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Limited Warranty

Metro Tel Corp. guarantees to the original purchaser of its products that if any product proves to be defective in workmanship or in material within a period of one year, the defect will be repaired without charge.

This limited warranty extends only to the original purchaser and is not salable or transferable.

The limited warranty shall not apply to any unit which has been subject to alteration or modification; abuse, negligence or accident; or used in any manner contrary to the instruction given by Metro Tel. This limited warranty is void if service is performed by other than Metro Tel or a Metro Tel authorized service facility.

Metro Tel Corp. offers product repairs after expiration of this limited warranty. Neither this warranty nor any other warranty expressed or implied, including warranties of merchantability shall extend beyond the warranty period. No responsibility is assumed for any incidental or consequential damages. Some states do not allow limitation on how long an implied warranty lasts and some states do not allow the exclusion or limitation of incidental or consequential damages, so that the above limitation or exclusion may not apply to you. This warranty gives specific legal rights, and you may also have other rights which vary from state to state.

For warranty service, return the product to address below, prepaid, with a note describing the defect and proof of purchase.

Metro Tel Corp.
250 South Milpitas Boulevard
Milpitas, CA 95035

Customer Service

If assistance is needed regarding the operation or repair of this product, contact our Customer Service department at:

tel (408)946-4600
fax (408)946-4069

Basic Features

Line Measurement

line voltage
loop current
ringer volts

Caller I. D.

name and number display
partial message display
displays up to 150 characters
ring time measurement
silent time measurement
message/parameter type and length indication
on-screen error messages
event list progress indication
checksum indication
alert-to-carrier time measurement
mark and space dB measurement

Caller I. D. with Call Waiting

multiple ACK tone character indication
ACK tone dB measurement
OSI time measurement
CAS tone dB measurement
tests external CPE

Enhanced Measurement Option

Noise

metallic noise
noise to ground
longitudinal balance

Loss/Slope

dBm level
frequency

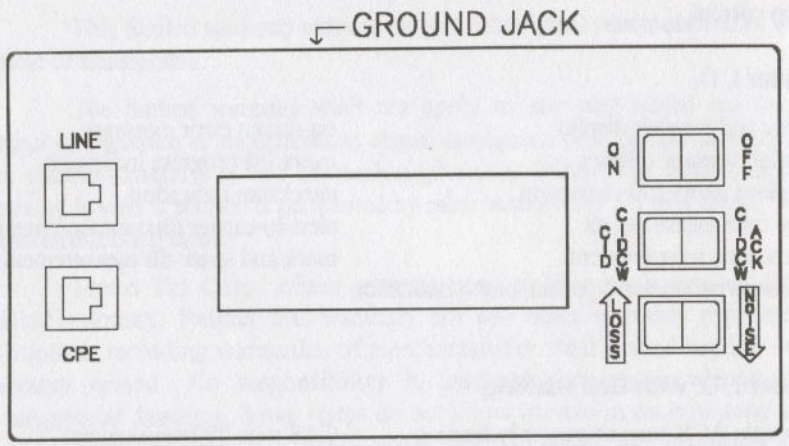
plus:

line termination
line hold
CPE disconnect during test

ACK Tone Option

generates DTMF ACK tone (acts as stand-alone CPE)
line termination
line hold
CPE disconnect during test

Front Panel Controls



LINE jack -- connects set to telephone line

CPE jack -- connects butt-set or customer's equipment to set

GROUND jack -- connects to ground when NOISE mode of Enhanced Measurement Option is used

ON - OFF switch -- turns power on and off

TEST switch -- starts automatic CID test sequence:

CID/CIDCW (left-hand position)
a. initiates Caller I. D. tests
b. initiates Caller I. D. with Call Waiting tests when CPE is used

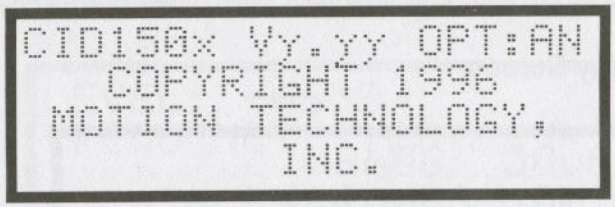
CIDCW+ACK (right-hand position)
initiates Caller I. D. with Call Waiting tests with the ACK tone option

⇑ and ⇓ cursor switches -- scroll through results of CID tests and with the Enhanced Measurement Option:

⇑ LOSS -- enables and disables the LOSS/SLOPE measurement mode
⇓ NOISE -- enables and disables the NOISE measurement mode

Firmware Version and Installed Options

To determine the revision level, firmware version and options installed in the set, press the ⇓ key with power off and hold it down while switching the power on. The model and version number appears on the screen until the ⇓ key is released. A letter (x) following the model number indicates its revision level. The firmware version number (y.yy) appears to the right of the model and revision number. An "A" in the option filed indicates the Ack Tone option is installed; an "N" indicates the presence of the Enhanced Measurement option. A "0" in this field means that no options are installed.



The Line Measurement Mode

When power is first turned on, the CID150 is in the Line Measurement Mode. In this mode line voltage, loop current, and ringing voltage can be measured. With the Enhanced Measurement option, loss, slope and noise measurements can also be made.

Connecting the CID150 to a Phone Line

Connect the telephone line to the set at the LINE jack and a butt-set or the subscriber's CID display unit (if under test) to the CPE jack. Line measurements may be made without anything being connected to the CPE jack.

The Display Screen

The top line of the screen displays DC phone line voltage and loop current through the CPE jack.

Ringing Signals

If a ringing signal occurs, its voltage will be displayed on the second line of the display. This reading is held on the screen briefly so that it may be easily read.

Battery Indicator

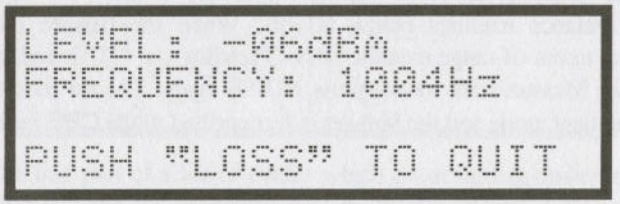
Along the bottom of the display is a cursor bar which indicates the state of the set's battery. A new battery sends the cursor to the right-hand side of the display. As the battery discharges, the cursor moves toward the left. When it reaches the left-hand side of the display, the battery must be replaced. The battery is accessed by sliding off the cover on the back of the set.

The Enhanced Measurement Option

When the Enhanced Measurement option is installed, additional tests can be accessed by pressing either the ⇑ and ⇓ keys.

Loss and Slope

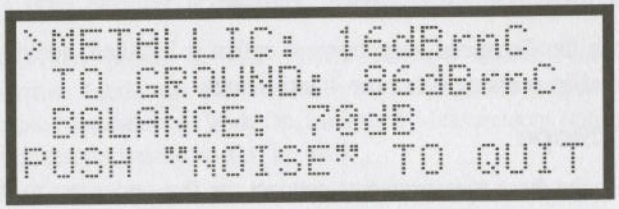
To make these measurements connect the line under test to the LINE jack and a butt-set to the CPE jack while still in the initial Line Measurement mode. Use the butt-set to dial up a milliwatt test number. Switch to the Loss/Slope Measurement mode by pressing LOSS. The CID150's internal line hold and termination will take over the line circuit while the butt-set is automatically switched out.



The set measures and displays the dB level and frequency of the received tone. If the level is underrange (below -34 dBm), a "--" is displayed. If the level is overrange (above 0 dBm), a "++" appears. The frequency reading indicates overrange if the received tone exceeds 3K Hz. Slope measurements can be made by dialing up a multiple tone transponder instead of the single tone milliwatt. In this case, observe the dB level of each frequency to determine the flatness of the line's response. To exit the Loss/Slope mode, press LOSS again. The set returns to the Line Measurement mode and the butt-set is reconnected to the CPE jack.

Noise

The setup for noise measurement also uses the butt-set connected to the CPE jack. In addition, plug the ground lead into the GROUND jack on the top of the CID150 and connect the yellow clip to a ground point. While still in the Line Measurement mode, use the butt-set to dial up a quiet termination. Switch to the Noise Measurement mode by pressing NOISE. The CID150's internal line hold and termination will take over the line circuit while the butt-set is automatically switched out.



The set alternately measures metallic noise and noise to ground and computes longitudinal balance. A " > " indicates the test currently being made. When measurements underrange (below 2 dBrnc metallic or 52 dBrnC to ground), a "--" is displayed. If a test overranges (above 40 dBrnC metallic or 94 dBrnC to ground), a "++" is shown as the result. A "*" precedes longitudinal balance readings below 60 dB. When the balance cannot be computed due to out-of-range metallic or N-G readings, a "??" is indicated. To exit the Noise Measurement mode, press NOISE again. The set returns to the Line Measurement mode and the butt-set is reconnected to the CPE jack.

Caller I.D. Tests

Caller I.D. signal tests are initiated by pressing CID/CIDCW. If on-hook CPE (or no CPE) is connected, the on-hook test will begin. If CPE connected through the CID150 is off-hook, the off-hook test mode will start instead.

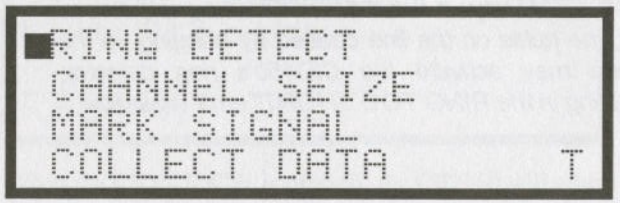
Testing On-Hook Caller I.D. with Ring Alerting

If the line was on-hook when CID/CIDCW was pressed, the following display appears on the screen:

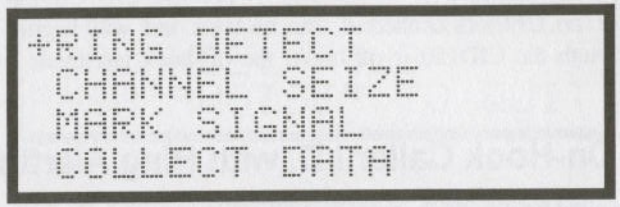
This is the first part of a list of events which occur during on-hook Caller I.D. testing. Initially, the cursor appears next to "RING DETECT." Once the Caller I. D. sequence begins, a "*" replaces the cursor as each event is completed and the cursor then points to the next item in the list. If execution stops and the Caller I.D. test does not finish, the cursor points to the defective or missing event. The CID/CIDCW key can be pressed at any time to abort the test sequence and return to the Line Measurement Mode.

Line Termination

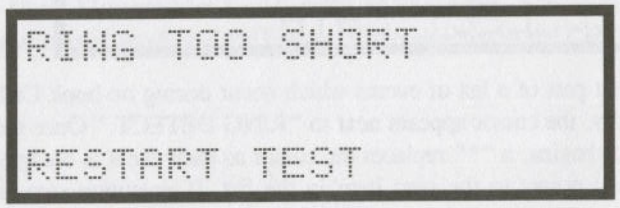
With the Enhanced Measurement option, the CID150 can supply a precision AC termination to the line while Caller I. D. signaling is in progress. The line termination is toggled on and off by pressing the ⇓ key while in the initial screen of the CID test. A "T" in the lower right-hand corner of the display indicates that the termination is activated.



First Ring Detect



The cursor blinks in front of the descriptor until the ring begins, at which time a "+" replaces the cursor. If a ring signal (or part of a distinctive ringing cadence) having a duration less than 150 milliseconds is received, the test is aborted and following error message is displayed:

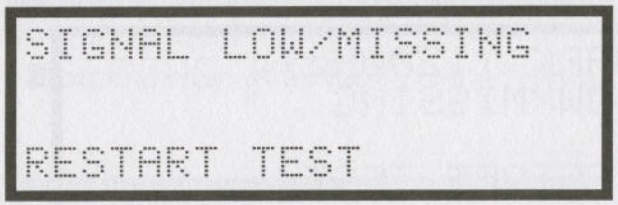


When the CID/CIDCW key is pressed, the CID150 will return to the Line Measurement Mode. Pressing CID/CIDCW again restarts the Caller I.D. signal test.

A common method of testing Caller I.D. is to connect a butt-in set or telephone to the CPE jack of the CID150 and then dial up a ringback number to supply the Caller I.D. signal. When doing this, be sure that the phone is hung up before pressing the CID/CIDCW key. If the CID/CIDCW key is pressed first, the pulse on the line caused by hanging up the phone may activate the CID150's ring detector, resulting in the RING TOO SHORT" error message.

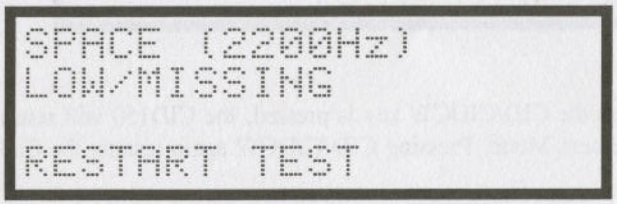
Channel Seizure

A "*" denotes the end of the first ring cycle and the cursor is moved to "CHANNEL SEIZE." At this point, the CID150 is awaiting the beginning of the Caller I.D. signal. If no signal is detected within a 3.6 second period, it is assumed that no Caller I.D. is present. The test is aborted and the following screen is displayed:



This screen appears not only when the signal is missing, but also if the signal is present, but at a level below -33 dBm. This message will also be displayed if the test is initiated after the first ring has already passed. When the CID/CIDCW key is pressed, the CID150 will return to the Line Measurement Mode. Pressing CID/CIDCW again restarts the Caller I.D. signal test.

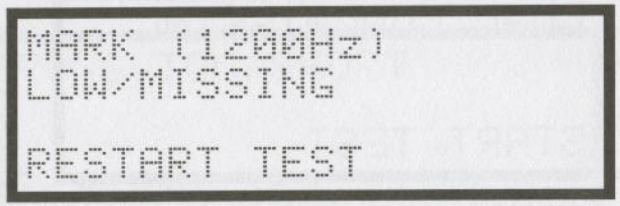
The CID150 begins analyzing the Caller I.D. signal when channel seizure begins. If the level of the FSK space (2200Hz) is below -33 dBm, the test is aborted and the following error message is displayed:



When the CID/CIDCW is pressed, the CID150 will return to the Line Measurement Mode. Pressing CID/CIDCW again restarts the Caller I.D. signal test.

Mark Signal

A "*" denotes the end of the channel seizure signal and the cursor is moved to "MARK SIGNAL." The CID150 continues to analyze the Caller I.D. signal during the mark signal. If the level of the FSK mark (1200Hz) is below -33 dBm, the test is aborted and the following error message is displayed:



During the mark signal, no FSK spaces should occur. If this happens, the test is aborted and the following error message is displayed:

When the CID/CIDCW key is pressed, the CID150 will return to the Line Measurement Mode. Pressing CID/CIDCW again restarts the Caller I.D. signal test.

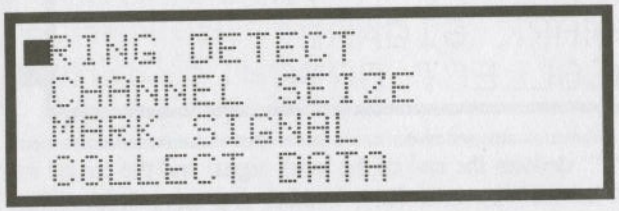
Collect Data

A "*" denotes the end of the mark signal and the cursor is moved to "COLLECT DATA" as time, date, number and name information is being received. When all of the events in the first part of the list have taken place, the remainder of the list is displayed:

The screen opens with the completion of the data collection event already noted and the cursor pointing to "SECOND RING." When the second ring begins, the test is finished and the first of the result screens is automatically displayed.

Testing On-Hook Caller I.D. with OSI Alerting

When the CID/CIDCW key is pressed with the line on-hook, the default opening screen appears:



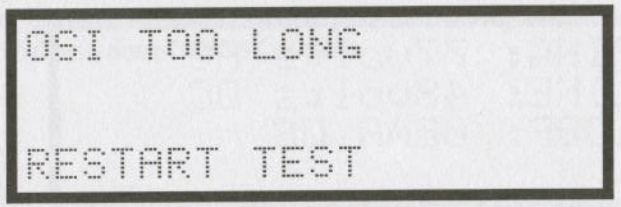
To use OSI alerting instead of ring alerting, press the ⇑ key to toggle to the OSI alerting mode:

The CID150 now polls for the beginning of an OSI event to start the Caller I.D. sequence. Pressing the ⇑ key again toggles back to ring alerting.

The OSI alerting mode will not function properly if the DC voltage on the line is below 30 Volts. If the OSI mode is entered under this condition, it may not be possible to toggle back to the ring alerting mode. In this case, switch the power off and back on again. Pressing TEST will restart the Caller I.D. signal test in the ring alerting mode.

OSI events should have a nominal duration of 350 milliseconds. If an OSI having a duration shorter than 100 milliseconds is detected, the test is aborted and the following error message appears:

If an OSI having a duration greater than 500 milliseconds is detected, the test is aborted and the following error message appears:



When the CID/CIDCW key is pressed, the CID150 returns to the Line Measurement Mode. Pressing CID/CIDCW again restarts the Caller I.D. signal test.

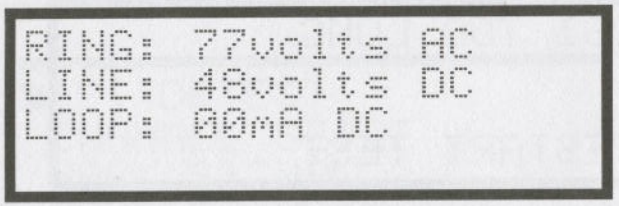
When a proper OSI signal is detected, its completion is noted by a "*." The cursor is then moved to "CHANNEL SEIZURE."

From this point on, the test proceeds in exactly the same manner as the ring alerting mode.

On-Hook Test Results

When all of the events in the test list have been completed the data screens appear. There are always at least four data screens, with a fifth screen being used in the case of extra long messages. Use the ⇑ and ⇓ cursor keys to switch between screens. The ⇑ key advances to the next screen and the ⇓ key reverts to the previous screen. The screens may be switched back and forth an unlimited number of times. When analysis of the data is completed, press the CID/CIDCW key to exit the Test Result mode and return to the Line Measurement Mode.

Data Screen #1

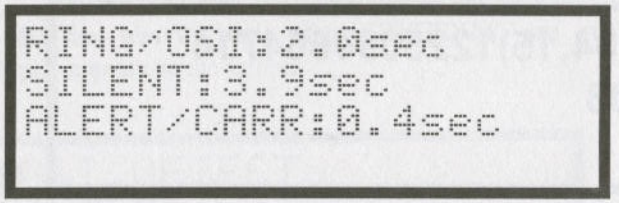


This screen indicates the line voltage, loop current (through the CPE jack) and voltage of the first ring.

If the test was initiated by an OSI, the value "???" will be indicated in the ringer voltage section.

If the ringing signal did not contain at least one burst >500 milliseconds long, the ring voltage will be indicated as 1 Volt.

Data Screen #2



The active time of the first ring or OSI is given on the first line.

The second line shows the silent time between the first and second rings.

The third line indicates the time from the end of the ring or OSI alerting signal to the initial reception of the FSK carrier.

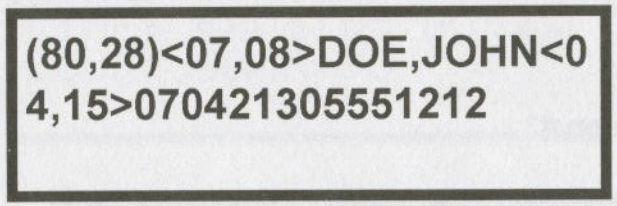
Data Screen #3

The dB level of the 1200Hz FSK "mark" signal is shown on the first line. The dB level of the 2200Hz FSK "space" signal is shown on the second line. The difference between these two dB levels is known as "twist" and should be less than 7 dB at the subscriber end. The FSK signal should leave the C.O. at -13 to -15 dBm.

Message checksums are shown on the bottom line. "TX CKSM" is the checksum value which was sent at the end of the message from the central office. "RX CKSM" is the CID150's computed checksum of the data actually received. If the message was sent without error, the TX and RX checksum values will be the same.

Data Screen #4

This screen shows the actual received message. In this example, the characters in parentheses (04,15) are the message type and length values. "12..." is the month (December), "...25..." is the day of the month, "...09..." is the hour of the day, "...46..." is the minute of the hour and "...6471403" is the telephone number of the calling party.

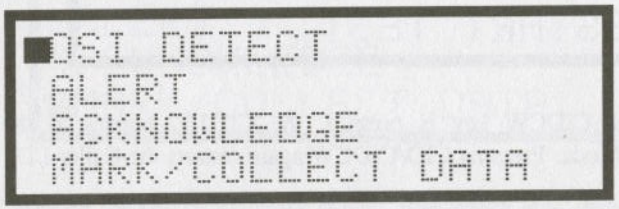


Here is an example of a multiple message transmission. The message type and length are shown in parentheses (80,28). The message length includes all parameter data, type and length words. The parameter type and length bytes each count as only one word even though they are displayed in decimal as two digits in brackets < > on the screen. The type and length of the first parameter are <07,08>. "DOE,JOHN" is the first parameter, the name of the calling party. The second set of bracketed numbers <04,15> represent the type and length of the second parameter. Its content is similar to that of the message in the first example: "07..." - month (July), "...04..." - day, "...21..." - hour, "...30..." - minute and "5551212" - Mr. Doe's phone number.

If the transmitted and received checksums do not match, "X" characters are inserted in place of the type and length values. If the length of the message exceeds the capacity of the screen, an additional screen, Data Screen #5, is added to show the remainder of the message.

Testing Off-Hook Caller I.D. - Caller I.D. with Call Waiting

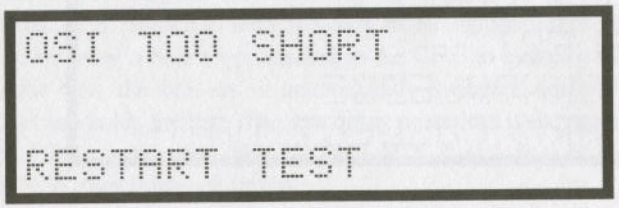
If the line was off-hook when CID/CIDCW was pressed, the following display appears on the screen:



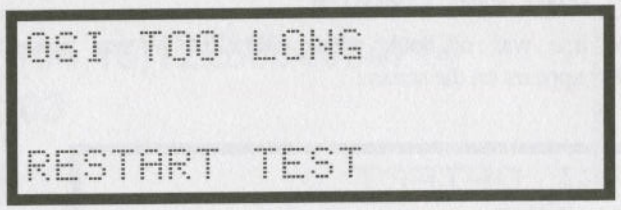
This is the first part of a list of events which occur during off-hook Caller I.D. signaling. Initially, the cursor appears next to "OSI DETECT." Once the Caller I. D. sequence begins, a "*" replaces the cursor as each event is completed and the cursor then points to the next item in the list. If execution stops and the Caller I.D. test does not finish, the cursor points to the defective or missing event. The CID/CIDCW key can be pressed at any time to abort the test sequence and return to the Line Measurement Mode.

OSI Detect

Off-hook Caller I.D. signaling may or may not initiate with an OSI event. The CID150 polls for either the beginning of an OSI or the beginning of an alert signal. OSI events should have a nominal duration of 350 milliseconds. If an OSI having a duration shorter than 100 milliseconds is detected, the test is aborted and the following error message appears:



If an OSI having a duration greater than 500 milliseconds is detected, the test is aborted and the following error message appears:



When the CID/CIDCW key is pressed, the CID150 returns to the Line Measurement Mode. Pressing CID/CIDCW again restarts the Caller I.D. signal test.

Alert

If a proper OSI signal is detected, its completion is noted by a "*." The cursor is then moved to "ALERT." If no OSI occurs before the start of the alert signal, "OSI DETECT" is not flagged, and the cursor is immediately moved to "ALERT."

Acknowledge

A "*" denotes the end of the alert signal and the cursor is moved to "ACKNOWLEDGE." The CID150 now polls for the CPE's DTMF signal back to the C.O. acknowledging the alert signal.

Mark Signal/Collect Data

Upon receipt of the CPE ACK signal, a"*" is placed by its indicator and the cursor is moved to the next event.

A "*" denotes the end of the mark signal, after which time, date, number and name information is received.

When data reception is completed, the first test result screen appears.

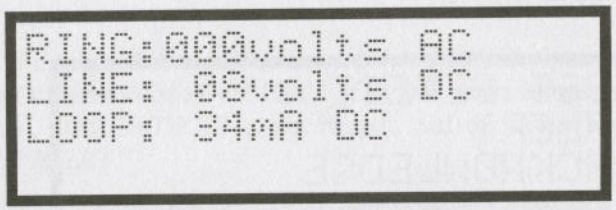
The ACK Tone Generate Option

This option enables the CID150 to operate as a CPE device during CIDCW testing. After receiving a valid alerting signal, the CID150 generates its own ACK tone back to the C.O., thus completing the handshaking process on it own and clearing the C.O. to send FSK data. This option is invoked by pressing the TEST switch to the CIDCW+ACK (right-hand) position to initiate the test after using a butt-set connected to the CPE to establish the connection. During the test, the butt-set is automatically switched out and the CID150 terminates and holds the line. The remaining procedure is the same as for testing off-hook CPE, except that the CIDCW+ACK switch is used in place of the CID/CIDCW switch in each instance.

Off-Hook Test Results

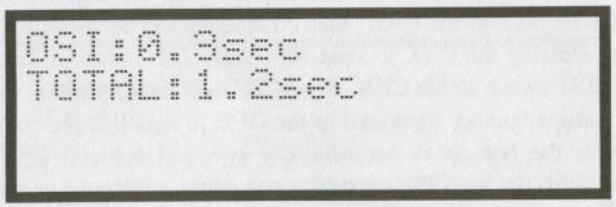
When all of the events in the test list have been completed, the data screens appear. There are always at least four data screens, with a fifth screen being used in the case of extra long messages. Use the ⇑ and ⇓ cursor keys to switch between screens. The ⇑ key advances to the next screen and the ⇓ key reverts to the previous screen. The screens may be switched back and forth an unlimited number of times. When analysis of the data is completed, press the CID/CIDCW key to exit the Test Result mode and return to the Line Measurement Mode.

Data Screen #1



This screen indicates the line voltage and loop current (through the CPE jack). Since ringing does not occur with off-hook signaling, the value "000" will be indicated in the ringer voltage section.

Data Screen #2



The active time of the initiating OSI is given on the first line. The total time of the message sequence is given on the second line.

Data Screen #3

The dB level of the 1200Hz FSK "mark" signal is shown on the first line. The dB level of the alerting signal is given on the second line. In the third line, the CPE's DTMF acknowledge characters are displayed, along with the dB level. Message checksums are shown on the fourth line. "TX CKSM" is the checksum value which was sent as part of the message from the central office. "RX CKSM" is the computed checksum of the data actually received. If the message was sent without error, the TX and RX checksum values will be the same.

Data Screen #4

This screen shows the actual received message. In this example, the characters in parentheses (04,15) are the message type and length values. "12..." is the month (December), "...01..." is the day of the month, "...10..." is the hour of the day, "...14..." is the minute of the hour and "...9464600" is the telephone number of the calling party.

```
(80,33)<07,14>METRO TEL
CORP<04,15>07042
1309464600
```

Here is an example of a multiple message transmission. The message type and length are shown in parentheses (80,33). The message length includes all parameter data, type and length words. The parameter type and length bytes each count as only one word even though they are displayed in decimal as two digits in brackets < > on the screen. The type and length of the first parameter are <07,14>. "METRO TEL CORP" is the first parameter, the name of the calling party. The second set of bracketed numbers <04,15> represent the type and length of the second parameter. Its content is similar to that of the message in the first example: "07..." - month (July), "...04..." - day, "...21..." - hour, "...30..." - minute and "9464600" - Metro Tel's phone number.

If the transmitted and received checksums do not match, "X" characters are inserted in place of the type and length values. If the length of the message exceeds the capacity of the screen, an additional screen, Data Screen #5, is added to show the remainder of the message.

Specifications

parameter	min	typ	max	tol	unit
Line Measurement Mode					
line volts	0		100	+/- 1	VDC
loop current	0		100	+/- 1	mA DC
ringing voltage			150	+/- 3	VAC
Enhanced Measurement Option					
dB level	-34		0	+/- 1	dBm
frequency	300		3000	+/- 2	Hz
metallic noise	10		40	+/- 2	dBrnC
noise to ground	60		94	+/- 2	dBrnC
longitudinal balance	54		84	+/- 2	dB
line termination	600 Ohms + 2.2 uF				
On-Hook Caller I.D. Test (CID)					
line volts	0		100	+/- 1	VDC
ringing voltage	0		150	+/- 3	VAC
ring time	.15		8		sec
silent time	.5		8		sec
OSI time	100		500		m sec
alert/carrier time	.1		3.6		sec
timing resolution	100				m sec
mark dB	-33		-4	+/- 1.5	dBm
space dB	-33		-4	+/- 1.5	dBm
message characters			150		
Off-Hook Caller I.D. Test (CIDCW)					
line volts	0		100	+/- 1	Volts DC
loop current	0		100	+/- 1	mA DC
OSI time	100		500		m sec
alert/carrier time	100				m sec
alert/answer time	1		20		seconds
timing resolution	100				m sec
mark dB	-33		-4	+/- 1.5	dBm
message characters			150		
ACK Tone Generation Option					
DTMF character		D			
DTMF level	-12		-6		dBm

Design Standard

The CID150 test set was designed to meet Bellcore specification TA-NWT-0030.

Terms Frequently Used in Caller I.D. Service:

ACK -- Acknowledge; a signal from the CPE to the C.O. confirming receipt of a signal

ASCII -- American Standard Coding for Information Interchange; the coding format of alphanumeric messages sent to the CPE for display

CID -- Caller Identification

CIDCW -- Caller Identification with Call Waiting

CND -- Calling Number Delivery

CNAM -- Calling Name Delivery

CPE -- Customer Premise Equipment; the customer's Caller I.D. display

DTMF -- Dual Tone Multifrequency; the signaling method used by CPE to generate ACK signals

FSK -- Frequency Shift Keying; the method by which data is transmitted to the CPE

MARK -- the representation of the binary "1" in FSK signaling; implemented as a 1200 Hz tone burst

MDMF -- Multiple Message Data Format

OSI -- Open Switching Interval; an interval in which DC voltage is removed from the line

parameter word(s) -- the words that contain the actual data to be displayed

SDMF -- Single Message Data Format

SPACE -- the representation of the binary "0" in FSK signaling; implemented as a 2200 Hz tone burst

Types of Caller I.D.

Caller I.D. service can be divided into two general categories, On-Hook and Off-Hook.

On-Hook Caller I.D.

On-Hook Caller I.D. occurs while the subscriber's telephone is hung up, and is used to convey a calling party's telephone number to the subscriber prior to answering. In addition to the number, the calling party's name and other information may be sent.

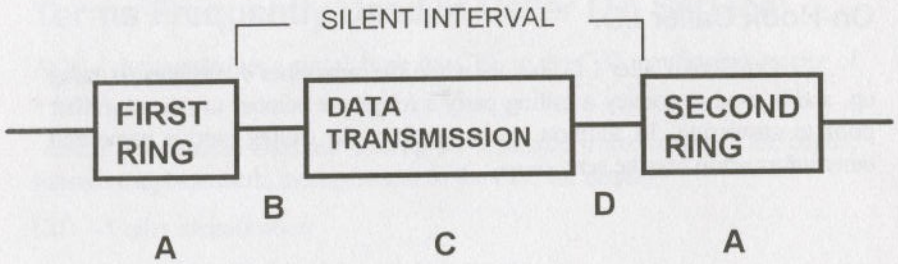
Off-Hook Caller I.D.

Off-Hook Caller I.D. is used to send a calling party's number to the subscriber while the subscriber's telephone is in use. This is Caller I.D. with Call Waiting (CIDCW). With this service the subscriber can see the number and, in some cases, the name of the party trying to call in while a conversation is already in progress.

Signaling Methods

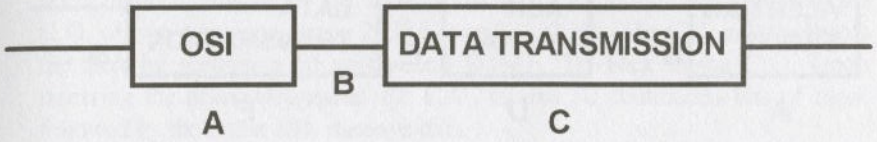
The two Caller I.D. types use different signaling methods. There are also variations within the methods. On-Hook Caller I.D. is initiated with either a ring or an OSI. It is a one-way communication consisting of channel seizure, mark signal and FSK transmission. Off-Hook Caller I.D. is a two-way communication initiated by a 2130+2750 Hz alert tone which may or may not be preceded by an OSI. The CPE sends a DTMF acknowledgment back to the C.O. after which the C.O. sends the FSK data. The channel seizure signal is not used in Off-Hook signaling, and the alert and acknowledge tones are not used in On-Hook signaling.

On-Hook Signaling



Event	Description	Duration	CO dB	CPE dB
A	ringing period	.2 to 2.2 seconds		
B	alert to carrier time	≥ 500 milliseconds		
C	data transmission, including channel seizure and mark	2.9 - 3.7 seconds	-13.5 each tone	mark (1200Hz): -32 to -12.5 space (2200Hz): -36 to -12.5
D	data ended, second ring begins	≥ 200 milliseconds		

Figure 1. Caller I.D. with Ring Alerting



Event	Description	Duration
A	OSI signal	150 - 300 milliseconds
B	alert to carrier time	≥ 300 milliseconds
C	data transmission, including channel seizure and mark	see text

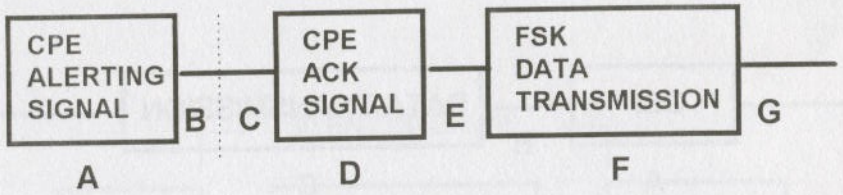
Figure 2. Caller I.D. with OSI Alerting

On-Hook Caller I.D.

The On-Hook Caller I.D. sequence consists of an alerting signal, a channel seizure signal, a mark signal and the data to be displayed. The alerting signal can be either a power ring (Figure 1.) or an OSI (Figure 2.). When power ring alerting is used, the Caller I.D. sequence will be sent between the first and second rings. In OSI alerting, DC power is momentarily removed from the line. This allows transmission of Caller I.D. information without ringing. The channel seizure signal consists of 300 continuous bits of alternating mark (1200 Hz) and space (2200 Hz). This signal has a nominal time duration of 250 milliseconds. Immediately following the channel seizure signal is an interval of 80 continuous bits of mark (1200 Hz). This lasts for approximately 66 milliseconds. The Caller I.D. message data immediately follows this event. The Caller I.D. sequence must end at least 200 milliseconds before the start of the second ring.

The original specification for Caller I.D. required that CPE apply an AC termination to the line during on-hook data reception. This requirement has since been rescinded, but a considerable amount of CPE with this capability has been installed.

Off-Hook Signaling



Event	Description	Duration	CO dB	CPE dB
A	2130 Hz + 2750 Hz alerting signal from C.O.	40 - 55 mS		-15 to -33 each tone 7 dB max twist
B	CPE mutes handset and disables keypad at least 20 mS before sending ACK	≥ 20 mS		
B + C	CPE sends ACK within 50 mS after receipt of the end of the alerting signal	< 50 mS		
D	CPE ACK signal, DTMF "D"	50 - 55 mS		-10 per tone
E	start of CPE data reception	110 - 199 mS		
F	message data transmission	depends on message	-13.5 each tone	mark (1200Hz): -32 to -12.5 space (2200Hz): -36 to -12.5
G	CPE unmutes handset and enables keypad within 50 mS after the end of data transmission	<50 mS		

Figure 3. Caller I.D. with Call Waiting

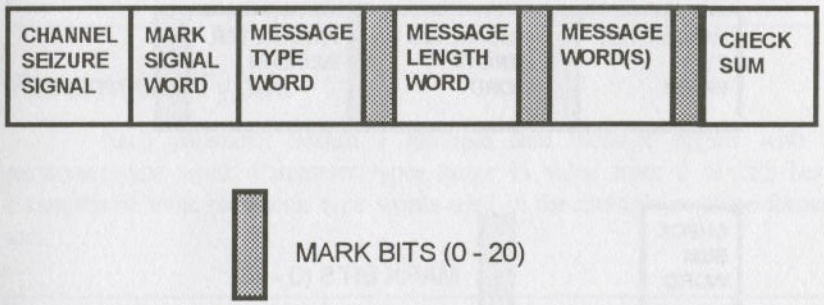
Off-Hook Caller I.D. (CIDCW)

The Off-Hook Caller I.D. sequence (Figure 3.) consists of an alerting signal, an acknowledgment (ACK) signal, a mark signal and the data to be displayed. OSI signals may precede and follow the sequence, but this will not occur in all circumstances. The alerting signal is a 50 millisecond burst from the C.O. of two combined tones, 2130 Hz and 2750 Hz. The CPE acknowledges the alert by sending a 50 millisecond DTMF "D" back to the C.O. Upon receiving the acknowledgment, the C.O. returns 80 continuous bits of mark followed by the Caller I.D. message data.

Message Formats

Both On-Hook and Off-Hook Caller I.D. can operate in either a single data message format (SDMF) or a multiple data message format (MDMF).

Single Data Message Format



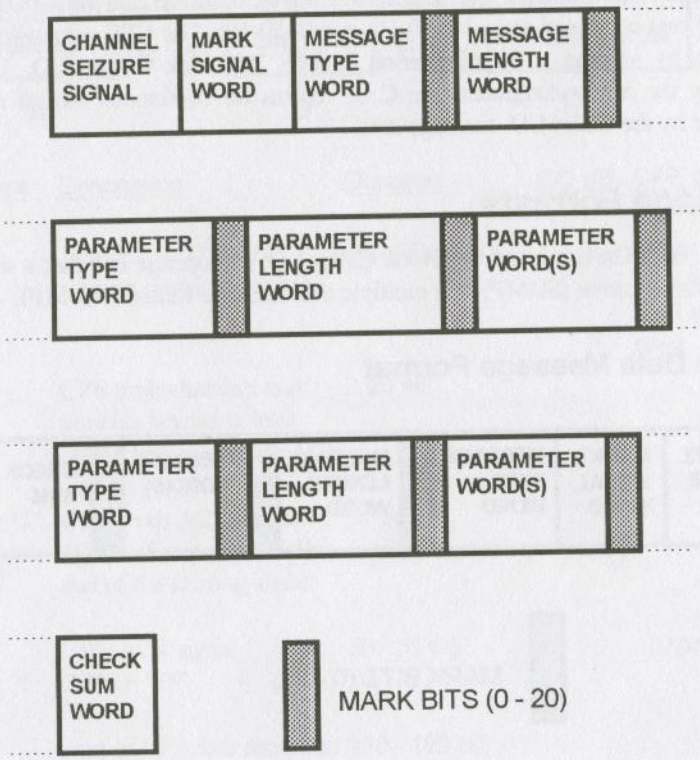
CHANNEL SEIZURE consists of 300 bits (250 milliseconds) of alternating mark and space.

Channel Seizure is not used in off-hook signaling.

The MARK SIGNAL consists of 80 bits (66 milliseconds) of continuous mark.

The single data message format transmits information to the CPE as a series of data words specifying message type, message length, message data and error detection information. The message type, length and error detection words are single data bytes. The message data consists of one or more bytes.

Multiple Data Message Format



The multiple data message format not only includes all of the elements of the single data message format, but also allows the transmission of multiple data messages as subcomponents or "parameters" of the sequence. Each parameter is a series of data words specifying parameter type, length and parameter message data.

Message Types

The message type word indicates the kind of information associated with the data message and is the first byte of the message data. Values used within single and multiple data messages range between the hexadecimal range 0 to 255. Here are some examples:

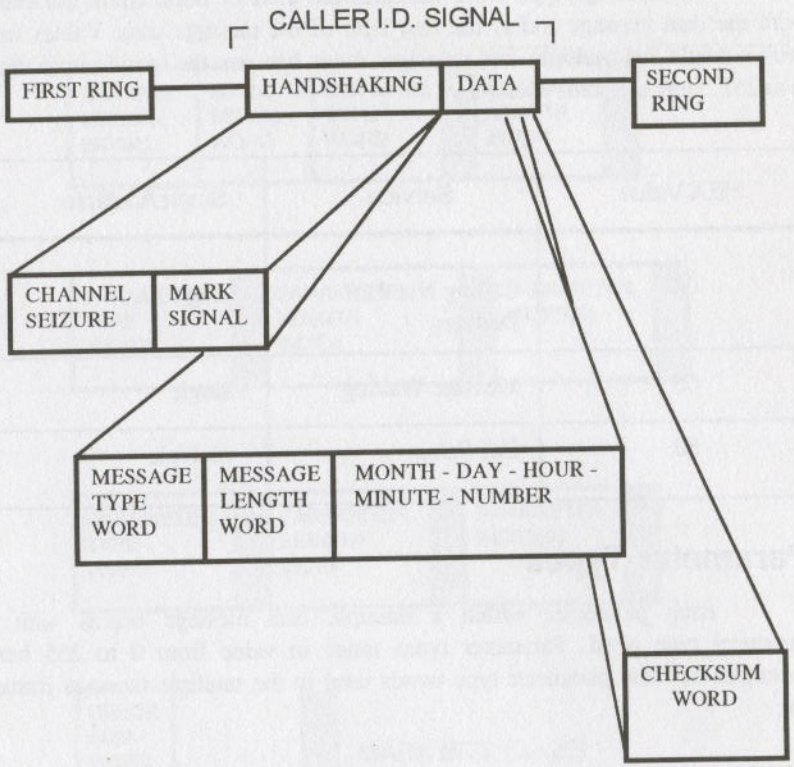
HEX Value	Service	Single/Multiple
04	Calling Number Delivery	single
05	Message Waiting	single
80	Call Setup	multiple

Parameter Types

Each parameter within a multiple data message begins with a parameter type word. Parameter types range in value from 0 to 255 hex. Examples of some parameter type words used in the multiple message format are:

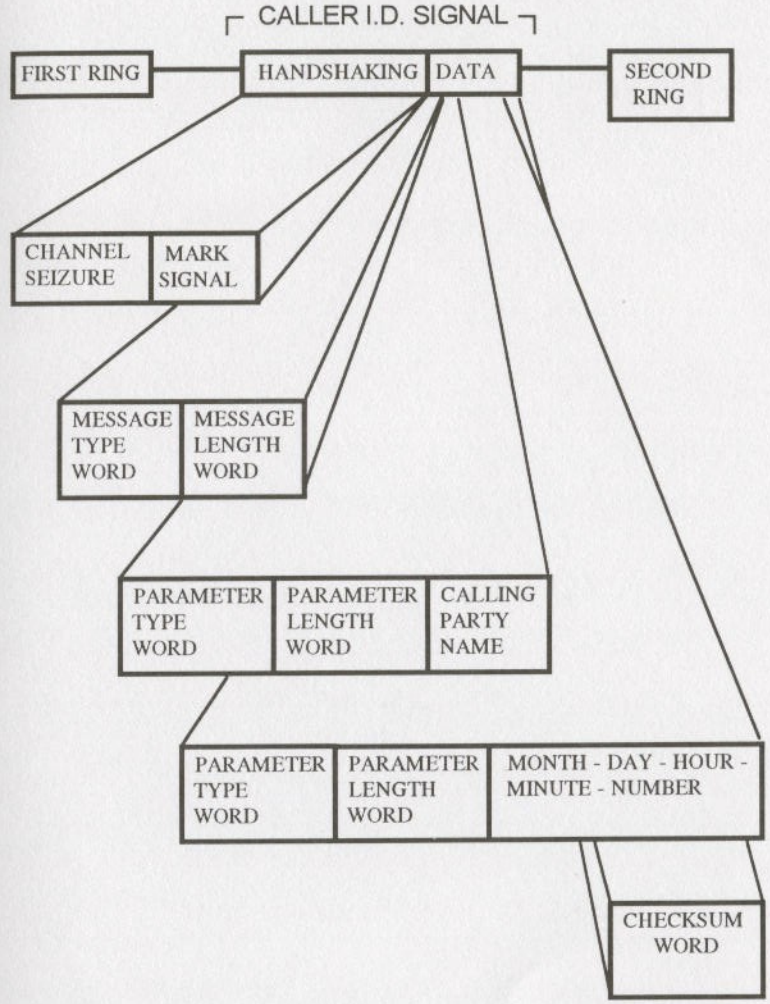
HEX Value	Service
01	Time
02	Calling Line Identification
03	Dialable Directory Number
07	Name

Typical Caller I.D. Signals



Single Data Message Format

A single letter "P" (privacy) after the date and time indicates the calling party is blocking transmission of the number. The letter "O" instead of a number indicates that the caller is outside the Calling Number Delivery area.



Multiple Data Message Format