transmission, since only the first number is enabled and all others are disabled. The start code for the number is the DTMF digit "D", and stop code, or last DTMF digit sent is a "C".

To start a Caller ID transmission, click the START button on the toolbar, or select the [TRANSMIT] [START TRANSMISSION] from the menu, or press F5. The program status line will display "Running" and shows the status of the Caller ID transmission. Once the transmission is complete, the program status line will return to the green "Ready" state.

Section 3 Program Operation

This section describes in more detail how to control and use the capabilities of the CID750D simulator to perform Caller ID Testing. Major topics covered include the following:

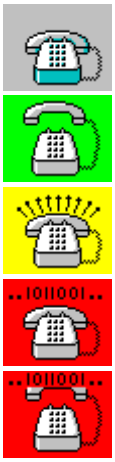
1) Viewing Current Telephone Status
2) Controlling the Caller ID Transmission
3) Modifying the Message to Send
4) Changing the Transmission Parameters
5) Using the Tone Generator
6) Signal Flow and Routing, and
7) Caller ID Signaling Options

■ Section 3-1 Telephone Status

Viewing Current Telephone Status

The current status of the telephone line is displayed in the MAIN SETTINGS window. This information is always being updated, regardless of the current program operation. The figure below is representative of the information displayed concerning the current telephone line conditions.

The telephone icons display various states or conditions experienced by the telephone under test. All of the possible telephone icons are shown below:



Telephone is On Hook

Telephone is Off Hook

Ringing Generator is Active

Transmitting Data On Hook

Transmitting Data Off Hook

If the telephone is in an on hook state, the current line voltage is displayed to the left of the status icon. Likewise, if the telephone is in an off hook state, the loop current is displayed to the left of the status icon.

The Line Signal Level meter displays the current signal level present on the telephone line. The units of measurement are in dBV (decibels relative to 1 Volt rms).

■ Section 3-2 Controlling Transmissions

Controlling a Caller ID Transmission

 **Starting,**

 **Stopping, or**

 **How to Pause a Caller ID Transmission:**

Starting a Caller ID transmission to a telephone under test is as simple a clicking on the Start icon in the toolbar. The menu option [TRANSMIT] [START TRANSMISSION] or pressing F5 will also start a Caller ID transmission.

Once started, the program status frame in the status line will display RUNNING. When a transmission sequence has been started, changing any parameters, or any aspect of the Caller ID data will have no effect on the current Caller ID transmission in progress. Any changes made will be reflected in any subsequent transmissions. If the tone generator had been active before starting the Caller ID transmission, it will be suspended until the transmission sequence is completed.

Once the transmission has finished its sequence the program status will return to READY, or TONE ON if the tone generator is enabled.

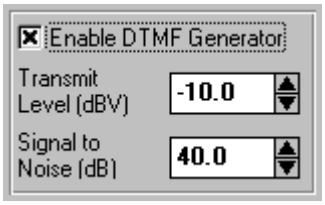
Pressing the Pause icon in the toolbar, or selecting the menu command [TRANSMIT] [PAUSE TRANSMISSION], or pressing F7, while a Caller ID transmission is active, will freeze the transmission sequence. PAUSE will be displayed in the program status frame in the status line. In the pause state, the Start command will allow the Caller ID transmission to continue until its completion. The Pause command has no effect unless a transmission is currently active.

During an active transmission, or in Pause mode, selecting the Stop command in the toolbar will terminate the transmission. The Stop toolbar button, or the menu command [TRANSMIT] [STOP TRANSMISSION], or the key F8 has no effect unless a Caller ID transmission is actively running, or is suspended via the Pause command.

Enabling or Disabling the DTMF Generator:

The DTMF generator used to send the Caller ID data to the CPE under test, can be enabled or disabled by clicking on the "Enable DTMF Generator" check box in the "Main Settings" window. If disabled, the operation of a Caller ID transmission

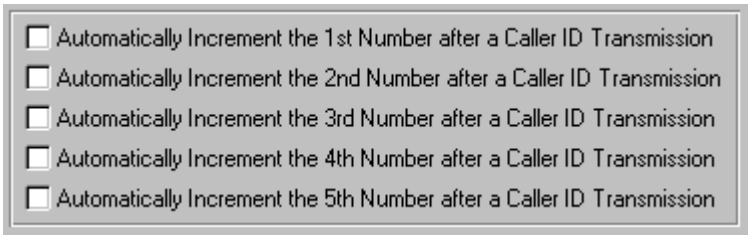
will proceed exactly as if the DTMF generator is enabled, except for the lack of a DTMF signal sent to the CPE. The timing of the line reversal and ringing generator are not effected by the status of the DTMF generator. The programmed noise level (SNR parameter) during the DTMF portion of the Caller ID transmission will continue to be generated even if the DTMF generator is disabled.



If the DTMF generator is disabled, the transmit level and signal-to-noise ratio of the DTMF generator can not be changed. The default state for the DTMF generator is to be enabled. As such, upon restoring the default parameters, the DTMF generator will be re-enabled, even if it was previously disabled.

Enabling Automatic Number Increment:

Selecting [CONFIGURATION] [MORE OPTIONS] in the program menu bar, displays the following window, from which the automatic number increment feature can be enabled or disabled.



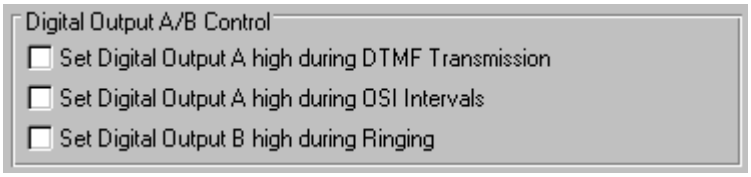
Any or all of the five number fields can have the automatic number increment feature enabled. When enabled, the value contained in the selected number field will be incremented by one after a Caller ID transmission has been sent. This can be useful in testing some CPE's, where you wish to insure that the data sent to the CPE is different every time. Only the DTMF numeric digits 0 to 9 will be incremented. If the number field contains the DTMF "*", "#", "A", "B", "C", or "D" digits, they will be unaffected. The method of incrementing the number fields is as following. The right most numeric (0-9) digit is incremented by 1. If that digit rolls over, then the next numeric digit to the left is incremented by 1. Any digit that rolls over causes the adjacent numeric digit to the left to be incremented. Numbers between 0 and 8 will be incremented by 1, while the number 9 rolls over to 0. The default state for this option is disabled.

Note: The background color of the number text boxes will change to a light blue color if the respective option is enabled. This serves as a reminder that the field(s) will be incremented at the end of a Caller ID transmission.

Note: When the option(s) are enabled, at the end of every Caller ID transmission, the respective number fields will be incremented. When incremented, any edits made to that specific number, using the Edit Data window, will be nullified. For example: if the number that was being automatically incremented was edited to change the DTMF tone on times, or the pause interval between two the tones, after the increment of the number, all of the tone on times and pause times will be set back to the value specified by the DTMF Tone On Time and Pause Time Between Tones parameters.

Controlling the Auxiliary Digital Outputs

The More Options panel includes a feature to automatically control two digital output signals during Caller ID transmissions. The output signals, termed Output A and Output B, can be accessed from the rear DB9 connector on the TSPC. The output signals can be programmed to indicate the presence of DTMF tones within the Caller ID transmission, along with indicating periods of ringing or an OSI event.



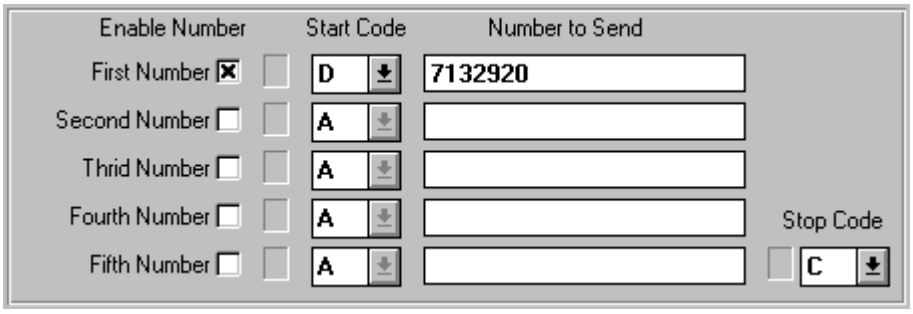
By clicking the mouse at the appropriate check box above, the output A or B will output a high level when that event is active. This feature can be useful in triggering external equipment such as oscilloscopes, logic analyzers, and emulators during key times of the Caller ID transmission.

The option of using Output A to indicate OSI events can be used to overcome a hardware limitation of earlier TSPCs (revision 2.2b and older) that do not support the generation of an OSI. By using the Output B signal to control an external relay that disconnects the tip and ring leads from a CPE under test, an OSI event can be simulated by the earlier hardware.

For more information on the digital output signals and the pin definitions of the rear DB9 connector, see: Auxiliary Digital Inputs and Outputs

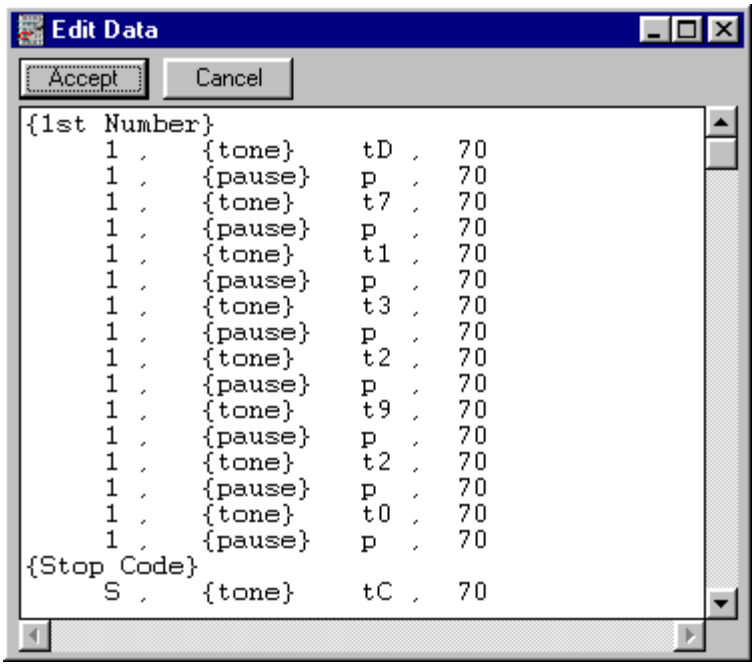
■ Section 3-3 Modifying the Message to Send

The Main Settings window provides the primary method of changing the DTMF message. As shown below, up to five numbers may be included in the DTMF message sent to the CPE. Each number can be individually enabled or disabled by clicking on the check boxes. If a number has been disabled, it is not included in the DTMF message, and the start code and number field can not be changed. The transmission order is from the first number to the fifth number.



For each number, a start code can be defined to be any DTMF digit, or "null", which would mean that no start code is sent with that number. The telephone number to send is entered in the text box and can contain up to 20 arbitrary DTMF digits. This includes the non-numeric digits of "*", "#", "A", "B", "C", and "D". Finally, at the end of the DTMF message, is the stop code digit. This digit is selected via the drop-down list box, and can be set to any of the 16 DTMF digits, or "null".

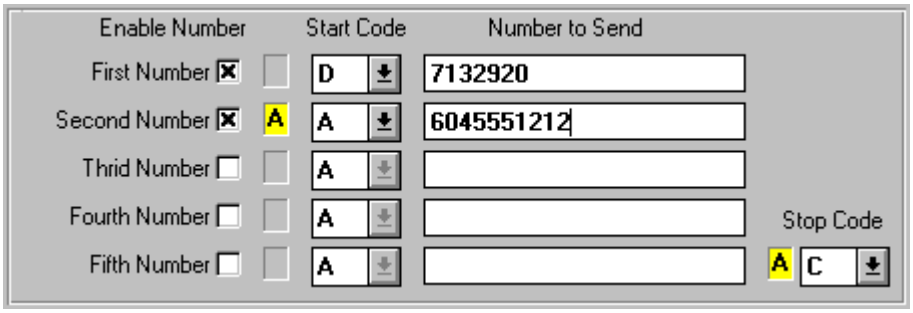
A more detailed view of the DTMF message is presented in the Edit Data window. This window shows each DTMF digit that is part of the message, and its associated tone duration, and the pause time between DTMF digits.



Any characters enclosed in { } brackets are for comment purposes only. Each non-comment line describes either a DTMF tone or a pause interval between tones. A valid line is composed of three fields, separated by two commas. The first field contains a number from 1 to 5, or "S" which defines which number field the data belongs too. Or in the case of "S", refers to the stop code of the message. The second field describes the action taken. This can be either to generate a DTMF tone, or a pause interval. A tone is described as the character "t" followed by a DTMF digit. A pause interval is identified by the character "p". Finally, the last field is an integer number between 0 and 20000, and is the time in milliseconds for the defined action. If the action is a tone, then the duration of the tone is defined in the last field. Or, if the action is a pause, then the pause interval is defined.

Any of this data may be edited. DTMF digits may be deleted or added. The duration of DTMF digits or pauses can be increased or reduced. If the data has been changed, pressing the "Accept" command button in the Edit Data window will process the changed data. Any syntax errors discovered will be displayed. If in the case, the data was changed but the user wishes to abort the changes, pressing the "Cancel" button will restore the data to the point before the changes were made.

If the message is edited, then the altered "A" flag will be illuminated in the status line. This is to remind the user that changes have been made to the message that may not be reflected in the Main Settings window. Also, an "A" flag will be illuminated beside the numbers that have been edited, in the Main Settings window.



In the example above, both the second number and the stop code data has been edited. As such the altered flag is illuminated.

Note: Any changes made to the settings in the Main Settings window take precedence over changes made in the Edit Data window. So if a number has been altered in the Edit Data window, changing any aspect of that number in the Main Settings window, will cancel the changes made in the Edit Data window.

Note: The DTMF tone on times and pause interval between DTMF digits is specified in two parameters that can be changed in the Advanced Setup window. Any changes to either of these parameters take precedence over any changes made in the Edit Data window. If a change is made to either of these parameters, then any changes made in the Edit Data window will be lost.

Section 3-4 Transmission Parameters

What are the Transmission Parameters?

Transmission parameters are a collection of properties that define how a Caller ID transmission will be sent. These parameters exist as two basic types. The first is a numeric parameter, which can be set to any value between its specified minimum and maximum values. The second, is a binary parameter, which can be set in only one of two possible states. These are typically used to enable or disable certain options.

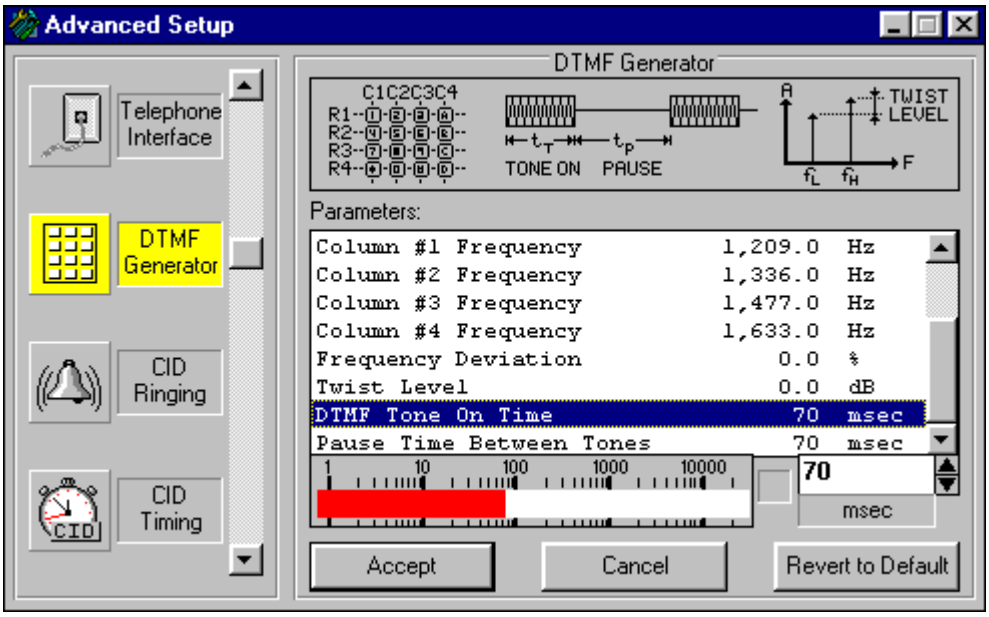
How to Change the Parameters

All of the parameters, except the DTMF Transmit Level and DTMF Signal-to-Noise Ratio (SNR), are modified, changed, or viewed within the Advanced Setup window. The two exceptions listed above can be changed within the Main Settings window.

The Advanced Settings window is used to adjust the parameters that deal with the physical data transmission layer. All of the parameters are grouped into categories that are displayed on the left side of the window. In the example below, the four parameter categories are:

1) Telephone Interface,
2) DTMF Generator,
3) Ringing Generator, and
4) Caller ID Transmission Timing

Select the general category of the parameter you wish to change by either clicking on the icon or by using the vertical scroll bar. The example below shows how to change the DTMF tone on time of the DTMF Generator. First click the DTMF Generator category, which displays a list of all parameters within that category, and at the top of the screen a graphical representation of the parameters.



From the list of parameters, select the one labeled DTMF Tone On Time. The selection shows the current setting along with its units. Below the list, a bar graph graphically represents the current value of the selected parameter, along with a text box displaying its value. To change the parameters value, either type in a new value in the text box, or use the up/down spin box to increment or decrement the current value, or click on the bar graph the approximate value you wish to enter. Once you have entered a new value, press the Accept button, or press ENTER and the new parameter value will be entered into the parameter list. To abort making any changes, press the Cancel button. If the Revert to Default button is pressed, the parameters value changes back to the default value.

If the value of parameter is outside normal limits, the letter L will be illuminated beside the text box, along with the letter L in the status line of the master window. This is to remind you that a parameter value is outside the normal limits.

List of Transmission Parameters

A list of all transmission parameters is given here by category. For a description of each parameters function, its default value, maximum and minimum values, and script language reference name, see Appendix A: Transmission Parameters.

Parameter Category: Telephone Interface

Parameters Contained within this Category

Telephone Line Voltage
Telephone Loop Current
Telephone Line Impedance (600 ohms, 900 ohms, or Complex)
Telephone Line Polarity

Parameter Category: DTMF Generator

Parameters Contained within this Category

Transmit DTMF Level
Transmit DTMF SNR
Row #1 Frequency
Row #2 Frequency
Row #3 Frequency
Row #4 Frequency
Column #1 Frequency
Column #2 Frequency
Column #3 Frequency
Column #4 Frequency
Frequency Deviation
Twist Level
DTMF Tone On Time
Pause Time between Tones

Parameter Category: Ringing Generator

Parameters Contained within this Category

Ringer Frequency
Ringer Level
Ringer Sequence
Ringer On Time #1
Ringer Off Time #1
Ringer On Time #2
Ringer Off Time #2
Ringer On Time #3
Ringer Off Time #3
Number of Ringing Cycles

Parameter Category: DTMF CID Timing

Parameters Contained within this Category

Open Switching Interval (OSI) Enable
Time to Open Switching Interval (OSI)
Open Switching Interval (OSI) Duration

1st Line Reverse Enable
Time to First Reversal

Ring Burst Enable
Time to Ring Burst
Ring Burst Duration
Ring Burst Frequency
Ring Burst Level

2nd Line Reverse Enable
Time to Second Reversal

Wait for CPE Off-Hook Enable

Timeout Period for CPE Off-Hook

Time to DTMF Tones

3rd Line Reverse Enable
Time to Third Reversal

Ringing Enable
Time to Ringing

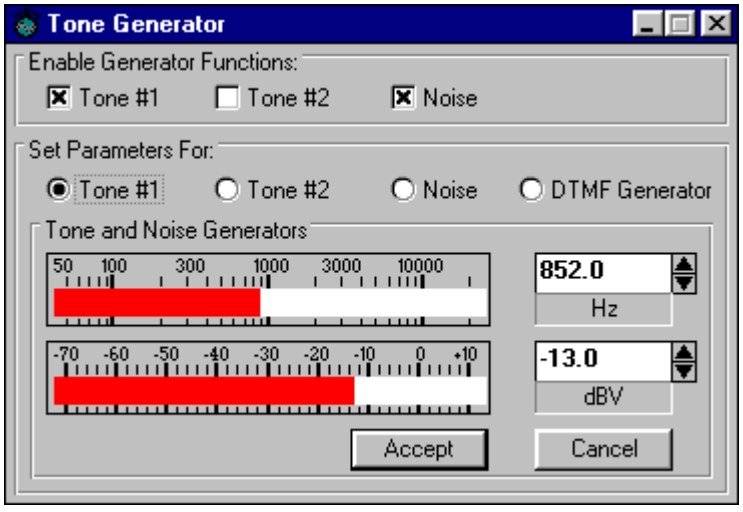
■ Section 3-5 Tone Generator Functions

Using the Tone Generator

What is the Tone Generator?
The Tone Generator window provides access to a flexible signal generator that can be used for various purposes. The signal generator can supply up to two pure tones at an arbitrary frequency and amplitude plus a broad band noise signal simultaneously. The frequency and amplitude of the two tones can either be individually controlled, or coupled to a DTMF tone generator capable of generating the 16 DTMF tones at arbitrary signal and twist levels. If the tone generator is active, starting a Caller ID transmission will suspend the tone generator until the transmission is completed. Once completed, the tone generator will be activated again.

Generating Sinusoidal Tones & Noise

Clicking the tone generator icon, or selecting [WINDOW] [TONE GENERATOR] for the menu will bring the Tone Generator window to the forefront. The top three check boxes shown in the Tone Generator window are used to enable or disable the two tone generators, Tone #1, Tone #2, and the noise generator. If any one of the signal generators are selected as enabled, the program status line will display TONE ON.



To change the settings of either tone #1, tone #2, or the noise generator, click the button associated with that tone or noise signal in the "Set Parameters For:" section of the window.

For tone #1 and tone #2, two bar graphs will display the current frequency and amplitude settings for the selected tone. For the noise signal, only an amplitude bar graph will be displayed. Beside the bar graph(s) a text box will show the numeric value for the frequency or amplitude. The settings can be changed by either:

i) clicking the mouse at the desired numeric value on the bar graph,
ii) typing a new value into the text box, or
iii) using the spin buttons to increment or decrement the current value.

After setting the new frequency and amplitude value, click the ACCEPT button to update the tone generator's settings, or click the CANCEL button to return the settings to the previous values. Note that pressing the ENTER key is equivalent to clicking the ACCEPT button.

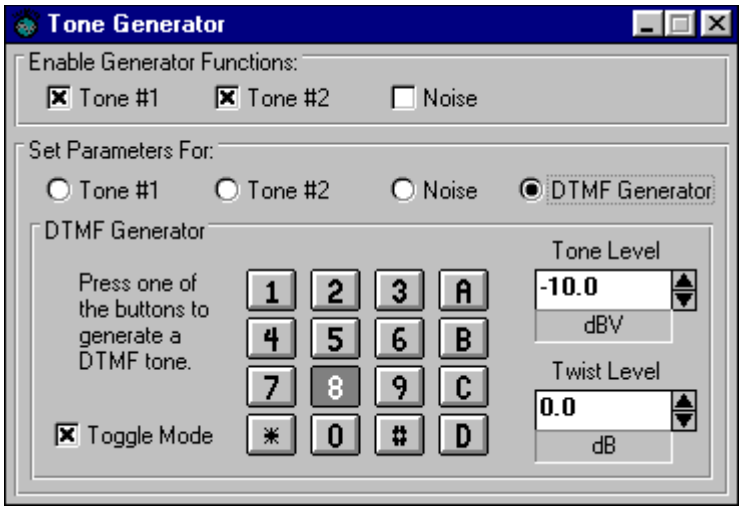
Note: The level of the noise generator is specified as the noise level delivered into the frequency band of 200 Hz to 3200 Hz. Since the noise produced is broadband over a 20 kHz bandwidth, its total signal level will exceed the value specified, if measured over a bandwidth greater than 200 Hz to 3200 Hz.

Generating a DTMF Tone

Clicking the tone generator icon, or selecting [WINDOW] [TONE GENERATOR] for the menu will bring the Tone Generator window to the forefront. The top three check boxes shown in the Tone Generator window are used to enable or disable the two tone generators, Tone #1, Tone #2, and the noise generator. If any one of the signal generators are selected as enabled, the program status line will display TONE ON.

To use the DTMF generator, click on the Button labeled "DTMF Generator" in the "Set Parameters For:" section of the window. A DTMF key pad is displayed along with the signal level and twist settings for the DTMF tone. Click the mouse on a DTMF digit, and the corresponding DTMF tone will be generated to the specified level and twist settings.

The check box labeled "Toggle Mode" selects the mode of operation for the DTMF key pad. If toggle mode is enabled, which is the default state, each time a DTMF key is clicked, the tone generator will toggle between on and off. If the toggle mode is disabled, the DTMF tone will only be generated for as long the mouse button is pressed.

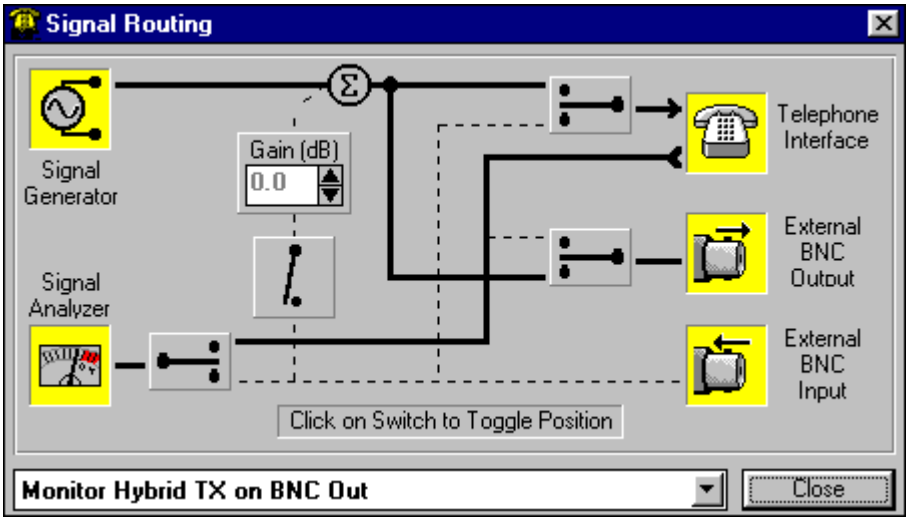


When a DTMF digit is generated, both tone generator #1 and #2 are enabled for the duration of the DTMF tone. Tone Generator #1 is set to supply the low group, or row tone of the DTMF digit, while tone generator #2 supplies the high group, or column tone. The row and column frequencies used are defined by the Caller ID transmission parameters, which are accessed in the Advanced Setup window. The value of the DTMF Frequency Deviation parameter is also used in the calculation of the low and high group frequencies. See DTMF Generator Parameters.

Note: The DTMF Signal-to-Noise ratio control on the Main Settings Window has no effect when using the DTMF generator in this manner.

■ Section 3-6 Signal Flow & Routing

Various options are available for controlling the signal flow through the Telephone Signal Processing Card (TSPC). The current setting can be displayed and changed by opening the Signal Routing window. This is accomplished by either clicking on the Signal Routing icon in the toolbar, selecting [CONFIGURATION] [SIGNAL ROUTING] from the menu, or pressing CTRL-R. As shown below, the window gives a graphical representation of the signal paths between the signal generator, signal analyzer, telephone interface, and external BNC input and output connectors.

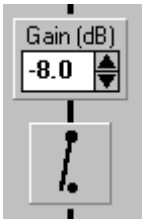


By changing the signal flow, the BNC connectors can be used to monitor the transmit or receive signal to and from the telephone. Or to provide for a loop through configuration for the transmit or receive path where externally applied signals or filtering can be added to the signals being generated by the TSPC or analyzed by the TSPC. The BNC connectors can also be configured so that the user has direct control over the signals being sent to and from the telephone interface.

The signal path can be changed by either clicking on the graphical switches, which will toggle their position, or use the drop down list box to select from a pre-defined list of setups.

External Input Signal Mixer

The external input signal mixer can be used to combine the output from the audio generators with the signal present at the input BNC connector. This can be useful for injecting custom signals, shaped noise, or other interference during a Caller ID transmission.

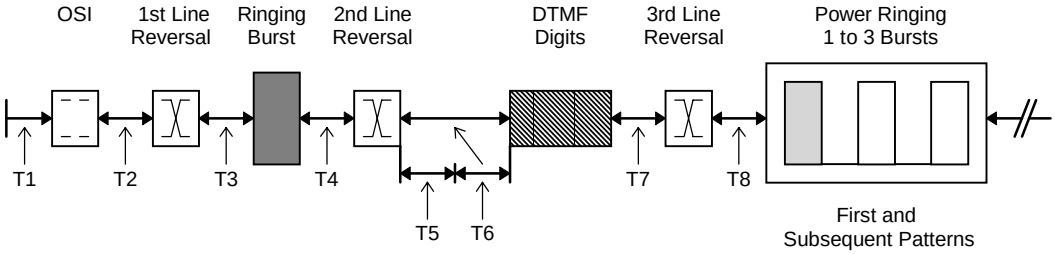


To enable or disable the signal mixer, click the mouse on the graphical switch. This will toggle the state of the signal mixer between on and off. The mixing gain can be adjusted using the up and down spin controls, or by entering a numeric value. The default state for the mixer is off, and upon restoring program defaults, or changing operational standards, the mixer will be turned off.

For more information about the signal levels present at the BNC connectors, see: External BNC Signal Levels (Section 5).

■ Section 3-7 Caller ID Signaling Options

Different DTMF Caller ID standards utilize various methods to alert the CPE of the impending transmission of data. These generally consist of combinations of line polarity reversals or short ringing bursts. The signaling method used by the CID750D program can be configured to meet the requirements of a wide number of different standards. A basic template for the signaling options is shown below. Each of indicated blocks can be enable or disabled independently from each other depending on the standard's requirements. All of the timing parameters are set by using the Advanced Setup window. This includes enabling or disabling the signaling elements along with the duration of the OSI and ringing burst.



The time intervals shown above represent the following parameters:

T1: Time to OSI
T2: Time to First Reversal
T3: Time to Ringing Burst
T4: Time to Second Reversal
T6: Time to DTMF
T7: Time to Third Reversal
T8: Time to Ringing

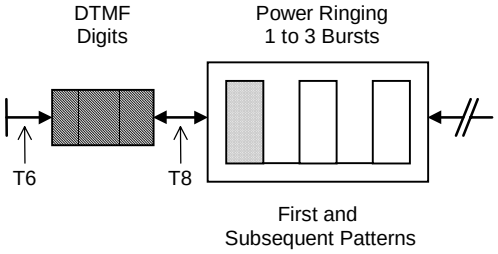
If a signaling element has been disabled, then its associated "Time to..." interval will have no effect on the Caller ID transmission. For example, if OSI is enabled, the delay between starting the Caller ID transmission and the OSI is defined by T1. However, if the OSI is disabled, but the 1st line reversal is enabled, the delay between starting the Caller ID transmission and the 1st line reversal is defined by T2 and T1 has no effect. The same applies to all the other signaling elements.

The time interval T5 is a special case. An option exists that if enabled, will wait for the CPE to go off-hook before sending the DTMF data. In this case, after the 2nd line reversal, the program will wait until the CPE goes off-hook. Once off-hook, the DTMF data will be sent after a delay of T6. So T5 represents the delay in the CPE going off-hook. However, if the "Wait for CPE Off-Hook" parameter is enabled, the maximum value of T5 is set by the "Timeout for Off-Hook" parameter. This is normally 800 msec. If the CPE does not go off-hook within 800 msec, the DTMF data is sent regardless of the hook switch status.

Four signaling types represent the most common situations used today. They are:

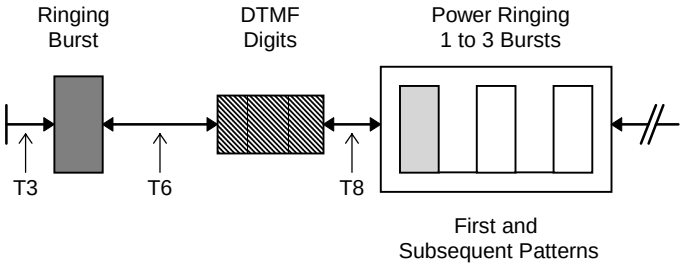
1. Send DTMF, then start ringing

This is the simplest of the different signaling methods. The DTMF is sent prior to ringing without any line reversals or ringing bursts. The CPE remains on-hook for the entire duration.



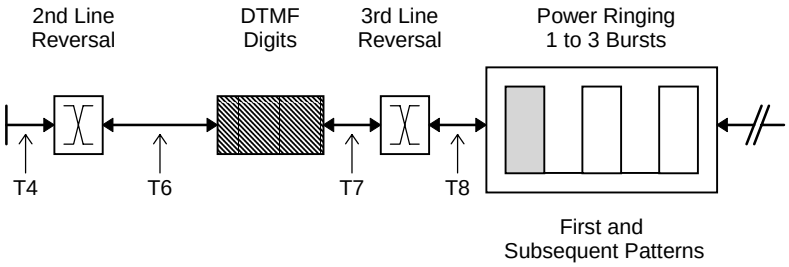
2. Generate a ringing burst, then send DTMF, then start ringing

In this case, a short ringing burst is sent prior to the DTMF digits. The ringing burst serves to alert the CPE of an incoming call and that it should expect to receive the DTMF Caller ID information shortly. Following the DTMF data begins the defined ringing pattern.



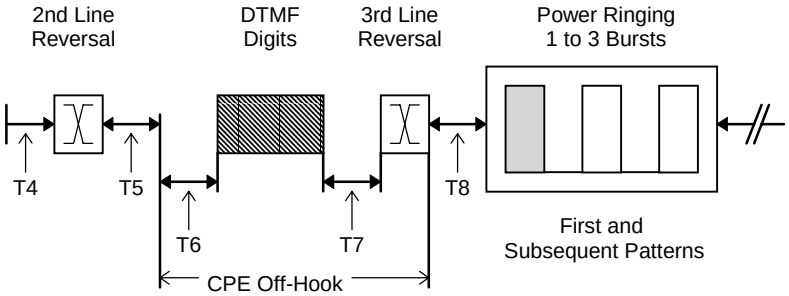
3. Line reversal, then send DTMF, then another line reversal, then start ringing

This signaling method uses a line reversal prior to sending the DTMF digits. The line reversal is used to alert the CPE of an incoming call with Caller ID information. Following the DTMF digits, the telephone line returns to its previous polarity and begins the normal ringing pattern.



4. Line reversal, wait for off-hook, send DTMF, line reversal, then start ringing

This signaling method is similar to the previous case, except that the CPE is expected to go off-hook during the transmission of the DTMF digits. The line reversal alerts the CPE to the incoming Caller ID information. Once the CPE detects the line reversal and goes off-hook, the DTMF is data is sent after a predefined delay. Following the DTMF digits, the telephone line returns to its previous polarity and begins the normal ringing pattern. It is expected that the CPE returns to the on-hook state after the line reversal following the DTMF data.



Open Switching Interval (OSI)

For any signaling method used, an OSI can be enabled at the start of the Caller ID transmission. Though sometimes used as part of the signaling to the CPE, generally the OSI is treated as a switching artifact that may or may not occur depending on the specific characteristics of the central office switch.

It is important to note that early TSPC's (revision 2.2b and older) can not generate an OSI. However, it is still possible to create an OSI by using the digital outputs from the DB9 connector at the rear of the TSPC. The digital output A can be configured to output a logic high level at the time an OSI should occur. Using this signal to control a relay that disconnects the tip and ring leads from the CPE simulates an OSI event. For more information on the program settings required for this, see Controlling the Auxiliary Digital Outputs

■ Section 4 Scripting Language

Basic Operation of Script Programs

The scripting language capability gives the user a method in which to automate complex test procedures. A script program is composed from a series of commands that can modify, change, and control various aspects of a Caller ID transmission. Other commands are available that control the flow of the script program, such as looping and branching commands.

Script programs can be composed with the built in editor or any other ASCII text editor and loaded into the script editor built into the program for execution. Once a script program exists, clicking the run script button on the toolbar, or selecting the [TRANSMIT] [RUN SCRIPT FILE] command will first scan the script program for syntax errors, and then begin to execute the script program.

The contents of this section

1) The Basics of Program Syntax
2) How the Script Program Editor works
3) Script Command Reference
4) Running a Script Program

The Basics of Script Program Syntax

The following example program is used to explain some of the basics in writing a script program.

Example Program

```
1:    ************************************************************
2:    *  DTMF CID Test Program
3:    *  Jan. 7, 1997
4:    *  Version 1.0
5:    ************************************************************
6:
7:    Label START_HERE
8:    Parameter DTMF_LEVEL = -24
9:    Start                              ;start CID transmission
10:   PrintScreen "Program Paused, press F6 to cont.  F9 to repeat"
11:   Pause START_HERE                   ;pause program
12:
13:   End                                ;end script program
```

Comment Fields
If the first non-space character on any line starts with the "*" or ";" character, the entire line will be interpreted as a comment line and ignored during program execution. In the example, the first five lines will be treated as comment fields since they start with the "*" character. If within a program line, a ";" character is encountered, the rest of that line will be treated as a comment field, and ignored during program execution. As shown in lines 9, 11, and 13 in the example program. Blank lines, or lines with only spaces will also be ignored.

Program Commands
Any line that does not start with "*" or ";" will be treated as what should be a valid command. The commands or data that follow are not case sensitive. So it does not matter if the program is written in upper case, lower case, or a combination of the two. It is important to use spaces (1 or more) between the command words and any data fields in a program line. Spaces are used by the script file interpreter to separate the command and data fields from each other. The only exception is any text that is placed within quotation marks "".

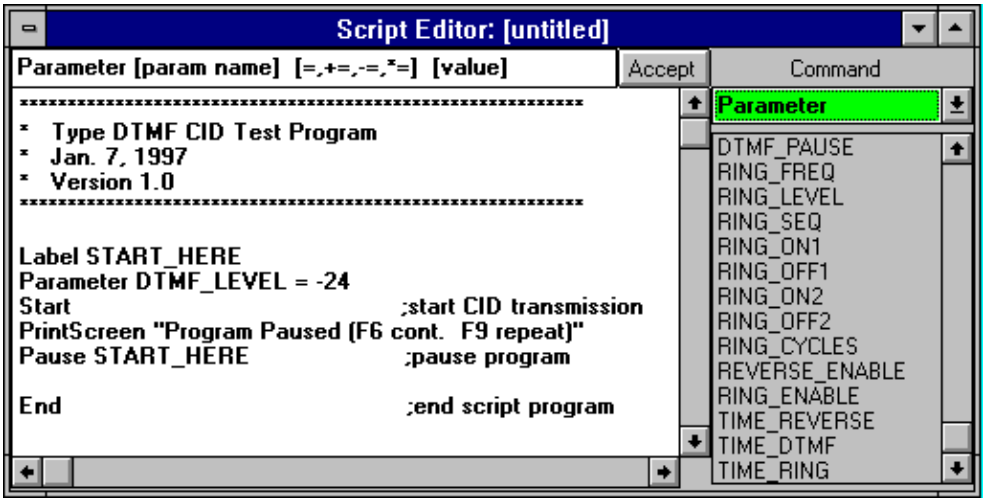
What the Example Program Does
The example program would execute as follows. The first 6 lines would be ignored since the first 5 start with the "*" character, and the 6th is a blank line. The first command encountered is the LABEL command. This command marks that point in the program with the label START_HERE. Labels are used in conjunction with the PAUSE command. When the program is in the paused state, the user may cause a branch to the label specified in the PAUSE command. Line 8 contains PARAMETER DTMF_LEVEL = -24, which sets the transmit level of the DTMF Generator to -24 dBV. The PARAMETER command can be used to set any transmission parameter to a new value. Next in line 9, the START command starts a Caller ID transmission just like clicking on the Start button in the toolbar. Once the Caller ID transmission has finished, line 10 is executed.

The PRINTSCREEN command will display the following text string, enclosed in quotation marks, on the screen. This allows the programmer to prompt the operator while the script file is executing. The PAUSE command on line 11 will suspend operation of the script program. Here the user may restart the script program, terminate the script program, or if the PAUSE command is followed by a label, restart the script program at the specified label. In this case, branching to the label START_HERE will repeat the Caller ID transmission. Line 12 is ignored, since it is blank. Line 13 will stop and terminate the script program with the END command. The END command is not explicitly needed, since the program would automatically end at the last line.

Note: It is important to understand that any changes made to the parameters, or message data will be in effect after the program finishes. In the case above, the DTMF transmit level will be set to -24 dBV when the program finishes. It will not be returned to its value prior to running the script program. The same applies to any changes made to the message data.

How the Script Program Editor works

The script editor provided contains some features to simplify writing script programs. All of the commands available can be selected from the drop down list box in the upper right corner of the editor window. Once a command has been selected, the list box on the right side of the editor fills with options for the selected command. The composing text line at the top of the editor is filled with a template of the selected command. In the example below, selecting the PARAMETER command shows all of the parameter names available in the list box and at the same time the command template is shown in the composing text line at the top of the window.



To enter the parameter name, scroll the list box until you find the parameter you wish to modify. Double click on this parameter. The parameter name will be transferred to the composing text line. Now the list box fills with further options for the parameter. As before double clicking on the item in the list box will transfer that selection to the composing text line and complete the template with the correct values.

Once the command has been composed, clicking the ACCEPT button will add the new command line to the program as shown in the large text area.

The operation of the command drop down list box and composing text line is basically the same for all the commands. This command composing feature eliminates the need to memorize the command names, or the structure of the command.

Note: The maximum size of the script editor is 32k bytes. The editor will truncate any characters beyond its 32k byte limitation.

Shortcuts:

1) When selecting the command data in the list box, double clicking or pressing the ENTER key will transfer the selection to the composing text line.

2) For some commands where text information is required to be entered (like PRINTSCREEN), the command data list box will be empty. If the current focus is still with the command data list box, you can type the text field without changing focus to the composing text line.

3) If the current focus is with the command data list box, pressing the right mouse button will transfer the text in the composing line to the script program just like the ACCEPT button.

Script Command Reference

The script command reference describes the function of the script command words. All of command words currently supported are listed below.

Command Word List:

START	Starts a Caller ID transmission
PAUSE	Suspends operation of the script program
END	Ends operation of the script program
LOOP	Marks the start of a loop within the program
LOOPEND	Marks the end of a loop within the program
LABEL	Defines a label within the program for branching
BRANCHIF	Performs a branch to a label
PARAMETER	Changes any of the transmission parameter values
NUMBER	Changes the DTMF number to send
STOPCODE	Sets the Caller ID message stop code
SET	Sets various program options
PACKET	Enables/Disables or sets the value of data packets
SEGMENT	Changes the time or number of bits in a segment
STOPBITS	Sets the number of stop bits
PRINTSCREEN	Displays a text string on the screen for user prompting
PRINTLOG	Writes a text string to the log file

Script Command: START

Description:
The START command initiates a Caller ID transmission. Its action is identical to that of clicking on the start icon in the toolbar, selecting from the menu [TRANSMIT] [START TRANSMISSION], or pressing F5.

Syntax:
START

Example:
The example program simply starts one Caller ID transmission using the START command, then ends.

```
1:  ************************************************************
2:  *  DTMF CID Test Program
3:  *  May 18, 1996
4:  *  Version 1.0
5:  ************************************************************
6:
7:  Start                          ;start CID transmission
8:
9:  End                            ;end script program
```

Script Command: PAUSE

Description:
The PAUSE command is used to suspend execution of the script program. While program execution is suspended in pause mode, the user can restart execution by pressing the START button or press F6, stop and reset the script program by pressing the STOP button, or branch to the label specified in the pause command by pressing F9. The label field of the PAUSE command is optional. However, if a label has been specified is must not contain any spaces in its name. Also, the same label name must be defined elsewhere within the program via the LABEL command.

A modification of the basic PAUSE command is to add "[EXT]" as a suffix. By adding this keyword at the end of the PAUSE command, the script program can also be restarted by asserting a high logic level at the digital input ports at the rear DB9 connector of the TSPC. With the [EXT] suffix, a logical high at Input A will restart the script program execution as if the Start button was pressed. Likewise, if a label has been specified, a logical high at Input B will branch to the label and restart the script program execution. For more information on the digital input and outputs, see Auxiliary Digital Inputs and Outputs.

Syntax:
PAUSE [label]

Example:
The example program starts the Caller ID transmission, then enters pause mode. If F9 is pressed, the program will branch to the BEGIN_PROGRAM label in line 1 and start executing from there. If F6, or the start button, had been pressed the program would continue after line 5. The second pause command in line 8, has no label specified, so pressing F9 will have no effect.

```
1:      Label  BEGIN_PROGRAM
2:      Start                          ;start CID transmission
3:
4:      *  when paused press F6 to continue, or F9 to branch to label
5:      Pause  BEGIN_PROGRAM           ;pause command with label
6:
7:      *  when paused press F6 to continue
8:      Pause                          ;pause command without label
9:      End                            ;end script program
```

Script Command: END

Description:
The END command stops execution of the script program. Once stopped the script program is reset and can only be started from the beginning. The END command is optional in that script program execution will automatically be stopped at the last line of the script program. END can be used in the middle of a script program to stop execution of the remainder of the program.

Syntax:
END

Example:
The example program starts a Caller ID transmission due to the START command in line 2, then stops at the END command in line 4. The START command in line 7 will not be executed.

```
1:      Label  BEGIN_PROGRAM
2:      Start                          ;start CID transmission
3:
4:      End                            ;end script program
5:
6:      *  The following commands will not be executed
7:      Start                          ;start CID transmission
```

Script Command: LOOP

Description:
The LOOP command in conjunction with the LOOPEND command allows for certain sections of the program to be repeated a specified number of times. The LOOP command marks the start of the loop, while the LOOPEND command marks the end of the loop. Up to 10 loops can be used in any script program. Loops can also be nested within each other. An error will be reported if a LOOP command is present without a corresponding LOOPEND command.

Syntax:
LOOP (number of loops)

Example:
The example program contains two loops in a nested fashion. The program will start 32 Caller ID transmissions with DTMF transmit levels ranging from -10 to -58 dBV and DTMF signal-to-noise ratios ranging from 40 dB to 0 dB. Lines 5 and 12 mark the outer loop with the LOOP and LOOPEND commands. This outer loop will be executed 8 times as specified in line 5. The inner loop is marked by lines 7 and 10. This loop will be executed 4 times for every outer loop cycle. As such, lines 7 to 10 will be executed a total of 32 times.

```
1:    * This program will cycle through various DTMF transmit levels
      and
2:    * Signal-to-Noise ratios as an example of the loop command.
3:
4:    Parameter DTMF_LEVEL = -10        ;set DTMF transmit level
5:    Loop 8                            ;repeat outer loop 8 times
6:       Parameter DTMF_SNR = 40        ;set DTMF SNR level
7:       Loop 4                         ;repeat inner loop 4 times
8:          Start                       ;start CID transmission
9:          Parameter DTMF_SNR -= 10    ;decrease SNR by 10 dB
10:      Loopend                        ;inner loop end mark
11:      Parameter DTMF_LEVEL -= 6      ;decrease level by 6 db
12:   Loopend
13:
14:   End                               ;end script program
```

Script Command: LOOPEND

Description:
The LOOPEND command in conjunction with the LOOP command allow for certain sections of the program to be repeated a specified number of times. The LOOP command marks the start of the loop, while the LOOPEND command marks the end of the loop. Up to 10 loops can be used in any script program. Loops can also be nested within each other. An error will be reported if a LOOPEND command is present without a corresponding LOOP command.

Syntax:
LOOPEND

Example:
The example program contains two loops in a nested fashion. The program will start 32 Caller ID transmissions with DTMF transmit levels ranging from -10 to -58 dBV and DTMF signal-to-noise ratios ranging from 40 dB to 0 dB. Lines 5 and 12 mark the outer loop with the LOOP and LOOPEND commands. This outer loop will be executed 8 times as specified in line 5. The inner loop is marked by lines 7 and 10. This loop will be executed 4 times for every outer loop cycle. As such, lines 7 to 10 will be executed a total of 32 times.

```
1:    * This program will cycle through various DTMF transmit levels
      and
2:    * Signal-to-Noise ratios as an example of the loop command.
3:
4:    Parameter DTMF_LEVEL = -10      ;set DTMF transmit level
5:    Loop 8                          ;repeat outer loop 8 times
6:       Parameter DTMF_SNR = 40      ;set DTMF SNR level
7:       Loop 4                       ;repeat inner loop 4 times
8:          Start                     ;start CID transmission
9:          Parameter DTMF_SNR -= 10  ;decrease SNR by 10 dB
10:      Loopend                      ;inner loop end mark
11:      Parameter DTMF_LEVEL -= 6    ;decrease level by 6 db
12:   Loopend
13:
14:   End                             ;end script program
```

Script Command: LABEL

Description:
The LABEL command is used to mark a location in a script program to branch to using the PAUSE command. The label specified must contain no spaces in its name. A maximum limit of 99 labels for the script program exists.

Syntax:
LABEL (label name)

Example:
The example program starts the Caller ID transmission, then enters the pause mode. If F9 is pressed, the program will branch to the BEGIN_PROGRAM label in line 1 and start executing from there. If F6, or the start button, had been pressed the program would continue after line 5. The second pause command in line 8, has no label specified, so pressing F9 will have no effect.

```
1:    Label  BEGIN_PROGRAM
2:    Start                        ;start CID transmission
3:
4:    * when paused press F6 to continue, or F9 to branch to label
5:    Pause  BEGIN_PROGRAM         ;pause command with label
6:
7:    * when paused press F6 to continue
8:    Pause                        ;pause command without label
9:    End                          ;end script program
```

Script Command: BRANCHIF

Description:
The BRANCHIF command can be used to execute a program branch based on various conditions. If the specified condition is evaluated as true, then the script program will branch to the specified label. The labels are defined using the LABEL command. The syntax for the BRANCHIF command is as follows:

Syntax:
BRANCHIF (condition) (label)

The possible conditions are:

ALWAYS	Causes an unconditional branch to the label
ONHOOK	Causes a branch if the CPE is currently on-hook
OFFHOOK	Causes a branch if the CPE is currently off hook
INPUTA	Causes a branch if digital input A is at a high state
INPUTB	Causes a branch if digital input B is at a low state

Example:
The example program prompts the user to ensure that the CPE is on-hook before starting a Caller ID transmission. Before the START command in line 6, the BRANCHIF command in line 4 checks to make sure the CPE is on-hook. If it is off-hook, then the program branches back to the beginning at line 1. Assuming the CPE is on-hook, then the START command in line 6 is executed, which starts a Caller ID transmission.

```
1:      Label  BEGIN_PROGRAM
2:      PrintScreen  "Make sure CPE is on-hook and press F6 to start"
3:      Pause
4:      BranchIf  OfHook  Begin_Program
5:
6:      Start                    ;start CID transmission
7:      End                      ;end script program
```

Script Command: PARAMETER

Description:
The PARAMETER command is used to change the setting for any of the transmission parameters. Since there are two basic types of parameters, there are accordingly two different syntax's. The first parameter type is numeric, in which the parameter contains a numeric value between the specified minimum and maximum values. The second type is a binary parameter, which the parameter can take on only one of two possible options as specified by that parameter. The syntax for numeric parameters is specified as the parameter name, then an operator, and then a numeric quantity. Four possible operators can be used. They are "=" which sets the parameter value to the quantity specified, "+=", "-=", "*=", which modify the existing parameter value by either adding, subtracting, or multiplying the numeric quantity respectively. If the resulting parameter value is outside the minimum to maximum range for that parameter, its value is clamped to the closest minimum or maximum value. Binary parameter types need no operator as their value can be only one of two settings. The desired option of the parameter simply follows the parameter name.

Syntax:
PARAMETER (numeric parameter name) (= , += , -= , *=) (numeric value)
PARAMETER (binary parameter name) (first option, second option)

Example:
The example program cycles through various DTMF transmit levels, then cycles though various degrees of frequency deviations for the DTMF generator. Line 4 sets the frequency deviation to the nominal zero level. Line 5 and 8 control the numeric parameter DTMF_LEVEL in the first program loop. Line 5 sets the level to -10 dBV, while inside the loop, line 8 decreases the level 5 dB for every time through the loop. Once the first loop has finished, lines 11 to 12 set the DTMF level to -20 dBV, and change the DTMF generator to have a frequency deviation of -2%. Line 15 changes by frequency deviation by 0.5 % for every cycle in the loop. The result is sending nine Caller ID transmissions with the frequency deviation being varied over the range of -2 % to 2%.

```
1:    * This program will cycle through various DTMF transmit levels then
2:    * cycle through various frequency deviations
3:
4:    Parameter FREQ_DEV = 0          ;set frequency deviation to
      zero
5:    Parameter DTMF_LEVEL = -10      ;set DTMF transmit level
6:    Loop 8                          ;repeat 8 times
7:       Start                        ;start CID transmission
8:       Parameter DTMF_LEVEL -= 5    ;decrease level by 5 db
9:    Loopend
10:
11:   Parameter DTMF_LEVEL = -20      ;set level to -20 dBV
12:   Parameter FREQ_DEV = -2.0       ;set deviation to -2%
13:   Loop 9                          ;repeat 9 times
14:      Start                        ;start CID transmission
15:      Parameter FREQ_DEV += 0.5    ;increase deviation by 0.5 %
16:   Loopend
17:
18:   End                            ;end script program
19:
```

Script Command: NUMBER

Description:
The NUMBER command is used to change the telephone numbers that are sent during a Caller ID transmission. This includes enabling or disabling one of the five possible numbers, along with changing its start code. The proper syntax of the command is the "NUMBER" command followed by the value 1 through 5, to specify which number field is to be changed. Then one of four possible key words controls what action will be taken. The key words "enabled" and "disabled" will respectively enable or disable the number field. This action is identical to enabling or disabling the appropriate checkbox on the Main Settings window. A third possible key word "value" followed by a string of DTMF digits will change the telephone number that is sent for that field. The last key word is "startcode"

followed by a single DTMF digit (0,1,2,3,4,5,6,7,8,9,*,#,A,B,C,D, or null), will set the start code for that number field.

Syntax:
NUMBER (1,2,3,4,5) (Enabled, Disabled, Value "DTMF digits", StartCode (DTMF digit))

Example:
The example program sends two Caller ID transmissions in which the second number field is first enabled and set with a start code of DTMF "A". The number to send with the first Caller ID transmission is "5551212". After the first transmission, the number is changed to "5559898" and then sent again.

```
1:    * This program will send two messages with different numbers
2:
3:    Number 2 Enabled
4:    Number 2 Startcode A
5:    Number 2 Value "5551212"
6:    Start                          ;start CID transmission
7:    Number 2 Value "5559898"
8:    Start                          ;start CID transmission
9:
10:   End                            ;end script program
```

Script Command: STOPCODE

Description:
The STOPCODE command is used to change the stop code DTMF digit that is sent with every Caller ID transmission. The stop code is the last DTMF digit sent and is used to inform the CPE that the DTMF transmission has ended. The value of the stop code can be any of the 16 possible DTMF digits, or "null". If "null" is selected, then no stop code will be sent with the Caller ID transmission.

Syntax:
STOPBITS (0,1,2,3,4,5,6,7,8,9,*,#,A,B,C,D,null)

Example:
The example program sends two Caller ID transmissions with a different stop code. The first message uses the valid stop code of "C", but the second message has no stop code. Line 4 sets the stop code to the DTMF digit "C", while line 7 sets the stop code to "null".

```
1:    * This program will send two message with a different
2:    * stop codes.
3:
4:    StopCode C
5:    Start                          ;start CID transmission
6:
7:    StopCode null                      ;don't send a stop code
8:    Start                          ;start CID transmission
9:
10:   End                            ;end script program
```

Script Command: SET

Description:
The SET command can be used to control the digital output A and B signals. These signals are present at the DB9 pin connector at the rear of the TSPC, and can be used for various functions. The outputs can be turned on (high logic level), off (low logic level), or programmed to track certain events in a Caller ID transmission. Output A can be programmed to automatically go high during sending of the DTMF data or during an OSI event. Likewise, output B can be programmed to go high during periods of ringing.

Syntax:
SET OUTPUTA (on/off/DTMF/OSI)
SET OUTPUTB (on/off/ring)

Example:
The following example programs output A to be active when the DTMF data is being sent to a CPE under test. Likewise, output B will be active whenever the ringing generator is active. These outputs can be useful in acting as triggers for external equipment such as oscilloscopes, logic analyzers, or microprocessor emulators.

```
1:    Set OUTPUTA DTMF          ;enable output during DTMF
2:    Set OUTPUTB Ring          ;enable output during ringing
3:
4:    Start                     ;start CID transmission
5:    End                       ;end script program
```

Script Command: PRINTSCREEN

Description:
The PRINTSCREEN command is used to display text strings on the screen during the execution of a script program. This can be used to display various test conditions, or what the user should expect of the telephone under test.

Syntax:
PRINTSCREEN "text message enclosed in quotation marks"

Example:
The example program uses the PRINTSCREEN command to first indicate to the operator what parameters are being changed, as in line 7. The PRINTSCREEN command in line 11, tells the operator what options are available.

```
1:    ************************************************************
2:    *  CID Test Program
3:    *  May 18, 1996
4:    *  Version 1.0
5:    ************************************************************
6:
7:    PrintScreen "The DTMF transmit level is at -36 dBV"
8:    Label START_HERE
9:    Parameter DTMF_LEVEL = -36
10:   Start                          ;start CID transmission
11:   PrintScreen "Program Paused, press F6 to cont.  F9 to
      repeat"
12:   Pause START_HERE               ;pause program
13:
14:   End                            ;end script program
```

Script Command: PRINTLOG

Description:
The PRINTLOG writes the text string enclosed in quotation marks to the data log file.

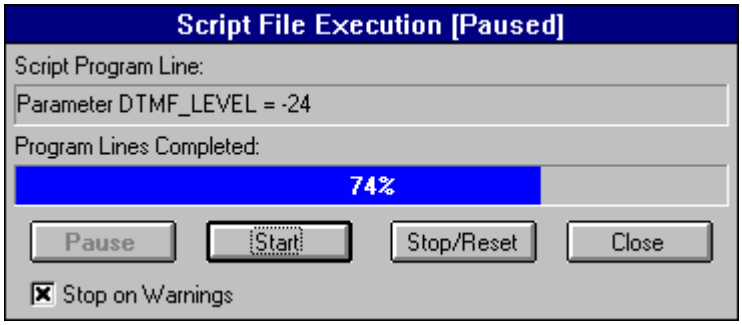
Syntax:
PRINTLOG "text message enclosed in quotation marks"
Example:
The example program uses the PRINTLOG command to write to the data log file the changes made to the telephone line polarity.

```
1:    *  Test CPE with different line polarities
2:
3:    Parameter LINE_POLARITY Normal
4:    Printlog "Sending CID with normal polarity"
5:    Start                          ;start CID transmission
6:
7:    Parameter LINE_POLARITY Reversed
8:    Printlog "Sendind CID with reversed polarity"
9:    Start                          ;start CID transmission
10:
11:   End                            ;end script program
```

Running a Script Program

When clicking the run script program icon, selecting [TRANSMIT] [RUN SCRIPT FILE] from the menu, or pressing F6, the current script file contained in the script editor is scanned for errors, then executed. See Appendix B: Script Error Reference for a list of script file syntax errors. If an error is encountered, a message will appear and the offending program line will be highlighted in the script file.

If no errors has been found, the Script Execution window will be displayed on the screen, similar to the figure below.



The Script Execution window shows the current script program line being processed, along with a scale showing percentage of program lines completed.

The script program execution can be controlled via the four buttons along the bottom edge of the window. The PAUSE button will suspend operation of the script program after the current command has finished its processing. Once in pause mode, the program may be restarted by pressing the START button, or pressing F6, or stopped completely by pressing the STOP button. Once stopped, the program can be restarted from the beginning with the START button, or pressing F6. The CLOSE button will remove the Script Execution window and stop any script programs that may be running.

Stop on Warning Option:
When the Stop on Warning option is enabled, any program warnings that are generated will cause the script program to be stopped. If disabled, program warnings will not stop the execution of the script program; however, a warning message will be written to the data log file.

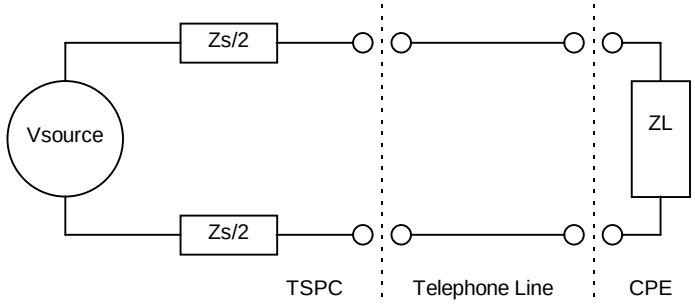
Script Program Errors:
See Appendix B: Script Error Reference for a list of script file syntax errors.

■ Section 5 Additional Information

Telephone Line Signal Levels

Signal levels are a common source of confusion with most signal generation equipment. This section aims to explain how signal levels are calculated within the program.

It is important to understand how the Telephone Signal Processing Card (TSPC) delivers its AC signals to the CPE under test. The figure below shows a simplified version of the AC signal path from the TSPC to the CPE. The TSPC consists of basically a programmable AC voltage source followed by two impedance's. The two impedance's combined represent the total source impedance (Zs) of the TSPC which can be set to 600 ohms, 900 ohms, or a complex impedance in the Advance Setup window (under the category of Telephone Interface). The CPE under test is represented by the impedance ZL.



From the standpoint of this program, the signal levels are quite simple to deal with. All signal levels are specified in dBV (decibels relative to 1 Vrms) with an open circuit impedance for the CPE. As such the voltage source of the TSPC will be set to the level specified by the program in dBV regardless of the TSPC's source impedance, or the load impedance of the CPE..

The voltage at the CPE can be calculated simply as:

$$V(ZL) = Vsource (ZL) / (Zs + ZL)$$

where: V(ZL) is the voltage level at the CPE in Vrms
Vsource is given in Vrms
ZL is the load impedance of the CPE
Zs is the source impedance of the TSPC

Note: Signal levels are also commonly expressed in terms of dBm (power level relative to 1 milliWatt) into an impedance of 600 ohms. The relationship between

dBV and dBm (600 ohms) is that a voltage level of 0 dBV across 600 ohms equates to a power level of 2.22 dBm into 600 ohms.

DTMF & Noise Generator Signal Levels

DTMF Generator Levels:

The DTMF tone created by the generator is composed of two separate tones. The lower frequency tone corresponds to the DTMF digit's row location in the DTMF tone array, while the higher frequency tone corresponds to the digit's column location. Since the DTMF tone level is specified as the total rms voltage level (in dBV) and twist level, the signal levels for each of the low and high group tones are calculated as follows.

LG = T / sqrt(1 + LinTwist)
HG = LG * sqrt (LinTwist)

where: LG = low group voltage level
HG = high group voltage level
T = voltage level of combined DTMF tone
LinTwist = linear (or non-logarithmic) value of the DTMF Twist

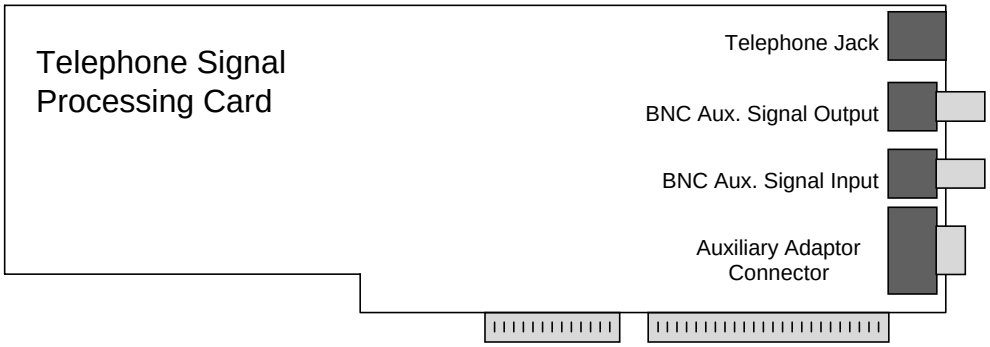
Note: DTMF Twist level is defined as the difference in signal level between the high group (column) tone and the low group (row) tone, expressed in decibels (dB). Positive twist is defined as the level of the high group tone being greater than the level of the low group tone. Correspondingly, a low group tone level greater than the high group tone level is defined as negative twist.

Noise Generator Levels:

The TSPC noise generator produces a spectrally flat noise bandwidth to a maximum frequency of approximately 22 kHz. However, when specifying the noise generator signal level, the noise bandwidth is taken from 200 Hz to 3200 Hz. As such the total noise power generated by the TSPC will be greater than the noise power specified by a factor of approximately 8.6 dB. This correction factor is also applied to the Signal-to-Noise Ratio (SNR) parameter of the DTMF generator when transmitting Caller ID data. As such, the Signal-to-Total Noise Ratio will be approximately 8.6 dB less that what is specified since the total noise power is greater than the noise power in the band of 200 Hz to 3200 Hz by about 8.6 dB.

External BNC Signal Levels

The two BNC connectors on the rear of the Telephone Signal Processing Card (TSPC) can be used to monitor various signals to and from the CPE, and to inject signals directly to the CPE. The figure below shows the BNC signal output connector being located below the telephone jack, and just above the BNC signal input connector.



BNC Output Connector:
The auxiliary signal output has an output impedance of 600 ohms, and can either be set to monitor the signal tones, FSK modulator, and noise signals generated by the TSPC, or the signals being received from the CPE connected via the telephone jack. When monitoring the signals generated by the TSPC, the output level present at the BNC connector (with a high impedance load) is equal to one quarter (12 dB less) of the AC voltage source driving the telephone interface.

For example, setting the Tone Generator for an output level of 0 dBV will produce a level at the BNC connector of -12 dBV into a high impedance load.

If monitoring signals generated from the CPE, the signal level present at the BNC connector (with a high impedance load) is 6 dB less than the voltage level across the CPE. So if a level of 0 dBV is present at the CPE terminals, the signal level at the BNC output connector will be -6 dBV into a high impedance load. See the section dealing with Telephone Line Signal Levels for a more in-depth look at the signal levels within the telephone interface.

BNC Input Connector:

The auxiliary signal input has an input impedance of approximately 100 kohms. Signals injected in this input can be routed to the CPE, or to the level analyzer within the TSPC. If set to route the input signal to the CPE, the voltage at the AC voltage source driving the telephone interface will be four times higher than the voltage level injected at the BNC input connector.

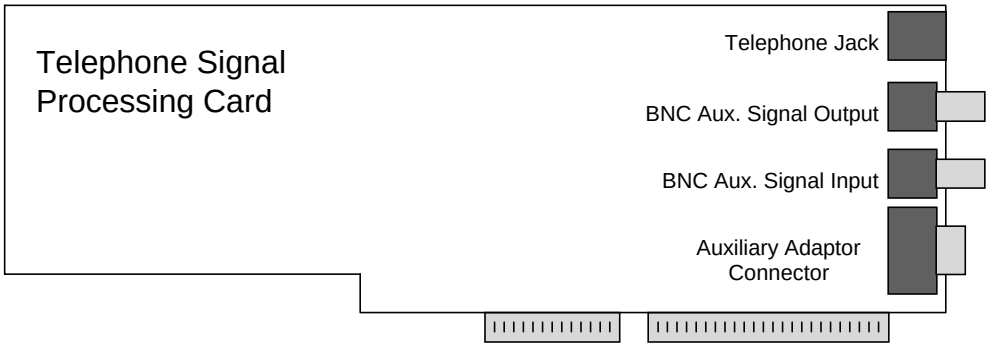
For example, if the CPE is disconnected (open circuit on tip and ring), the voltage at the telephone line would be 12 dB more than the voltage present at the BNC input connector. If the CPE presents a 600 ohm load and the telephone interface impedance (Zs) is 600 ohms, the voltage level across the CPE would be 6 dB more than the voltage level at the BNC input connector. Changing the telephone interface's source impedance (Zs) to 900 would cause the voltage level across the CPE to be reduced by 1.96 dB.

If the BNC input is routed to the level analyzer within the TSPC, the voltage read by the level meter will be the same as the signal level at the BNC connector. As above, see the section dealing with Telephone Line Signal Levels for a more in-depth look at the signal levels within the telephone interface.

For more information on how to change, and configure the function of the auxiliary BNC connectors, see: Signal Flow and Routing

Auxiliary Digital Inputs and Outputs

The DB9 pin connector at the rear of the Telephone Signal Processing Card (TSPC) provides access to general purpose digital outputs and inputs that can be used for various functions throughout the program.



The DB9 female connector allows for the use of up to 2 digital outputs, 2 digital inputs, and a +5V supply from the PC. The digital outputs are only active when Pin 7 is connected to ground. This serves as a output port enable. The outputs are driven from 5V 'HC CMOS logic. Pin 3 is defined as Output A, while pin 4 is Output B. The two available inputs are at pins 8 (Input A) and 9 (Input B). The input voltages should be limited to ground and +5V in order to prevent damage to the internal HC CMOS buffers. Both Input A and Input B have 10 kohm resistors to ground in order to prevent floating inputs. The pin assignment for the DB9 connector is as follows:

Pin 1: +5V (can draw up to 0.5A from this pin) (internally fused)
Pin 2: Reserved Output (do not use)
Pin 3: External Output A (HC CMOS 5V output)
Pin 4: External Output B (HC CMOS 5V output)
Pin 5: Ground
Pin 6: Reserved Output (do not use)
Pin 7: Digital Output Enabled (connect to ground to enable outputs)
Pin 8: External Input A (HC CMOS 5V input)
Pin 9: External Input B (HC CMOS 5V input)

The two digital outputs (A & B) can be programmed high or low by scripting commands, or they can be set to indicate certain activities such as DTMF data transmission, ringing, or OSI signaling. This feature can be enabled or disabled in the [MORE OPTIONS] settings panel under the [CONFIGURATION] menu. Output A can be set to be active during DTMF data transmissions, or during an open switching interval (OSI), while output B can be set active during ringing. For earlier hardware that does not support the generation of OSI, output A can be used to control an external relay that breaks the circuit to the CPE in order to simulate an OSI. Other uses for these output signals include the ability to trigger external equipment (oscilloscopes, logic analyzers, emulators) during the DTMF or ringing portions of a Caller ID transmission.

The two digital inputs can be used to control the execution of a script language program. The BRANCHIF command can be used to branch the execution point of the script program if either of the digital inputs are currently at a high level.

Telephone Line Unbalance and Grounding

As with any system of instruments and devices, proper grounding is essential in order to minimize circuit hum and susceptibility to interference. It is important to understand the circuit grounds of all the devices in the test setup to ensure their proper connection.

Like most PC based instruments the TSPCs ground point is referenced to the PCs ground, which should be connected to earth ground. The ground conductor on the BNC input and output and the DB9 connector are at earth ground potential, assuming the computer is properly grounded. The tip and ring leads of the telephone interface have a negative potential with respect to ground depending on the programmed line voltage. At the default setting of 48 volts, the voltages present on tip and ring are approximately -52 volts and -4 volts with respect to the computers ground.

Care must be taken with CPEs that do not maintain isolation from the telephone interface. Most Caller ID adjunct units fall into this category. This can cause grounding problems when connecting the ground leads of oscilloscopes or other equipment that is normally earth grounded. The most common cause is that the CPE connects either tip or ring to its circuit ground via a bridge rectifier. If the CPEs circuit ground is then connected to earth ground by use of an oscilloscope ground lead, an emulator, or logic analyzer, then this effectively shorts either the tip or ring line to earth ground. The imbalance in loop current is detected by the TSPC and will be shown as a line unbalanced condition.

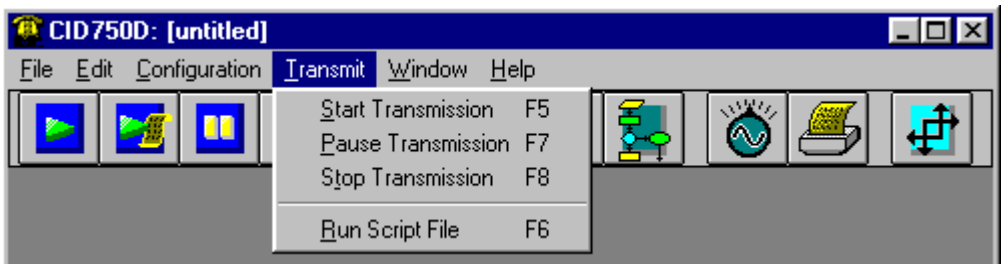
If the CPE has an isolated telephone interface, then this condition should not occur, since the CPEs circuit ground is not connected to its telephone interface circuitry. If this is not the case, and external equipment must be connected to the CPE under test that forces its ground to be connected with earth ground, there are a few possible solutions available. In some cases, the telephone interface is not a requirement for the testing situation, and the BNC inputs or outputs can be used, since the BNCs are ground referenced unbalanced signals. If the telephone interface is required, then the grounding loop must be broken. This can mean isolating the PC that contains the TSPC, or the test equipment connected to the CPE, or the telephone line itself. Depending on what testing is required, the telephone line can be isolated via an AC coupling transformer and a DC feeding bridge. Of course, the DC supply would have to be isolated from earth ground, but this is generally easier to do than isolating the PC.

Note: Disconnecting the earth ground wire from the computer is both an improper and potentially dangerous method of isolating the computer from the remainder of the test setup. The AC isolation achieved is generally poor due to the large parasitic capacitance to earth ground. An alternative approach may be the use of a UPS. UPSs are an excellent method of achieving near perfect isolation between circuit grounds.

■ Section 6 Program Reference

Menu Options

This section lists each command available at the program's command line, along with its function.



The program menu bar contains the following headings.

1) FILE menu heading
2) EDIT menu heading
3) CONFIGURATION menu heading
4) TRANSMIT menu heading
5) WINDOW menu heading
6) HELP menu heading

The FILE Menu Options

The options under the FILE menu are the following

[NEW SCRIPT FILE] This option erases the current script file contained in the script file editor window, such that a new script file can be entered.

[OPEN SCRIPT FILE] Selecting this option opens up a dialog box where a saved script file can be loaded into the script file editor window. The program will only work with one script file at any given time, so the original script file will be lost, if not saved.

[SAVE SCRIPT FILE] This menu item will save the current script file contained in the script editor window with the current script file name. If no previous file name has been given, then a dialog box will allow the user to enter the file name for the script program.

[SAVE AS SCRIPT FILE] This menu item will save the current script file contained in the script editor window. A dialog box will allow the user to enter the file name used to save the script program.

[SAVE AS LOG FILE] The menu item will save the current log file as contained in the log file window. A dialog box will allow the user to enter the file name used to save the log file.

[PRINT PARAMETER SETTINGS] Selecting this option sends a snapshot of all the parameter settings to the printer.

[PRINT SCRIPT PROGRAM] This option prints a copy of the current script file contained in the script file editor window.

[PRINT DATA LOG] This option prints a copy of the current data log file contained in the data log file window.

[PRINTER SETUP] If various print devices are connected, this option allows the user to select the preferred printer.

[EXIT] This option will shut down the telephone signal processing card, and end the program's operation. Before terminating, the program will save its window position on the screen, currently selected standard, and the last four configuration files used. When the program is restarted at a later time, this information will be restored.

The EDIT Menu Options

The options under the EDIT menu are the following:

[CUT] Any text that is currently selected or highlighted will be removed and placed into the Windows clipboard. Once inside the clipboard, the text may be transferred to other Windows programs by PASTE'ing it out of the clipboard.

The shortcut key for this command is: **CTRL-X**

[COPY] Any text that is currently selected or highlighted will be copied into the Windows clipboard. Once inside the clipboard, the text may be transferred to other Windows programs by PASTE'ing it out of the clipboard.

The shortcut key for this command is: **CTRL-C**

[PASTE] If any text is contained within the Windows clipboard, it can be placed into the current text region that has the focus at the insertion point. If text within the text region has been selected, the text from the clipboard will replace the selected text.

The shortcut key for this command is: **CTRL-V**

[SELECT ALL] This option will select or highlight all of the text in the current text region.

The shortcut key for this command is: **CTRL-A**

[CLEAR] Any text that is currently selected will be deleted. This option does not effect the text within the Windows clipboard.

The CONFIGURATION Menu Options

The options under the CONFIGURATION menu are the following:

[SIGNAL ROUTING] Selecting this option will display the Signal Routing Window. From this window, the user can configure the telephone signal processing card to various types to signal flow conditions.

The shortcut key for this command is: CTRL-R

See Also: Signal Flow and Routing

[SAVE AS CONFIGURATION] This option will display a dialog box where the user can select a file name for saving the program's configuration. The resulting configuration file will contain a snap shot of all parameters, packet data, segment data, script program, data log file, and program options. This configuration file can then be loaded into the program at any time to quickly return to the same state as when it was saved.

[LOAD CONFIGURATION] This option will display a dialog box where the user can select a configuration file to be loaded into the program. The configuration files contain an exact snap shot of all of the parameters, packet data, segment data, script program, data log file, and program options the program contained at the time the configuration file was saved.

[1,2,3,4] The four menu options contain the names of the last four configuration files used. Selecting the menu option with the desired configuration file, will load that configuration file into the program. This provides a shortcut method of loading configuration files that are frequently used.

[RESTORE DEFAULTS] This option will change all parameters and settings back to their default value. The script and data log files will be cleared and the telephone signal processing card reset to the default settings. Effectively, this command results in the same actions as quitting and restarting the program.

[MORE OPTIONS] This selection presents additional program options. These options, when enabled, will automatically increment any or all of the five possible telephone numbers after each Caller ID transmission.

The TRANSMIT Menu Options

The options under the TRANSMIT menu are the following:

[START TRANSMISSION] Selecting this option starts a Caller ID transmission using the current parameters, packet data, and segment data options. Once the transmission has started, changing any of the parameters, packet, or segment data options will no effect on the current Caller ID transmission underway. Any changes will take effect when the next transmission is started. While a Caller ID transmission is in progress, selecting this option will have no effect.

The shortcut key for this command is: **F5**

[PAUSE TRANSMISSION] This option will suspend a Caller ID transmission currently in progress. If no transmission is taking place, this command will have no effect. Once paused, the transmission can be resumed by selecting [START TRANSMISSION], or terminated by selecting [STOP TRANSMISSION]. In the suspended state, changing any parameters, packet, or segment data options will have no effect on the transmission when it is restarted.

The shortcut key for this command is: **F7**

[STOP TRANSMISSION] Selecting this option will terminate any Caller ID transmission that is running or in a paused state. If no Caller ID transmission is taking place, this command will have no effect.

The shortcut key for this command is: **F8**

[RUN SCRIPT FILE] This command starts the execution of the script file program contained in the Script File Window. The script file will first be scanned for syntax errors, before execution begins. Once executing, the Script File Execution window will be displayed. From this window, the progress of the script file can be monitored along with pausing, or stopping its execution.

The shortcut key for this command is: **F6**

See Also: Running Script Files

The WINDOW Menu Options

[TILE HORIZONTAL] This menu option will arrange all open windows in a horizontal pattern across the main program window.

[CASCADE] This menu option will arrange all open window in a cascading pattern from top left to bottom right.

[ARRANGE ICONS] This menu option will arrange all minimized windows along the bottom of the main program window.

[1 to 6] Selecting any of these menu options will bring the associated window to the front, and place all other windows behind it.

The HELP Menu Options

The options under the HELP menu are the following:

[CONTENTS] This menu option displays the help window table of contents. From the table of contents, specific areas of program help can be reached by clicking on the underlined topic heading.

The shortcut key for this command is: F1

[SEARCH FOR HELP ON] This menu option displays the Windows Help Search dialog box. By typing key words, the help program will display help topics that relate to the key word entered.

[TECHNICAL SUPPORT] This menu option shows how you can contact us for questions concerning the product.

[ABOUT CID750D] This menu option displays the program version code, along with the revision and product codes for the telephone signal processing card. The base I/O address used to communicate with the telephone signal processing card is also displayed.

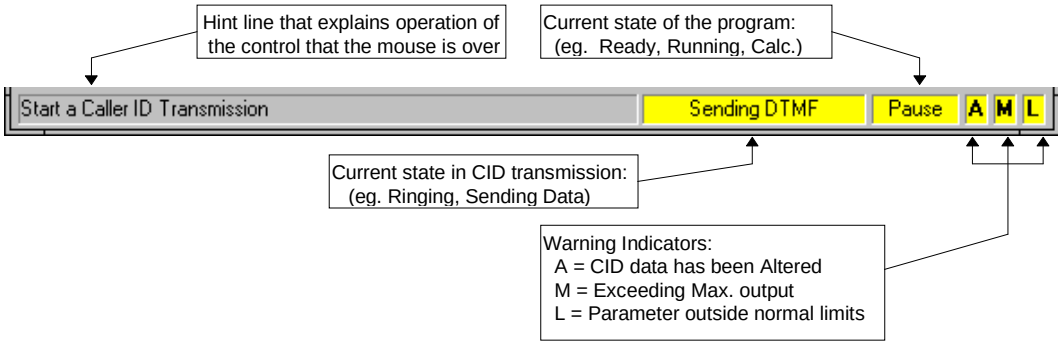
The Toolbar

The toolbar gives a shortcut method for accessing various program functions contained in the menus. The function of each toolbar button is described below. For more information on each menu item, see Program Reference: Menu Options

ICON	*Description of Action*	*Equivalent Menu Option*
	Start Caller ID Transmission:	[TRANSMIT] [START TRANSMISSION]
	Start Executing the Script Program	[TRANSMIT] [RUN SCRIPT FILE]
	Pause Caller ID Transmission	[TRANSMIT] [PAUSE TRANSMISSION]
	Stop Caller ID Transmission	[TRANSMIT] [STOP TRANSMISSION]
	Main Settings Window	[WINDOW] [MAIN SETTINGS]
	Advance Setup Window	[WINDOW] [ADVANCE SETTINGS]
	Packet/Segment Editor Window	[WINDOW] [EDIT PACKET/SEGMENT DATA]
	Script Editor Window	[WINDOW] [SCRIPT EDITOR]
	Tone Generator Window	[WINDOW] [TONE GENERATOR]
	Log File Window	[WINDOW] [DATA LOG]
	Signal Routing Window	[CONFIGURATION] [SIGNAL ROUTING]

The Status Line

At the bottom of the master window, is the status line. Here you can instantly determine the current state of the program. The following diagram helps to illustrate some examples.



The first frame, the Hint Line, helps to explain the operation of most of the controls in the sub-windows, when the mouse is placed over them. The next frame shows the current state of any Caller ID transmissions taking place. When a transmission is active, it will be highlighted in yellow, with the text indicating the current action being taken. The following frame indicates the status of the program. It will display READY at idle times. During data transmissions, it will display either RUNNING or PAUSE. Also, when performing calculations, it may display CALC.. "TONE ON" will be indicated if the tone generator is currently active.

The last three frames are warning indicators. These help remind the user that certain settings have been set to unusual values, or are outside recommended limits.

The first indicator will illuminate with an “A” to signify altered Caller ID data. This means that the Caller ID data has been changed in the Edit Data window. If any of the DTMF digits are altered, or the duration of any digit is set to something other than the value specified by the parameter: DTMF Tone On Time, then the Caller ID data will be flagged as altered. Also, changing the pause time between DTMF digits to something other than the parameter value of: DTMF Pause Time, will also illuminate the "A" flag.

The second indicator displays a “M” whenever the Telephone Signal Processing Card (TSPC) has been directed to generate simultaneous tones at a level that exceeds its maximum undistorted output capability.

Finally, the third indicator will display a “L” anytime transmission parameters fall outside their nominal range. If a parameter value has been changed to a value that is outside its nominal range, the "L" indicator will be shown. Not all transmission parameters are defined with nominal maximums or minimums. To determine what are the nominal limits, if any at all, located the desired parameter under the Help Section: Changing the Transmission Parameters

Shortcut Keys

Pressing the shortcut keys are equivalent to selecting its associated menu option.

File - Save Script File	**CTRL-S**
Edit - Cut	**CTRL-X**
Edit - Copy	**CTRL-C**
Edit - Paste	**CTRL-V**
Edit - Select All	**CTRL-A**
Signal Routing Window	**CTRL-R**
Help	**F1**
Start CID Transmission	**F5**
Pause CID Transmission	**F7**
Stop CID Transmission	**F8**
Run Script File	**F6**
Script File Program Branch	**F9**

Loading Files at Startup

It is possible to load a script program or configuration file automatically at the program startup. This is done by specifying the file to load on the program command line. For example, the default command line that windows uses to run the CID705D program is:

CID750D

However, this can be changed to specify the immediate loading of a script or config file at program start by appending either s=(script file name), or c=(config file name). Two examples of this are given below.

CID750D s=ant3_a.scr
CID750D c=c:\test1.cfg

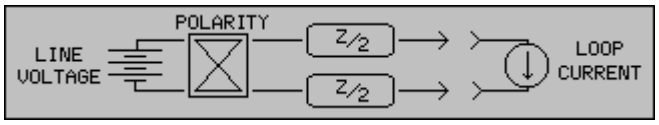
The first example loads the script file called ant3_a.scr that is located in the same program directory as the CID1500 program. The second example loads the configuration file test1.cfg from the root directory of C drive.

It is also possible to automatically load and begin executing a scripting program at startup. By adding either sr=(script file name), or cr=(config file name) to the command line, once the scripting or configuration file has loaded, the script program will start to run.

■ Appendix A Transmission Parameters

Parameter Category: Telephone Interface

Parameter: Telephone Line Voltage

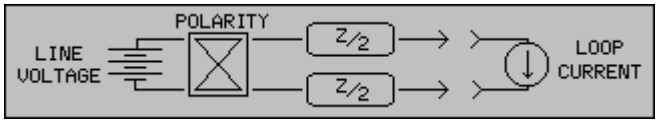


Parameter Description:
This parameter sets the voltage present on the telephone line when the telephone is in an on hook state (drawing no current). Once the telephone goes off hook, a constant current mode of operation is engaged, where the setting of this parameter is not relevant. Any changes made in the parameter will take effect immediately.

Details:

Title:	Line Voltage
Units:	Volts
Default Value:	**48**
Maximum Value:	52
Minimum Value:	20
Maximum Standard Value:	n/a
Minimum Standard Value:	n/a
Script Name:	LINE_VOLTAGE

Parameter: Telephone Loop Current



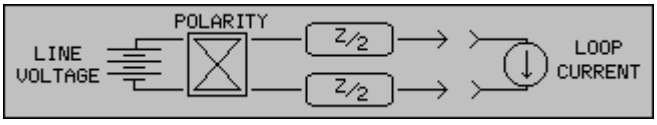
Parameter Description:
This parameter sets the loop current flowing through the telephone line when the telephone is in an off hook state (drawing current). Once the telephone goes on hook, a constant voltage mode of operation is engaged, where the setting of this parameter is not relevant. Any changes in the parameter will take effect immediately.

Note: In the off hook state, the constant current mode of operation will only be maintained if the DC voltage across the CPE is less than the setting of the parameter: Telephone Line Voltage. If this condition is not met, then the loop current will fold back to a lower level. For example, setting a loop current of 40 mA, with a CPE that has 600 ohms of DC resistance will cause a line voltage of 40 mA x 600 ohms or 24 Volts. However, if the Telephone Line Voltage parameter is set to 20 Volts, then it would be impossible to feed 40 mA through the CPE.

Details:

Title:	Loop Current
Units:	mA
Default Value:	**26**
Maximum Value:	40
Minimum Value:	20
Maximum Standard Value:	n/a
Minimum Standard Value:	n/a
Script Name:	LOOP_CURRENT

Parameter: Telephone Line Impedance

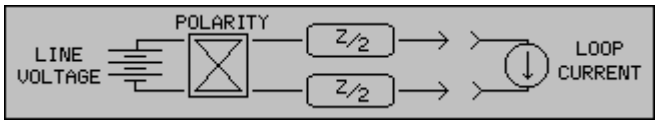


Parameter Description:
This parameter selects whether the AC impedance presented by the telephone line is either a real 600 ohms, 900 ohms, or a complex impedance. To change the line impedance setting from the Advanced Settings window, select the impedance parameter and then choose the impedance value from the drop-down list displayed and press the Accept button.

Details:

Title:	Line Impedance (600, 900, or Complex)
Units:	n/a
Default Value:	**900 ohms**
Maximum Value:	n/a
Minimum Value:	n/a
Maximum Standard Value:	n/a
Minimum Standard Value:	n/a
Script Name:	LINE_IMPEDANCE

Parameter: Telephone Line Polarity



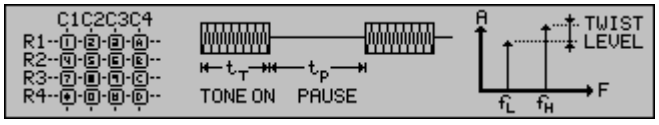
Parameter Description:
The Line Polarity parameter selects the voltage and current polarity of the telephone interface. The two options are normal and reversed

Details:

Title:	Line Polarity (normal/reversed)
Units:	n/a
Default Value:	**Normal**
Maximum Value:	n/a
Minimum Value:	n/a
Maximum Standard Value:	n/a
Minimum Standard Value:	n/a
Script Name:	LINE_POLARITY

Parameter Category: DTMF Generator

Parameter: Transmit DTMF Level



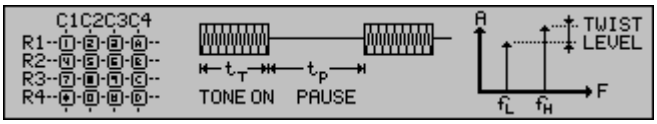
Parameter Description:
This parameter sets the level of the DTMF signal used to transmit the Caller ID data. Unlike most parameters, this parameter can be changed in the Main Settings window, as opposed to the Advanced Setup window.

For information on how to enable or disable the DTMF Generator, see:
Controlling the Caller ID Transmission

Details:

Title:	Transmit DTMF Level
Units:	dBV
Default Value:	**-10 dBV**
Maximum Value:	6 dBV
Minimum Value:	-60 dBV
Maximum Standard Value:	n/a
Minimum Standard Value:	n/a
Script Name:	DTMF_LEVEL

Parameter: Transmit DTMF Signal-to-Noise Ratio



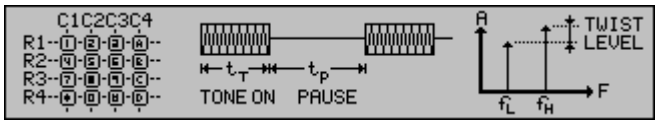
Parameter Description:
This parameter specifies the signal-to-noise ratio between the transmit DTMF level and the noise generator. The larger the value, the lower the noise level is with respect to the DTMF signal. Note, the noise level is defined as the noise power in the frequency band from 200 Hz to 3200 Hz. However, the noise spectrum produced by the noise generator is flat to 20 kHz. As a result the broad band noise power produced by the noise generator will be higher than that within the 200 Hz to 3200 Hz bandwidth.

For information on how to enable or disable the DTMF Generator, see:
Controlling the Caller ID Transmission

Details:

Title:	Transmit DTMF Signal-to-Noise Ratio
Units:	dB
Default Value:	**60 dB**
Maximum Value:	60 dB
Minimum Value:	0 dB
Maximum Standard Value:	n/a
Minimum Standard Value:	n/a
Script Name:	DTMF_SNR

Parameter: DTMF Row #1 Frequency

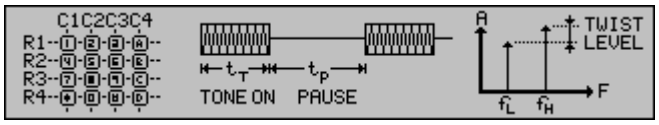


Parameter Description:
This parameter specifies the frequency for the first row of the DTMF digit array. The rows of the array correspond to the low group frequencies, while the columns refer to the high group frequencies. The row #1 frequency value sets the "1", "2", "3", and "A" digit low group frequency.

Details:

Title:	Row #1 Frequency
Units:	Hz
Default Value:	**697 Hz**
Maximum Value:	5000 Hz
Minimum Value:	100 Hz
Maximum Standard Value:	686.5 Hz
Minimum Standard Value:	707.5 Hz
Script Name:	FREQ_R1

Parameter: DTMF Row #2 Frequency

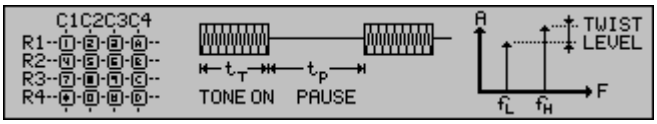


Parameter Description:
This parameter specifies the frequency for the second row of the DTMF digit array. The rows of the array correspond to the low group frequencies, while the columns refer to the high group frequencies. The row #2 frequency value sets the "4", "5", "6", and "B" digit low group frequency.

Details:

Title:	Row #2 Frequency
Units:	Hz
Default Value:	**770 Hz**
Maximum Value:	5000 Hz
Minimum Value:	100 Hz
Maximum Standard Value:	758.5 Hz
Minimum Standard Value:	781.6 Hz
Script Name:	FREQ_R2
Standard:	

Parameter: DTMF Row #3 Frequency

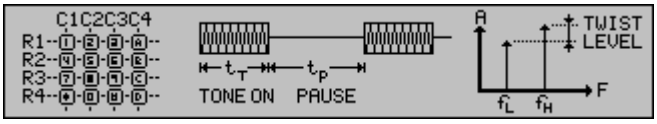


Parameter Description:
This parameter specifies the frequency for the third row of the DTMF digit array. The rows of the array correspond to the low group frequencies, while the columns refer to the high group frequencies. The row #3 frequency value sets the "7", "8", "9", and "C" digit low group frequency.

Details:

Title:	Row #3 Frequency
Units:	Hz
Default Value:	**852 Hz**
Maximum Value:	5000 Hz
Minimum Value:	100 Hz
Maximum Standard Value:	839.2 Hz
Minimum Standard Value:	864.8 Hz
Script Name:	FREQ_R3

Parameter: DTMF Row #4 Frequency

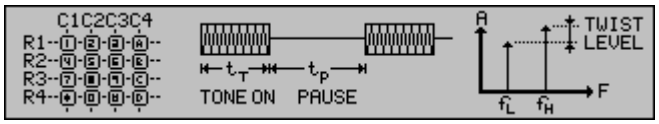


Parameter Description:
This parameter specifies the frequency for the forth row of the DTMF digit array. The rows of the array correspond to the low group frequencies, while the columns refer to the high group frequencies. The row #1 frequency value sets the "*", "0", "#", and "D" digit low group frequency.

Details:

Title:	Row #4 Frequency
Units:	Hz
Default Value:	**941 Hz**
Maximum Value:	5000 Hz
Minimum Value:	100 Hz
Maximum Standard Value:	926.9 Hz
Minimum Standard Value:	955.1 Hz
Script Name:	FREQ_R4

Parameter: DTMF Column #1 Frequency

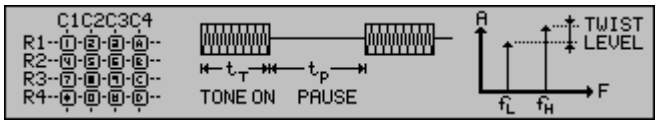


Parameter Description:
This parameter specifies the frequency for the first column of the DTMF digit array. The columns of the array correspond to the high group frequencies, while the rows refer to the low group frequencies. The column #1 frequency value sets the "1", "4", "7", and "*" digit high group frequency.

Details:

Title:	Column #1 Frequency
Units:	Hz
Default Value:	**1209 Hz**
Maximum Value:	5000 Hz
Minimum Value:	100 Hz
Maximum Standard Value:	1190.9 Hz
Minimum Standard Value:	1227.1 Hz
Script Name:	FREQ_C1

Parameter: DTMF Column #2 Frequency

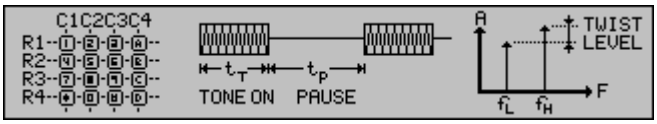


Parameter Description:
This parameter specifies the frequency for the second column of the DTMF digit array. The columns of the array correspond to the high group frequencies, while the rows refer to the low group frequencies. The column #2 frequency value sets the 2", "5", "8", and "0" digit high group frequency.

Details:

Title:	Column #2 Frequency
Units:	Hz
Default Value:	**1336 Hz**
Maximum Value:	5000 Hz
Minimum Value:	100 Hz
Maximum Standard Value:	1316 Hz
Minimum Standard Value:	1356 Hz
Script Name:	FREQ_C2

Parameter: DTMF Column #3 Frequency

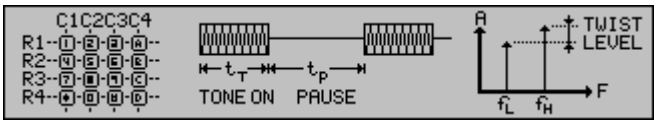


Parameter Description:
This parameter specifies the frequency for the third column of the DTMF digit array. The columns of the array correspond to the high group frequencies, while the rows refer to the low group frequencies. The column #3 frequency value sets the "3", "6", "9", and "#" digit high group frequency.

Details:

Title:	Column #3 Frequency
Units:	Hz
Default Value:	**1477 Hz**
Maximum Value:	5000 Hz
Minimum Value:	100 Hz
Maximum Standard Value:	1454.8 Hz
Minimum Standard Value:	1499.2 Hz
Script Name:	FREQ_C3

Parameter: DTMF Column #4 Frequency

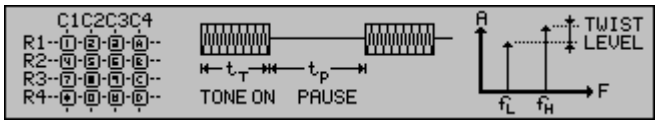


Parameter Description:
This parameter specifies the frequency for the forth column of the DTMF digit array. The columns of the array correspond to the high group frequencies, while the rows refer to the low group frequencies. The column #1 frequency value sets the "A", "B", "C", and "D" digit high group frequency.

Details:

Title:	Column #4 Frequency
Units:	Hz
Default Value:	**1633 Hz**
Maximum Value:	5000 Hz
Minimum Value:	100 Hz
Maximum Standard Value:	1608.5 Hz
Minimum Standard Value:	1657.5 Hz
Script Name:	FREQ_C4

Parameter: DTMF Frequency Deviation

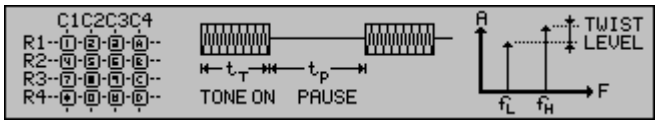


Parameter Description:
This parameter defines a frequency deviation, or shift for each of the eight DTMF tones (Row 1 to 4, and Column 1 to 4). By changing this parameter, all of the DTMF frequencies can be shifted up to 20 % higher or lower than their defined value.

Details:

Title:	Frequency Deviation
Units:	%
Default Value:	**0 %**
Maximum Value:	20 %
Minimum Value:	-20 %
Maximum Standard Value:	1.5 %
Minimum Standard Value:	-1.5 %
Script Name:	FREQ_DEV

Parameter: DTMF Twist Level

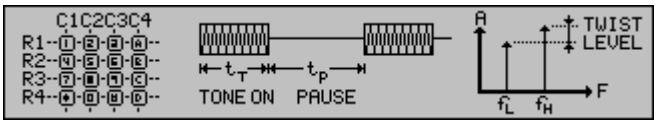


Parameter Description:
The DTMF twist level is the difference in signal level between the high group (column) tone and the low group (row) tone. Positive twist is defined where the column tones have a higher signal level than the row tones.

Details:

Title:	Twist Level
Units:	DB
Default Value:	**0 dB**
Maximum Value:	20 dB
Minimum Value:	-20 dB
Maximum Standard Value:	n/a
Minimum Standard Value:	n/a
Script Name:	DTMF_TWIST

Parameter: DTMF Tone On Time

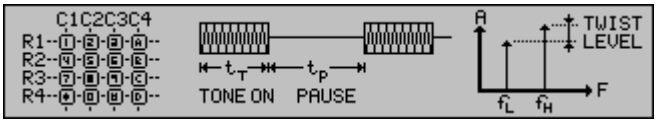


Parameter Description:
The DTMF tone on time specifies the duration of the DTMF tone for each of the digits sent in the Caller ID transmission. This duration is the same for all of the digits sent. However, using the Edit Data Window, it is possible to change the tone on time for any digit to an arbitrary value between the maximum and minimum limits defined here. Changing this parameter will set the DTMF tone duration of all digits to the value specified, and effectively cancel any changes made in the Edit Data Window.

Details:

Title:	DTMF Tone on Time
Units:	msec
Default Value:	**70 msec**
Maximum Value:	20000 msec
Minimum Value:	1 msec
Maximum Standard Value:	n/a
Minimum Standard Value:	48 msec
Script Name:	DTMF_ONTIME

Parameter: Pause Time Between Tones



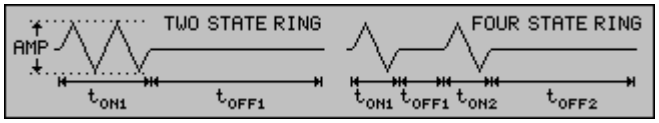
Parameter Description:
The pause time specifies the silence duration, or interval, between DTMF digits in a Caller ID transmission. This interval is the same for all of the digits sent. However, using the Edit Data Window, it is possible to change the pause time between any DTMF digits to an arbitrary value between the maximum and minimum limits defined here. Changing this parameter will set the pause time interval between all DTMF digits to the value specified, and effectively cancel any changes made in the Edit Data Window.

Details:

Title:	Pause Time Between Tones
Units:	Msec
Default Value:	**70 msec**
Maximum Value:	20000 msec
Minimum Value:	1 msec
Maximum Standard Value:	n/a
Minimum Standard Value:	48 msec
Script Name:	DTMF_PAUSE

Parameter Category: Ringing Generator

Parameter: Ring Generator Frequency

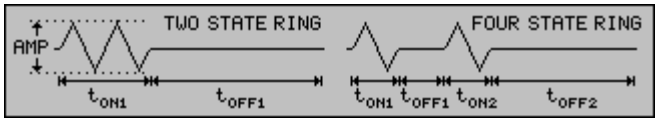


Parameter Description:
This parameter defines the frequency of the Ringing Generator.

Details:

Title:	Ring Generator Frequency
Units:	Hz
Default Value:	**22 Hz**
Maximum Value:	1000 Hz
Minimum Value:	10 Hz
Maximum Standard Value:	68 Hz
Minimum Standard Value:	13 Hz
Script Name:	RING_FREQ

Parameter: Ring Generator Level



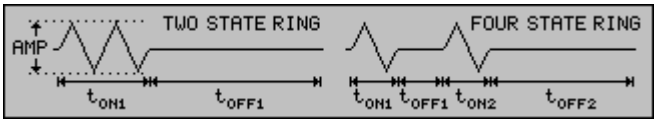
Parameter Description:
This parameter specifies the level of the Ringing Generator. The maximum ringing level that can be generated is 80 Vrms; however, this is dependent on the setting of the Telephone Line Voltage. Below a setting of 48 Volts for the Telephone Line Voltage, the maximum unclipped ring generator level must be de-

rated. At the minimum Telephone Line Voltage level of 20 V, the maximum unclipped ringing voltage is 60 Vrms.

Details:

Title:	Ring Generator Level
Units:	Vrms
Default Value:	**50 Vrms**
Maximum Value:	80 Vrms
Minimum Value:	0 Vrms
Maximum Standard Value:	n/a
Minimum Standard Value:	40 Vrms
Script Name:	RING_LEVEL

Parameter: Ring Generator Sequence

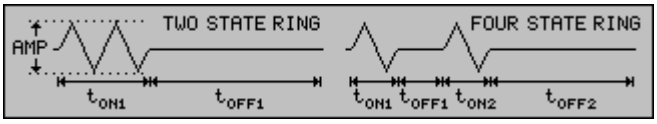


Parameter Description:
This parameter determines whether the Ring Generator pattern is either a 2 state or 4 state ringing pattern. The two state ringing is a single ringing burst followed by silence. The four state ringing is two ringing bursts followed by silence. Similarly, six state ringing allows for three ringing bursts.

Details:

Title:	Ring Generator Sequence (2,4,6 state)
Units:	n/a
Default Value:	**4 State**
Maximum Value:	n/a
Minimum Value:	n/a
Maximum Standard Value:	n/a
Minimum Standard Value:	n/a
Script Name:	RING_SEQ

Parameter: Ring Generator On Time #1

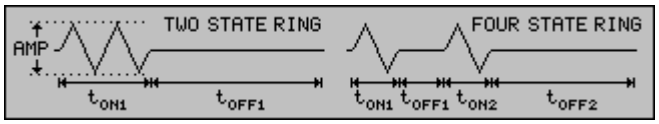


Parameter Description:
This parameter defines the length of the ringing burst generated for the two state ringing pattern. For the four and six state pattern, this parameter defines the length of the **first** ringing burst.

Details:

Title:	Ring Generator On Time #1
Units:	msec
Default Value:	**700 msec**
Maximum Value:	100,000 msec
Minimum Value:	0 msec
Maximum Standard Value:	n/a
Minimum Standard Value:	n/a
Script Name:	RING_ON1

Parameter: Ring Generator Off Time #1

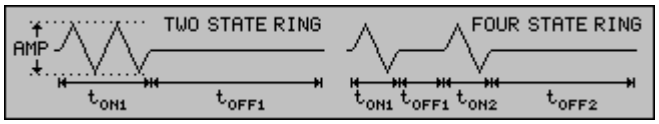


Parameter Description:
This parameter defines the length of the silence interval for the two state ringing pattern. For the four and six state pattern, this parameter defines the length of the time between the first and second ringing bursts.

Details:

Title:	Ring Generator Off Time #1
Units:	msec
Default Value:	**700 msec**
Maximum Value:	100,000 msec
Minimum Value:	0 msec
Maximum Standard Value:	n/a
Minimum Standard Value:	n/a
Script Name:	RING_OFF1

Parameter: Ring Generator On Time #2

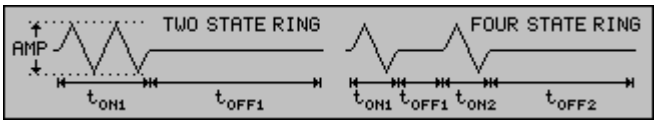


Parameter Description:
This parameter is used in conjunction with the four or six state ringing pattern. It specifies the duration of the second ringing burst.

Details:

Title:	Ring Generator On Time #2
Units:	msec
Default Value:	**700 msec**
Maximum Value:	100,000 msec
Minimum Value:	0 msec
Maximum Standard Value:	n/a
Minimum Standard Value:	n/a
Script Name:	RING_ON2

Parameter: Ring Generator Off Time #2

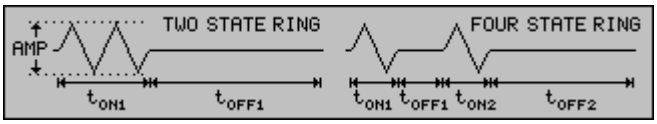


Parameter Description:
This parameter is used in conjunction with the four or six state ringing pattern. It specifies the duration of the silence interval after the second ringing burst.

Details:

Title:	Ring Generator Off Time #2
Units:	msec
Default Value:	**3,000 msec**
Maximum Value:	100,000 msec
Minimum Value:	0 msec
Maximum Standard Value:	n/a
Minimum Standard Value:	n/a
Script Name:	RING_OFF2

Parameter: Ring Generator On Time #3

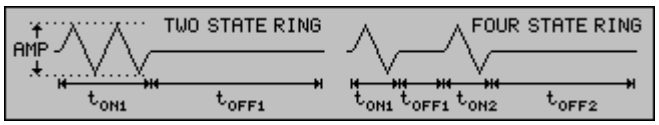


Parameter Description:
This parameter is only used in conjunction with the six state ringing pattern. It specifies the duration of the third ringing burst.

Details:

Title:	Ring Generator On Time #3
Units:	msec
Default Value:	**700 msec**
Maximum Value:	100,000 msec
Minimum Value:	0 msec
Maximum Standard Value:	n/a
Minimum Standard Value:	n/a
Script Name:	RING_ON3

Parameter: Ring Generator Off Time #3

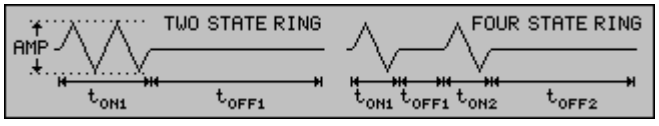


Parameter Description:
This parameter is only used in conjunction with the six state ringing pattern. It specifies the duration of the silence interval after the third and last ringing burst.

Details:

Title:	Ring Generator Off Time #3
Units:	msec
Default Value:	**3,000 msec**
Maximum Value:	100,000 msec
Minimum Value:	0 msec
Maximum Standard Value:	n/a
Minimum Standard Value:	n/a
Script Name:	RING_OFF3

Parameter: Ring Generator Number of Cycles



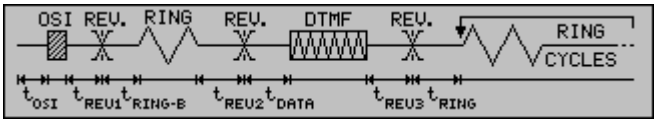
Parameter Description:
This parameter specifies the number of complete ring cycles to generate for a Type I Caller ID Transmission.

Details:

Title:	Ring Generator Number of Cycles
Units:	cycles
Default Value:	**2 cycles**
Maximum Value:	100 cycles
Minimum Value:	1 cycle
Maximum Standard Value:	n/a
Minimum Standard Value:	n/a
Script Name:	RING_CYCLES

Parameter Category: Caller ID Timing

Parameter: Open Switching Interval (OSI) Enable

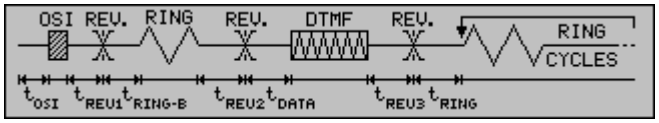


Parameter Description:
This parameter enables or disables the Open Switching Interval (OSI), which is an interval where the telephone line is disconnected from its feeding voltage. The OSI, when enabled is the first part of the Caller ID transmission. The value of the parameter "Time to OSI" controls the time period from when the Caller ID transmission is started to when the OSI interval starts. If the OSI is disabled, then the "Time to OSI" parameter has no effect on the Caller ID timing.

Details:

Title:	OSI Enable
Units:	n/a
Default Value:	**Disabled**
Maximum Value:	n/a
Minimum Value:	n/a
Maximum Standard Value:	n/a
Minimum Standard Value:	n/a
Script Name:	OSI_ENABLE

Parameter: Time to Open Switching Interval (OSI)

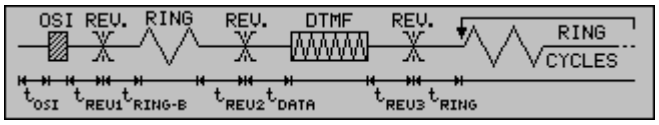


Parameter Description:
This parameter defines the amount of time between the start of a Caller ID transmission and the OSI event. Normally, this parameter is set to zero such that the OSI occurs immediately after starting a Caller ID transmission. However, if conducting repeated Caller ID transmission via a Script program, this parameter can be used to define a time interval between consecutive Caller ID transmissions. If the OSI is not enabled, then this parameter has no effect on the Caller ID transmission timing.

Details:

Title:	Time to OSI
Units:	msec
Default Value:	**0 msec**
Maximum Value:	20000 msec
Minimum Value:	0 msec
Maximum Standard Value:	n/a
Minimum Standard Value:	n/a
Script Name:	TIME_OSI
Standard:	

Parameter: Open Switching Interval (OSI) Duration

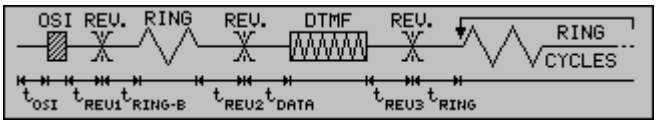


Parameter Description:
This parameter defines the length of the Open Switching Interval (OSI). This is the time period for which the telephone line will be disconnected from the DC feeding voltage. If the OSI is not enabled, then this parameter has no effect on the Caller ID timing.

Details:

Title:	OSI Duration
Units:	msec
Default Value:	**200 msec**
Maximum Value:	20000 msec
Minimum Value:	0 msec
Maximum Standard Value:	n/a
Minimum Standard Value:	n/a
Script Name:	TIME_OSI

Parameter: 1st Line Reversal Enable

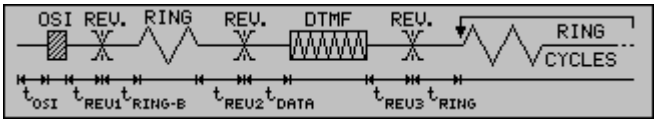


Parameter Description:
This parameter enables or disables the telephone line polarity reversal before the optional ringing burst is generated and after the optional OSI event. If disabled, then the value of the parameter "Time to First Line Reversal" has no influence on the Caller ID timing.

Details:

Title:	1st Line Reversal (enable/disable)
Units:	n/a
Default Value:	**Disabled**
Maximum Value:	n/a
Minimum Value:	n/a
Maximum Standard Value:	n/a
Minimum Standard Value:	n/a
Script Name:	REV1_ENABLE

Parameter: Time to First Line Reversal

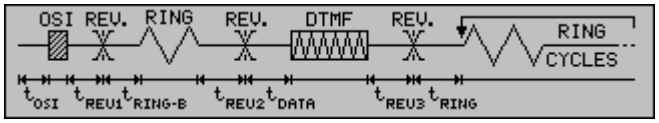


Parameter Description:
This parameter defines the amount of time between the optional OSI event and the first telephone line reversal. If the OSI event is not enabled, then the time interval specified is from the start of the Caller ID transmission to the first line reversal. If the first line reversal is not enabled, then this parameter has no effect on the Caller ID transmission timing.

Details:

Title:	Time to First Line Reverse
Units:	msec
Default Value:	**0 msec**
Maximum Value:	20000 msec
Minimum Value:	0 msec
Maximum Standard Value:	n/a
Minimum Standard Value:	n/a
Script Name:	TIME_REV1

Parameter: Ring Burst Enable

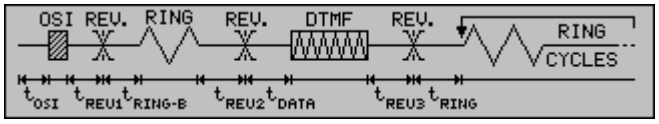


Parameter Description:
This parameter enables or disables the telephone line ring burst which is generated after the optional first line reversal and before the optional second line reversal. If disabled, then no ring burst will be generated, and the parameters "Time to Ring Burst" and "Ring Burst Duration" will have no effect on the Caller ID transmission timing.

Details:

Title:	Ring Burst Enable
Units:	n/a
Default Value:	**Disable**
Maximum Value:	n/a
Minimum Value:	n/a
Maximum Standard Value:	n/a
Minimum Standard Value:	n/a
Script Name:	RING_B_ENABLE

Parameter: Time to Ring Burst



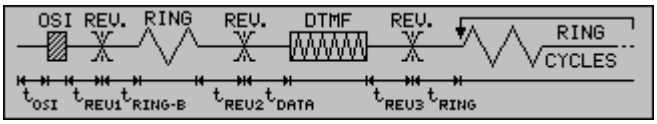
Parameter Description:
This parameter defines the amount of time between the first line reversal and the start of the ringing burst. If the first line reversal is disabled, then this parameter

defines the time between the end of the optional OSI and the ring burst. If the ring burst is disabled, then the value of this parameter has no effect..

Details:

Title:	Time to Ring Burst
Units:	msec
Default Value:	**0 msec**
Maximum Value:	20000 msec
Minimum Value:	0 msec
Maximum Standard Value:	n/a
Minimum Standard Value:	n/a
Script Name:	TIME_RING_B

Parameter: Duration of Ring Burst

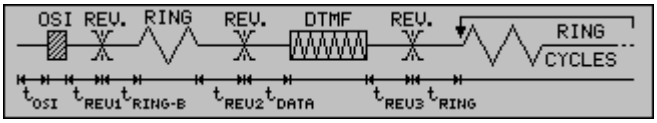


Parameter Description:
This parameter specifies the duration of the optional ringing burst.

Details:

Title:	Duration of Ring Burst
Units:	msec
Default Value:	**500 msec**
Maximum Value:	20000 msec
Minimum Value:	0 msec
Maximum Standard Value:	n/a
Minimum Standard Value:	n/a
Script Name:	RING_B_DUR

Parameter: Frequency of Ring Burst

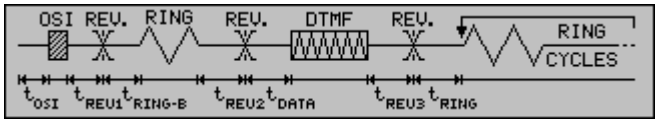


Parameter Description:
This parameter specifies the frequency of the optional ringing burst.

Details:

Title:	Ring Burst Frequency
Units:	Hz
Default Value:	**22 Hz**
Maximum Value:	1000 Hz
Minimum Value:	10 Hz
Maximum Standard Value:	68 Hz
Minimum Standard Value:	13 Hz
Script Name:	RING_B_FREQ

Parameter: Level of Ring Burst

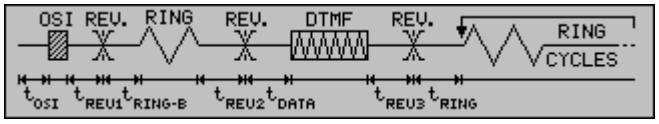


Parameter Description:
This parameter specifies the level of the Ring Burst. The maximum ringing level that can be generated is 80 Vrms; however, this is dependent on the setting of the Telephone Line Voltage. Below a setting of 48 Volts for the Telephone Line Voltage, the maximum unclipped ring generator level must be de-rated. At the minimum Telephone Line Voltage level of 20 V, the maximum unclipped ringing voltage is 60 Vrms.

Details:

Title:	Ring Burst Level
Units:	Vrms
Default Value:	**60 Vrms**
Maximum Value:	80 Vrms *
Minimum Value:	0 Vrms
Maximum Standard Value:	n/a
Minimum Standard Value:	40 Vrms
Script Name:	RING_B_LEVEL

Parameter: 2nd Line Reversal Enable



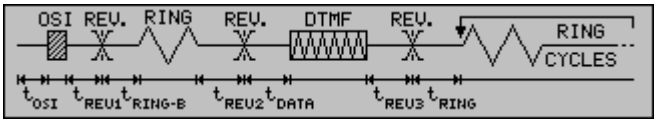
Parameter Description:
This parameter enables or disables the telephone line polarity reversal that occurs after the optional ringing burst and before the DTMF tones are sent. If

disabled, then the value of the parameter "Time to Second Line Reversal" has no influence on the Caller ID timing.

Details:

Title:	2nd Line Reversal (enable/disable)
Units:	n/a
Default Value:	**Disable**
Maximum Value:	n/a
Minimum Value:	n/a
Maximum Standard Value:	n/a
Minimum Standard Value:	n/a
Script Name:	REV2_ENABLE

Parameter: Time to Second Line Reversal

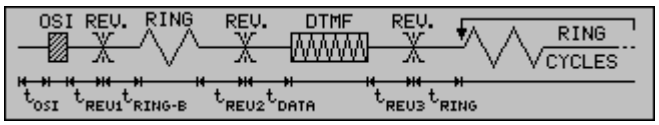


Parameter Description:
This parameter defines the amount of time between the end of the optional ringing burst and the second line reversal. If the ring burst is disabled, then this parameter defines the time between the first line reversal and the second line reversal. In the case that the first line reversal is also disabled, then the time is taken from the start of the Caller ID transmission. This parameter will have no effect unless the second line reversal is enabled.

Details:

Title:	Time to Second Line Reverse
Units:	msec
Default Value:	**0 msec**
Maximum Value:	20000 msec
Minimum Value:	0 msec
Maximum Standard Value:	n/a
Minimum Standard Value:	n/a
Script Name:	TIME_REV2

Parameter: Wait for CPE Off-Hook Enable

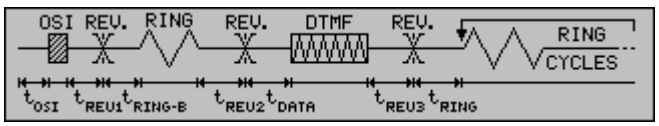


Parameter Description:
In certain DTMF based Caller ID standards, the CPE is required to enter the off-hook state after detecting a line polarity reversal. The central office equipment waits for the CPE to go off-hook before sending the DTMF digits. This parameter is used to enable or disable the option to wait for the CPE to go off-hook. If enabled, the program will wait until the time-out period specified for the CPE to go off-hook. If the time-out period has elapsed, then the Caller ID transmission will continue by sending the DTMF digits.

Details:

Title:	Wait for CPE Off-Hook (enable/disable)
Units:	n/a
Default Value:	**Disable**
Maximum Value:	n/a
Minimum Value:	n/a
Maximum Standard Value:	n/a
Minimum Standard Value:	n/a
Script Name:	OFFHOOK_ENABLE

Parameter: Wait for CPE Off-Hook Timeout



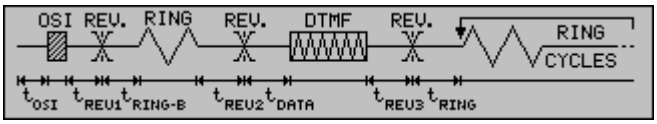
Parameter Description:
If the option to wait for the CPE to go off-hook before sending the DTMF digits has been enabled, then this parameter defines the maximum amount of time to

wait. If the CPE does not go off-hook within the time-out value specified, then the DTMF digits will be sent regardless. If the Wait for CPE Off-Hook option is disabled, then this parameter has no effect on the Caller ID timing.

Details:

Title:	Timeout for Off-Hook
Units:	msec
Default Value:	**800 msec**
Maximum Value:	20000 msec
Minimum Value:	0 msec
Maximum Standard Value:	800 msec
Minimum Standard Value:	n/a
Script Name:	TIME_REV2

Parameter: Time to DTMF Tones

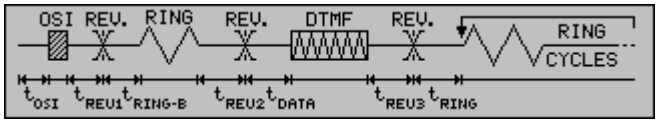


Parameter Description:
This parameter defines the amount of time from when the CPE went off-hook to the start of the DTMF digits, if the "Wait for CPE Off-Hook" option has been enabled. If not enabled, then this parameter specifies the time interval from the previous enabled event. This can be the second line reversal, ringing burst, first line reversal, or OSI.

Details:

Title:	Time to DTMF Tones
Units:	msec
Default Value:	**500 msec**
Maximum Value:	20000 msec
Minimum Value:	0 msec
Maximum Standard Value:	n/a
Minimum Standard Value:	200 msec
Script Name:	TIME_DTMF

Parameter: 3rd Line Reversal Enable

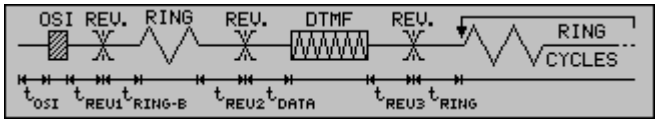


Parameter Description:
Following the transmission of the DTMF digits, a telephone line polarity reversal can be enabled. This option is usually enabled if the DTMF data was sent in the CPE off-hook state, as this reversal is sensed by the CPE as a signal to go on-hook before the ringing starts.

Details:

Title:	3rd Line Reversal (enable/disable)
Units:	n/a
Default Value:	**Disable**
Maximum Value:	n/a
Minimum Value:	n/a
Maximum Standard Value:	n/a
Minimum Standard Value:	n/a
Script Name:	REV3_ENABLE

Parameter: Time to Third Line Reversal

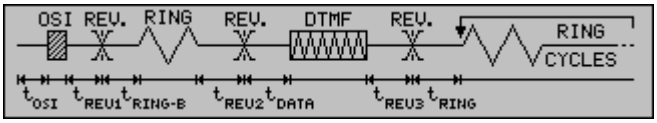


Parameter Description:
This parameter defines the amount of time between the end of the DTMF digits and the third telephone line polarity reversal. If the third line reversal is not enabled, then this parameter has no effect on the Caller ID timing.

Details:

Title:	Time to Third Line Reverse
Units:	msec
Default Value:	**500 msec**
Maximum Value:	20000 msec
Minimum Value:	0 msec
Maximum Standard Value:	n/a
Minimum Standard Value:	n/a
Script Name:	TIME_REV3

Parameter: Ringing Enable

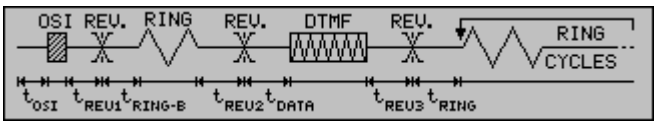


Parameter Description: This parameter enables or disables the telephone line ringing after the DTMF digits or optionally, the third line reversal. The ringing pattern is controlled by the parameters under the ringing generator category. If disabled, no ringing will follow the DTMF digits, or third line reversal, and the Caller ID transmission will end.

Details:

Title:	Ringing (enable/disable)
Units:	n/a
Default Value:	**Enable**
Maximum Value:	n/a
Minimum Value:	n/a
Maximum Standard Value:	n/a
Minimum Standard Value:	n/a
Script Name:	RING_ENABLE

Parameter: Time to Ringing



Parameter Description:
This parameter defines the amount of time between the end of the DTMF tones, or optionally, the third line reversal and the start of the telephone ringing.

Details:

Title:	Time to Ring
Units:	msec
Default Value:	**500 msec**
Maximum Value:	20000 msec
Minimum Value:	0 msec
Maximum Standard Value:	1000 msec
Minimum Standard Value:	n/a
Script Name:	TIME_RING

■ Appendix B Script Language Errors

The following is a list of script program errors:

The script program contains an unknown command.
The first word in a script program line, that is not a comment, must be a command key word. The command must match the spelling as given in the script command reference. Note, the command words are **not** case sensitive See Script Command Reference

The program line's syntax is inconsistent with the command.
The command has been recognized, but the line's syntax is incorrect. This is usually due to an incorrect number of operands on the program line. Remember that spaces are required between operands.

The PARAMETER specified is unknown.
The parameter name that must be specified after the PARAMETER command is unknown. Check the spelling of the parameter name. Note, the parameter names are **not** case sensitive.

The operator being used is invalid.
For the parameter command, the operator specified is not one of the four accepted types. The valid operators are "=" "+=" "-=" "*=" with at least one space before and after the operator.

The value specified for the PARAMETER is unknown or invalid.
The value given for parameter may not be spelled correctly if it is a binary type parameter.

The program line contains a text string without matching quotation marks.
There must be two quotation marks to correctly specify a text string.

The loop count value must be an integer value greater than zero.
The numeric value given after the LOOP command must be an integer value and be greater than zero.

Too many loops are being used in the script program.
A maximum limit of 10 loop may be used in any one script program. If this limit has been exceeded, some of the LOOP and LOOPEND commands must be removed.

A LOOP command has been found without a matching LOOPEND command.
For every LOOP command, a matching LOOPEND command must be present. This error indicates that there are more LOOP commands than LOOPEND commands.

A LOOPEND command has been found without a matching LOOP command.
For every LOOPEND command, a matching LOOP command must be present. This error indicates that there are more LOOPEND commands than LOOP commands.

The value specified can not be negative.

The numeric value specified in the program line is negative. This is an illegal value.

The LABEL command requires a single label to follow it, without any spaces in the label.

The LABEL command has more than one label specified after the LABEL command word, or it has no label specified.

The maximum number of labels has been exceeded in this program.

Only a maximum of 99 labels can be used in a script program. The number of labels must be reduced before the program can be executed.

Can't find the label specified in the PAUSE command.

The label given in the PAUSE does not match any of the labels specified with the LABEL command. Check the spelling of the offending label.

The DTMF code specified is unknown.

The specified DTMF digit is not recognized in the command line. DTMF digits must be specified as one of the following: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, *, #, A, B, C, D, E, or null.

The number specifier must be between the range of 1 to 5 and an integer number.

The number specifier, which follows the NUMBER command key word, must be either 1, 2, 3, 4, or 5. Other values will not be accepted. Please insure there is a space between the NUMBER command and the number specifier, and at least one space character following the number specifier.

The operator key word must be either Enabled, Disabled, Value, or Startcode.

The operator key word given in the NUMBER command is not recognized as one of the four valid possibilities listed above. Please insure there is at least one space character before and after the key word. Note, that the key words are not case sensitive.

Warnings that may be issued during the execution of a script file are listed here.

The new parameter value exceeds its maximum allowable value.

The parameter value, changed with the PARAMETER command, is greater than its maximum allowed value. As such, it will be clamped to its maximum value.

The new parameter value is below its minimum allowable value.

The parameter value, changed with the PARAMETER command, is less than its minimum allowed value. As such, it will be clamped to its minimum value.

Appendix C Modifying the Complex Impedance

The telephone line impedance that is presented to the CPE can be set to ,under program control, to one of three possible values. These are:

i) 600 ohms (real)
ii) 900 ohms (real)
iii) Complex impedance ZR

Where the complex impedance ZR is modeled by the following schematic diagram:

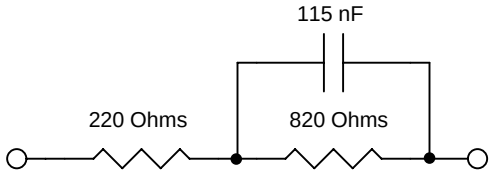


Figure 2. ZR Impedance

However, it is possible to change various components on the TSPC in order to present other custom or user defined impedance's. Figure 3 represents a network of components present on the TSPC that determine the value of the complex line impedance. The line impedance presented to the CPE will be 0.1 times the impedance of the network shown in figure 3. As such, the default complex impedance of ZR can be changed to other values simply by changing values of components R1, R2, C1, C2, and C3.

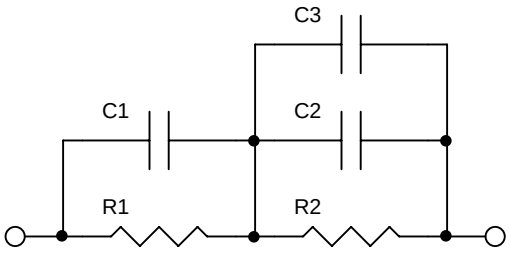


Figure 3. Complex Impedance Network

The default values for the components, in order to present a ZR impedance, are:

R1 = 2200 ohms
R2 = 8200 ohms
C1 = open (not used)
C2 = 10.0 nF
C3 = 1.50 nF

The position of these components on the TSPC is shown in figure 4.

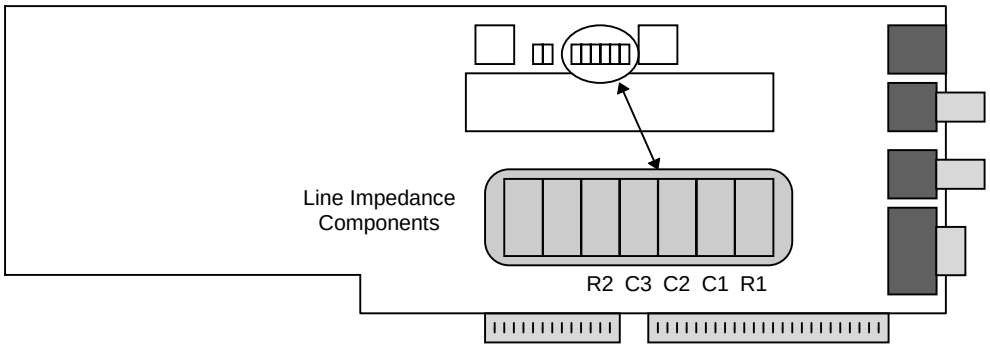


Figure 4. Complex Line Impedance Components

If the component values are to be changed, make sure that standard ESD precautions are taken during the removal of the existing components and soldering of the new components. Of course, the PC should be turned off and the TSPC removed from the PC before any changes are made.

Appendix D General Specifications

Tone Generator

Output Level	-70 dBm to +6 dBm +/- 0.3 dB
Frequency Range	50 Hz to 10 kHz
Flatness	+/- 0.3 dB
THD+N	0.09% C-message
Harmonic Distortion	> 65 dBc
Frequency Accuracy	0.015%

FSK Generator

Output Level	-60 dBm to 0 dBm +/- 0.3 dB
Frequency Range	100 Hz to 5 kHz
Flatness	+/- 0.1dB

Noise Generator

Output Level	-60 dBm to -8 dBm +/- 0.3 dB

Ring Generator

Output Level	0 Vrms to 80 Vrms.
Frequency Range	10 Hz to 600 Hz
Flatness	+/- 0.2 dB
THD+N	0.1%
Frequency Accuracy	0.015%
Ringer Load	5 REN

Telephone Line

Output Impedance	600, 900, or complex +/- 2%
Loop Voltage	20 - 52 Volts +/- 1V
Loop Current	20 - 40 mA +/- 10%

Level Meter

Level Accuracy	+/- 0.2 dB
Frequency Range	10 Hz to 10 kHz
Flatness	100 Hz to 5 kHz +/- 0.2 dB
Maximum Input	+14 dBm
Residual Noise	<-70 dBmC

ACK Analyzer

Level Accuracy	+/- 0.2 dB
Maximum Input	+6 dBm per tone
Minimum Input	-20 dBm
Frequency Resolution	0.1 Hz

Appendix E Technical Support

If you encounter problems while using the CID750D Caller ID simulator, please contact us so that we can provide assistance. You may reach us in any one of the following manners:

Email: techsupport@adventinst.com

In North America:

Tel: (604) 944-4298
Fax: (604) 944-7488

Mail: Advent Instruments Inc.
Suite 111 – 1515 Broadway Street
Port Coquitlam, British Columbia
Canada, V3C 6M2

In Asia:

Tel: (852) 2994-1338 / 8108-1338
Fax: (852) 2900-9338

Mail: Advent Instruments (Asia) Limited
Unit 13, 23rd F., Peninsula Tower,
538 Castle Peak Road,
Kowloon, Hong Kong

Note: Please include the program version, TSPC product code, revision code, option code, and TSPC base I/O address as given in the [HELP] [ABOUT CID750D] window in your correspondence.