CTI CALL INFORMATION INTERFACE

MODEL CN-4750

SERIAL/ITEM 533/nnn

OPERATOR MANUAL

Issue 3, FEB, 2002 AUTHOR: PETER ZEUG

PATENTS PENDING

DESIGNED AND MANUFACTURED IN AUSTRALIA

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DESIGN TWO THOUSAND IS CERTIFIED TO ISO9001

MADE IN AUSTRALIA

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SERVICE INFORMATION

If problems are experienced with the installation or operation of the CTI Call Information Interface, please call the Help Desk Number listed below before returning units to the factory for repair.

In most cases, problems can be diagnosed and rectified over the phone, avoiding unnecessary transportation and service costs.

HELP DESK NUMBER:

+61 3 9758 5933 (All hours)

CTI Call Information Interface Model CN-4750

David Bagnara, Peter Zeug
17th June, 1998

Description

The CN-4750 Computer Telephony Integration Call Information Interface was developed by Design Two Thousand Pty Ltd to allow telephone call information to be exchanged between standard the Public Switched Telephone Network (PSTN) Plain Old Telephone Services (POTS) and a computer or computer network.

The CTI Call Information Interface (CN-4750) provides all types of call data and is compatible with all PSTN POTS exchange technologies. For Calling Number Display (CND) information to appear on computer screens, the CN-4750 relies on the CND presentation from electronic telephone exchanges. With the high penetration of electronic (digital) exchanges (switches or central offices) in the PSTN, this is not seen as a limitation.

The CN-4750 is Customer Equipment (CE) independent meaning that it is compatible with any PSTN based analogue two wire telephones or telephone systems. The customer's telephone system itself may be a digital PABX or Key System.

The CN-4750 is supplied in a stand-alone 19 inch rack mount format, occupying 2 units high (88mm) of space. Each CN-4750 can accommodate a control card and up to 10 line cards. Expansion is achieved by simply daisy chaining additional CN-4750s as required up to 100 lines. Power for each unit is provided by a 10VAC 1 amp power adaptor (supplied).

Each line card is connected to a telephone line using a standard RJ modular cord. These can be simply connected in parallel with existing telephone lines. Additional features can be obtained by connecting the line cards in 'series' (same as a Telecom Mode 3 connection) with existing lines as detailed later.

The CN-4750 has the ability to monitor and control all aspects of POTS use:

Detectors

It can detect the following events

Incoming ring
CND (if available)
Phone on/off hook
DTMF digits dialled
Service tones
Line polarity
Open switching interval

Functions

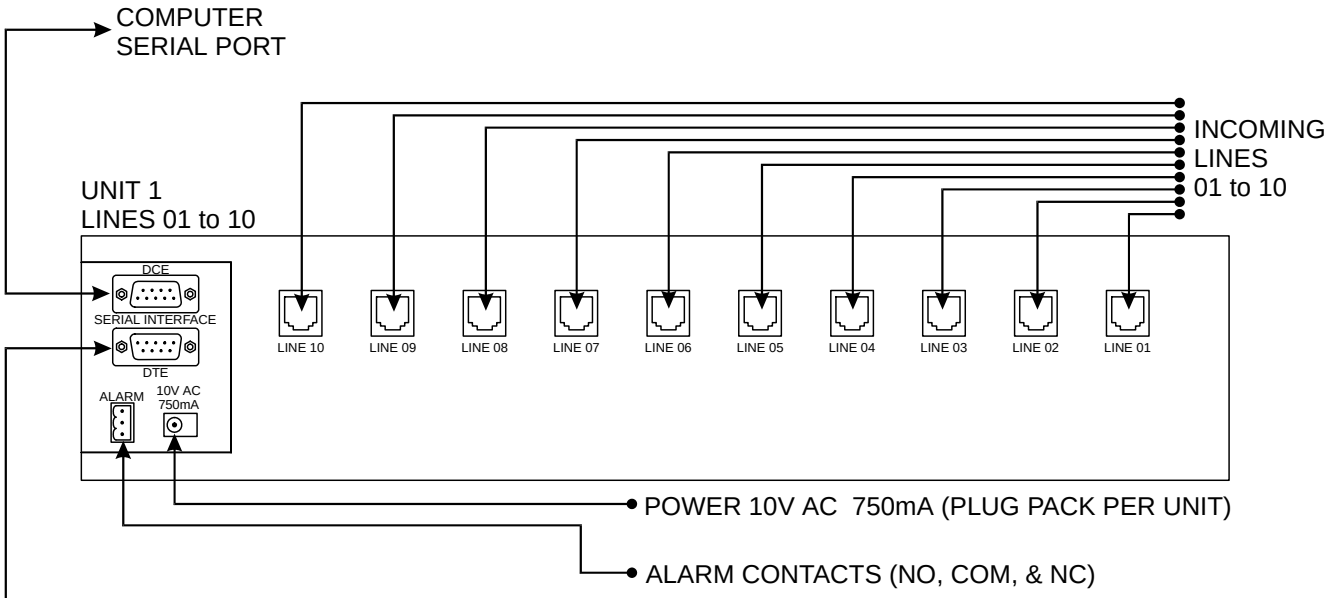
The CN-4750 can also perform all telephone functions

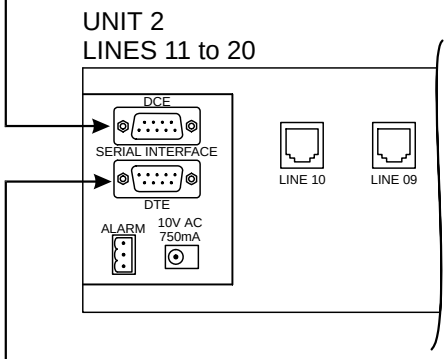
On/off hook
Hook flash
Dial DTMF digits
Disconnect series telephone.

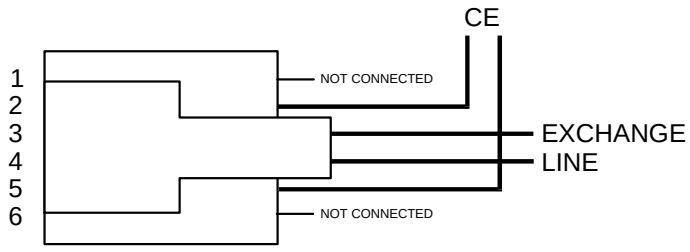
Connection

Communication with the CN-4750 is achieved using a standard RS232 port. This connector on the rear of the unit is configured as a DCE (female 9 pin socket) and can be connected to a PC using standard cables. It is a 3 wire interface with only pins 2, 3 and 5 currently implemented. Additional CN-4750s can be connected by daisy chaining the other connector, a 9 pin male configured as a DTE, to the additional CN-4750 DCE connector. Up to 10 units can be interconnected, allow access to 100 telephone lines through a single RS232 computer port.

CONNECTION DIAGRAM

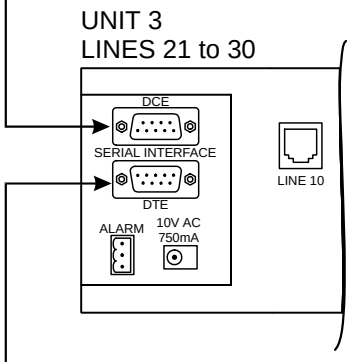






RJ12 CONNECTOR (VIEWED FROM TAB SIDE)

CE CONNECTIONS ONLY REQUIRED IF CONNECTED IN SERIES.
CE IS NORMALLY CONNECTED IN PARALLEL WITH EXCHANGE LINE.



UPTO 10 UNITS (TOTAL)
FOR 100 LINES CAN BE
ADDRESSED FROM 1 PORT

THE SERIAL DATA INTERFACE SHOULD CONFORM TO RS-232C CONNECTIONS FOR THE CN-4750 TO PC ARE AS FOLLOWS.		
SIGNAL	DCE (DB9 FEMALE) SK1 (COMPUTER)	DTE (DB9 MALE) PL23 (CN-4750)
CD	1	1
RD	2	2
TD	3	3
DTR	4	4
GND	5	5
DSR	6	6
RTS	7	7
CTS	8	8

Communication Format

The data format is 9600 baud, 8 data bits, 1 stop bit and no parity. Communication between the PC and the CN-4750 uses fixed format data packets. The format of this packet is as follows

[nnt.. d..]<CR>

where
<CR> is ascii carriage return 10 decimal
nn is two ascii digit line number 00 to 99
t.. is the type of message
d.. is the optional data.

Note that line numbers start in the software at 00, which is the most left hand card of the CN-4750 in the first subrack connected to the computer. Additional daisy chained units have their line numbers identified by this formula:

Software Line Number = (Rack number (0 → 9) x 10) + the line number (0 → 9) = Actual Line Card Number – 1.

Eg. Line number 1 = (0 x 10) + 1 = 1, which is card number 2, physically the second card in the first subrack.
Line number 12 = (1 x 10) + 2 = 12, which is card number 13, physically the third card in the second subrack.
Line number 27 = (2 x 10) + 7 = 27, which is card number 28, physically the eighth card in the third subrack.

The following messages are received from the CN-4750 during normal operation

R1	ring voltage detected
R0	ring voltage gone away
H1	telephone has gone off hook
H0	telephone has gone on hook
F1	muted series connected telephone has gone off hook (Refer to command M1 below)
F0	muted series connect telephone has gone on hook (Refer to command M1 below)
Cd.	calling number delivery number d..
Tmmddhhmm	date and time of CND
Nd..	dialable directory number
P	no CND data available for this number (private)
Dd..	DTMF digits d.. detected
A	line polarity has changed (answer)
K1	acknowledge
K0	negative acknowledge
St..	service tone (t = 0 → 9, where 1 = busy tone, 2 = dial tone, 7 = ring tone)
V0	Distinctive ring 0 (Normal)
V1	Distinctive ring 1 (Forwarded calls)
V2	Distinctive ring 2 (Selective ring 2/Operator/Recall)
V3	Distinctive ring 3 (Multiple subscriber number 1)
V4	Distinctive ring 4 (Selective ring 1/Centrex)
V5	Distinctive ring 5 (Selective ring 3)
V6	Distinctive ring 6 (Multiple subscriber number 2) - Easycall "*Multi-Number*"
V7	Distinctive ring 7 (Multiple subscriber number 3/Data) -Easycall "*Duet*"

The control of the CN-4750 can be accomplished using the following commands

I	inquire
Dd..	dial DTMF digits d..
L1	loop phone line
L0	hang up line
F	hook flash line
M1	mute series connected telephone (disconnect telephone from line)
M0	connect series connected telephone to line
-	reset

The information provided to the computer from the phone line is detailed as follows:

R1 is sent when ringing voltage is detected. This is usually followed by a C and T message, giving the calling number, date and time of the incoming call. Other carrier dependent information may also be forwarded such as dialable directory number and possibly even caller name. At the time of writing, these facilities were not available in Australia. This information may not come if the telephone line does not have CND enabled, or if the caller choses not to have their number presented. The R0 message is sent when there is no further ring voltage detected. The H1 message is sent when the telephone service is detected going off hook. This could be the result of answering an incoming call or to make an outgoing call. When the user puts the phone back on the hook, a H0 message is sent. While the phone is OFF HOOK, the DTMF receiver is detecting any DTMF digits dialled. These are sent as they are received within the D packet. A variable number of digits will be within the one packet. Most installations can provide information by changing the polarity of the phone line during a call eg. line reversal on called party answer, and this information is provided with the A message. The CN-4750 is also constantly monitoring the line for service tones and will report them as they are detected. The common tones are ring (T7), busy (T1) and dial tone (T2).

The computer can control the CN-4750 as detailed here:

The computer can make the CN-4750 perform telephony functions. If the telephone is connected in series with the CN-4750 line card, the CN-4570 can disconnect it from the phone line using the M command. M1 will disconnect the phone and M0 will connect the phone. This allows the computer full control of the phone connected to the line card. While the M1 command is active, the state of the phone is reported using the F1 and F0 commands. Independently of the phone, the CN-4750 can loop the phone line using the L1 command and go back on hook using the L0 command. While the line is looped, DTMF digits may be dialled using the D command. If the phone is on hook or is connected in series, the F command will perform a hook flash (timed loop break) on the phone line.

The CN-4750 also has a change-over relay which provides voltage free contacts to the outside world. The normally open or normally closed contacts may be used to control switchable systems. The commands to operate the relay were not yet implemented at the time of writing.

Specifications	**CN-4750**
Size	19 inch rack mount, 2 unit high, 250mm deep
Weight	3 kg
Power	10 VAC, 10 Watts maximum
Capacity	10 lines
Expansion	Up to 100 lines
Compatibility	All two wire ring in/loop out exchange technologies, CE independent
Interface	Standard 3 wire RS232, 9 pin female DCE
Format	9600 baud, 1 stop bit, no parity, 8 data bits
DTMF Detect	$\geq$ 40 ms, -30 $\rightarrow$ 0 dBm
Service Tone Detect	Automatic cadence detection, software adjustable sensitivity.
CND (CLI)	TS030 Compliant, Bell 202 (ITU V.23 optional)

Notes.

1. Future features will include least cost routing and call barring.

Warranty

The equipment has a warranty against defects in material and workmanship for a period of 24 months from date of delivery into the customer's store. Within this period repairs, if necessary, are without charge for parts and labour.

Transport costs to the factory will be to the customer's account, and Design Two Thousand Pty Ltd will cover the return transport costs for warranty repairs. If units are sent to the factory and discovered to be 'No Fault Found', a service charge may apply and the return transport costs may be to the customer's account.

See 'SERVICE INFORMATION' on page 1 of this document. In the unlikely event of a breakdown, units can be sent for repair to:

DESIGN TWO THOUSAND PTY LTD
11 ROSE STREET
UPPER FERNTREE GULLY
MELBOURNE AUSTRALIA 3156

TELEPHONE: + 613 9758 5933
FACSIMILE: + 913 9758 5560
E-MAIL: gen@design2000.com.au
WEBSITE: www.design2000.com.au

Please remember to include an accurate fault report, contact name and number, and a return address .

CTI CALL INFORMATION INTERFACE

MODEL CN-4750

MADE IN AUSTRALIA

design2000

SMDR Reporting Option

The SMDR Reporting option (SW-4768) will generate human readable data records, one record to a line. Each line is of fixed format as described below. SMDR stands for Station Message Details Reporting.

The data is output on an RS232 port. The data is formatted to 9600 baud, 8 data bits 1 stop bit and no parity. The interface is a 9 pin female DB style connector. It is configured as a DCE with Transmitted data output on pin 2 and received data input on pin 3. CTS is an output on pin 8 which is asserted when the device is ready to receive data and RTS is a input on pin 7 which signals the device when it can send data. RTS is only recognised at the start of a record and will not stop the transmission of a record in progress.

When DTR is not asserted, only one record for each card can be buffered. This will changed in a later hardware revision to allow a larger record buffer.

If DTR hand shaking is not required, it must be asserted to enable communication. If a 3 wire serial data connection is used, loop pin 7 and 8 together.

Call records (detailed on the next page) are presented in the following format:

Col>	0		1	2		3 4 5	6	7	8
LineV	12	345	678901234567	890123456	789	012345678901234567890123456	78901234567	89	01234567890
1	R	0	SMDR Format CND 476900						
2	L	09	SMDR Line Card 476800						
3	E	09	/ 00:00	00:00:14	OG	97587267		1	
4	E	09	/ 00:01	00:00:18	OG	97587267		0	
5	S	09	13/07 14:31		IC	0397581576			
6	E	09	13/07 14:31	00:00:05	IC			1	009
7	E	09	13/07 14:31	00:00:12	OG	07587267		0	
8	S	09	13/07 14:32		IC	0397581576			
9	E	09	13/07 14:33	00:00:00	IC			0	091

These records show rack and line card power on, firmware version, start or end of a call, line number, date and time, call duration, incoming or outgoing call, number received (CND) or dialed, line reversal, and seconds ringing before IC call was answered.

The records are of the following format

Column

01 Record type
S for start of call.
E for end of call.
R for rack power on.
L for line card power on.

03 → 04 S E and L records: line number 00 → 99.
R records: rack number 0 → 9 followed by the software revision.

The following format is for the E and S records.

06 → 16 message date and time (dd/mm hh:mm).
If no date is available (from exchange on incoming call), the date is printed blank and the time is relative to power up.

18 → 25 duration of call for E records (hh:mm:ss). For OG calls the time is from the start of the call unless line reversal on answer is detected, where the time is then duration from the answer being detected.

27 → 28 IC for incoming or OG for outgoing.

30 → 55 S records: CND data.
E records: DTMF digits during call (0 → 9, A, B, C, D, *, #) and hook flash (F).

57 → 66 reserved.

68 E Records: Answer flag (Reversal on OG, Answer on IC) 0=no 1=yes.

70 → 72 E Records: Ringing time for IC call in decimal seconds.

Example records.

```
   Column
   0        1         2         3         4         5         6         7
   12345678901234567890123456789012345678901234567890123456789012345678901
1  R 0 SMDR Format CND 476900.
2  L 09 SMDR Line Card 476800.
3  E 09   /   00:00 00:00:14 OG 97587267                              1
4  E 09   /   00:01 00:00:18 OG 97587267                              0
5  S 09 13/07 14:31          IC 0397581576
6  E 09 13/07 14:31 00:00:05 IC                                       1 009
7  E 09 13/07 14:31 00:00:12 OG 97587267                              0
8  S 09 13/07 14:32          IC 0397581576
9  E 09 13/07 14:33 00:00:00 IC                                       0 091
```

Row

1 is a power on from Rack 0, software revision 476900.
2 is a power on from Line card 09, software revision 476800.
3 is a 14 second successful outgoing call to 9758 7267 ending during the first minute of operation.
4 is an 18 second unsuccessful outgoing call to 9758 7267 ending during the second minute of operation.
5 is the start of an incoming call from 03 9758 1576 at 2:31 PM, 13th July.
6 is the end of the 5 second incoming call from 03 9758 1576 answered after 9 seconds.
7 is a 12 second unsuccessful outgoing call to 97587267 at 2:31 PM.
8 is the start of an incoming call from 03 9758 1576 at 2:32 PM.
9 is the end of the unanswered incoming call from 03 9758 1576 which rang for 91 seconds.

CN-4750 Call Information Interface

Ordering Codes:

19” 2RU Subrack: RA-4757
Includes:
PC-4758 Mother Board
PC-4751 Controller Card
SW-4756 Controller firmware
PP-1 220-240/10Vac Power supply

Line Card: PC-4752
Includes:
SW-4753 Line Card firmware

SMDR Firmware: SW-4768

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