

Interface converter G.703.1 64 kbit/sec

Features

- Maximum line attenuation -10 dB
- G.703 line interface 64 kbit/sec
- Duplex mode
- V.35/RS-530/RS-449/RS-232 digital interface
- Capability to double the data transmission rate
- Digital, local and remote loops
- Built-in Bit Error Rate tester (BER tester);
- Two DTE emulation modes
- Alarm interface ("dry" relay contacts)
- Built-in mains or battery power supply unit

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Functions

The PCM64 is designed for converting G.703.1 64 kbit/sec interface signals into synchronous and asynchronous interfaces of terminal data transmission equipment (DTE). The device is manufactured in two models – a universal one, having codirectional and contradirectional G.703 interface operating modes, and a model having only a codirectional G703 interface. The converter may be used to create a duplex data transmission link using digital trunking equipment. The converter allows connecting computers, routers, terminals, etc. to digital trunking equipment with a codirectional 64 kbit/s interface (G.703.1). The presence of a built-in synchronous/asynchronous converter provides the capability to connect to asynchronous ports of various equipment. The built-in BER tester and the capability to enable a loop remotely on the remote device allow testing link from the local device completely. The capability to enable external receiver and transmitter clocks allows selecting one of the two DTE port emulation modes when connecting the converter to a DCE device. The PCM64 converter allows operating at double transmission rate (128 kbit/sec) in the line.

Technical specifications

Digital interface	
Data transmission rate	Async 115, 57.6, 38.4, 19.2, 9.6, 4.8, 2.4, 1.2, 0.6 and less kbit/sec; Sync 64 or 128 kbit/sec
Clock signals	TXC, RXC, ETC, ERC
Modem signals	DSR, CTS, RTS, CD
G.703 interface (64 kbit/sec)	
Connector	removable terminal
Encoding	G.703.1
Line impedance	120 Ohms (balanced twisted pairs)
Signal level at the receiver input	0 to -10 dB
Transmitter path synchronization	INT (from the internal clock) RCV (from the receiver path) EXT (from the digital interface)
Alarm interface	
Connector	Mini-DIN 6-pin female
Relay contact current	up to 250 mA
Relay contact voltage	up to 175 VDC

Diagnostic modes

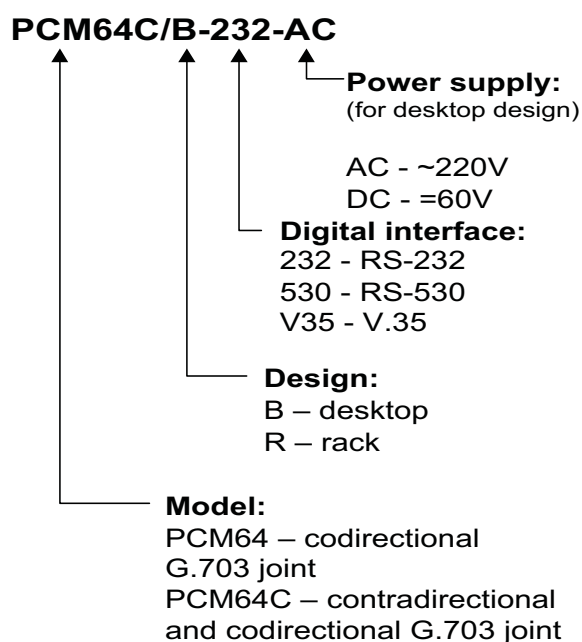
Loops	Digital (on the digital interface) Local (on the G.703 line at the local device) Remote (on the G.703 line at the remote device)
BER tester	Enabled by a button on the front panel

Delivered items

Delivered items include:

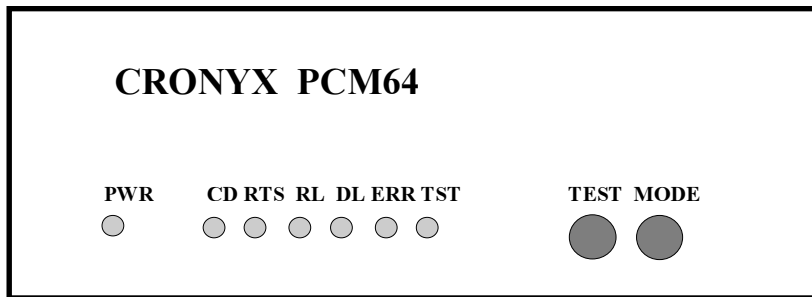
- PCM64 converter of the corresponding design
- Removable terminal for connecting to the line
- Power cable (for models with AC power supply)
- User's guide

Order code

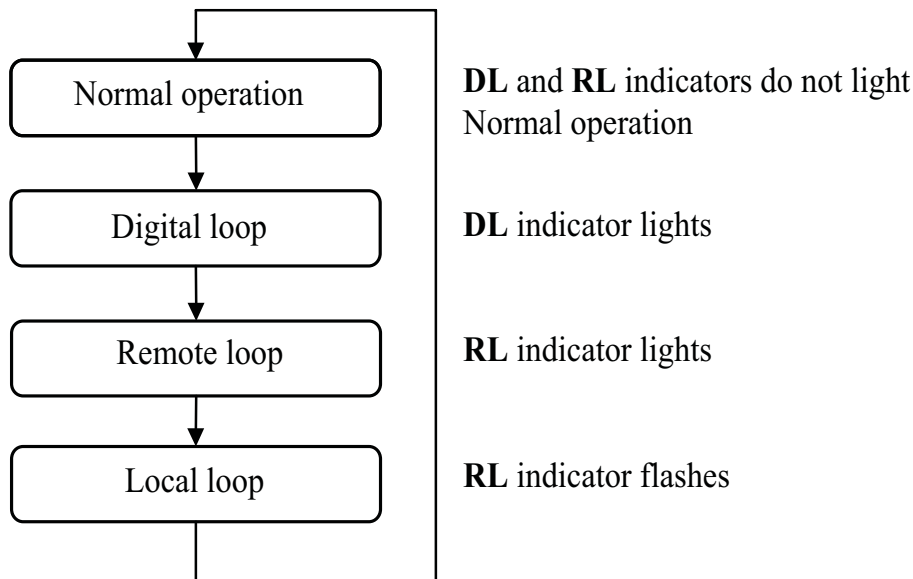


Controls and indicators

Front panel controls



1. The **MODE button** enables diagnostic loops. When the button is pressed, the following loops are enabled in sequence:



The **TST button** enables the BER tester. When the TST button is pressed again, the BER tester is disabled. If the BER tester is enabled, the TST indicator lights. In this case test data are transmitted into the line, and the data received from the line are compared to the transmitted data, and the ERR indicator lights in case of discrepancy.

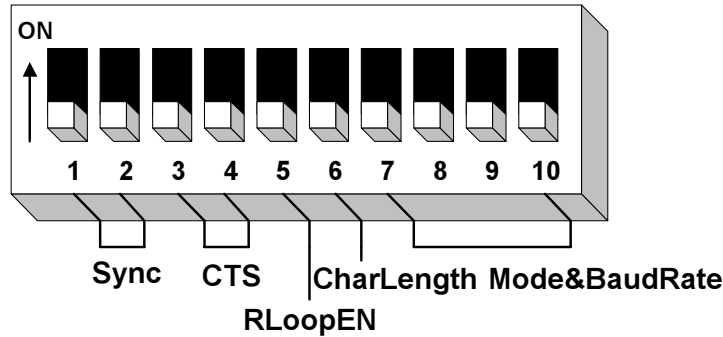
Indicators

1. The **PWR** lights when the device is connected to the power supply.

2. **The CD indicator** lights during normal signal level at the receiver input.
The CD signal is set to the active state when the digital loop is enabled, irrespectively of the signal at the receiver input.
3. **The RTS indicator** indicates the status of the RTS signal from the DTE connected to the digital interface.
4. **The RL indicator** flashes if the local loop is enabled, and lights continuously, if the remote loop is enabled:
5. **The DL indicator** lights if the digital loop is enabled.
6. **The TST indicator** lights if the BER tester is enabled.
7. **ERR indicator** warns about errors:

<i>ERR indicator</i>	<i>Additional conditions</i>	<i>Error cause</i>
Lights	CD does not light, codirectional mode	No signal at the G.703 receiver input (loss of carrier)
Lights	CD does not light, contradirectional mode	No receiver clock (RSYNC) at the interface G.703 input
Lights/flashes	DL, TST indicators do not light (normal operating mode) ERC mode enabled	ERC clock frequency deviates from the frequency of clocks received from the G.703 line due to loss of common synchronization
Lights/flashes	TST indicator lights (BER tester enabled)	Data transmitted by the BER tester into the line, do not correspond to the data received from the line
Flashes	EXT synchronization mode selected (from the digital interface) The DL indicator flashes continuously	1. Frequency deviation of TXCount pulses from the digital interface is beyond the permitted limits, or clock is absent. 2. No cable connected to the DTE. 3. DTE configured incorrectly.
Flashed	Contradirectional mode The DL indicator flashes continuously	No transmitter clock (TSYNC) at the G.703 interface input

DIP switches



Sync - transmitter path synchronization mode

S1:S2	Sync
<input type="checkbox"/> <input type="checkbox"/>	INT synchronization from the internal clock
<input type="checkbox"/> <input type="checkbox"/>	RCV synchronization from the G.703 receiver
<input type="checkbox"/> <input type="checkbox"/>	EXT synchronization from the digital interface
<input type="checkbox"/> <input type="checkbox"/>	CONTR contradirectional G.703 interface mode

CTS - CTS signal generation logic

S3:S4	CTS
<input type="checkbox"/> <input type="checkbox"/>	CTS = 1
<input type="checkbox"/> <input type="checkbox"/>	CTS = RTS
<input type="checkbox"/> <input type="checkbox"/>	CTS = CD
<input type="checkbox"/> <input type="checkbox"/>	CTS = CD * RTS

RLoopEn - loop enabling at the remote device request permitted

S5	RLoopEn
<input type="checkbox"/>	prohibited
<input type="checkbox"/>	permitted

CharLength/ERC - Symbol length in the asynchronous mode / External receiver clock mode in the synchronous mode

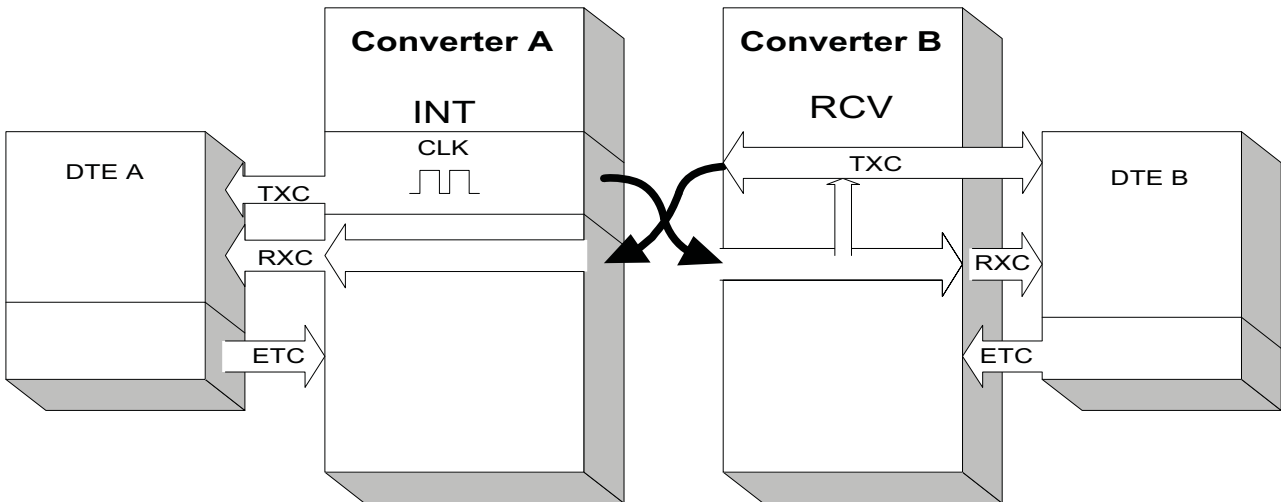
S6	CharLength/ERC
<input type="checkbox"/>	9 bit / External ERC clock permitted
<input type="checkbox"/>	8 bit / External ERC clock prohibited

Mode & Baud Rate - Data transmission rate and mode

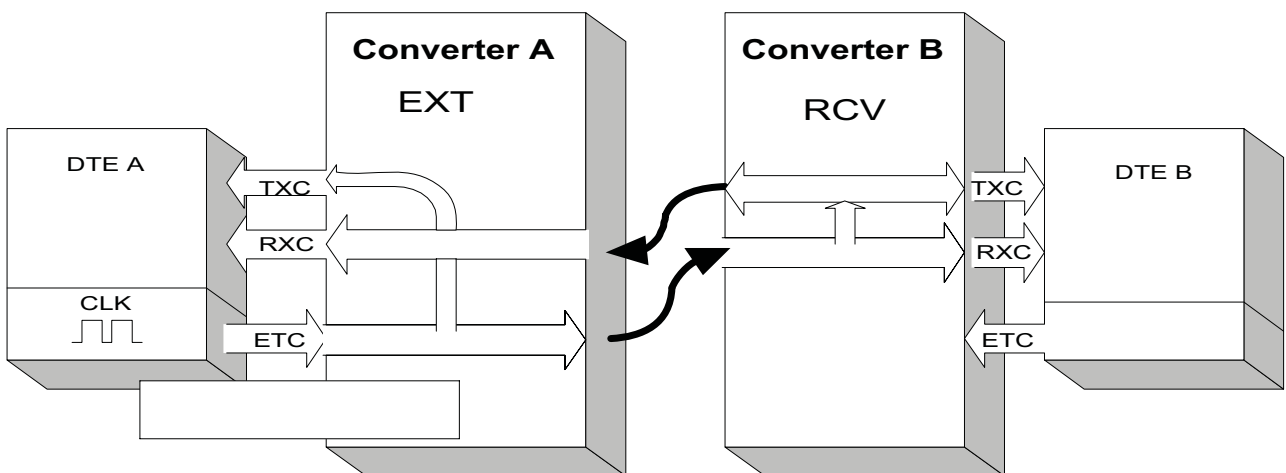
S7:S10	BaudRate & Mode
□□□□	Async 600 bit/sec and less
□□□□	Async 1200 bit/sec
□□□□	Async 2400 bit/sec
□□□□	Async 4800 bit/sec
□□□□	Async 9600 bit/sec
□□□□	Async 19200 bit/sec
□□□□	Async 38400 bit/sec
□□□□	Async 57600 bit/sec
□□□□	Async 115200 bit/sec
□□□□	Sync 64 kbit/sec
□□□□	Sync 128 kbit/sec
□□□□	Sync 128 kbit/sec
□□□□	Sync 128 kbit/sec
□□□□	Sync 128 kbit/sec
□□□□	Sync 128 kbit/sec
□□□□	Sync 128 kbit/sec

Synchronization settings

Setting alternatives with a common clock source

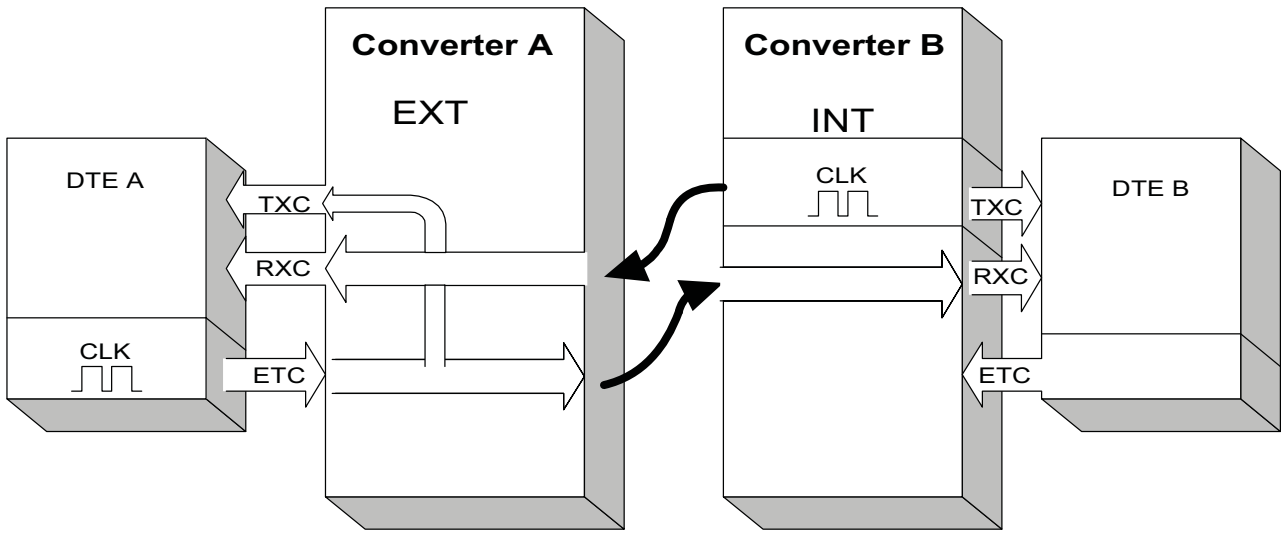


Common clock from converter A

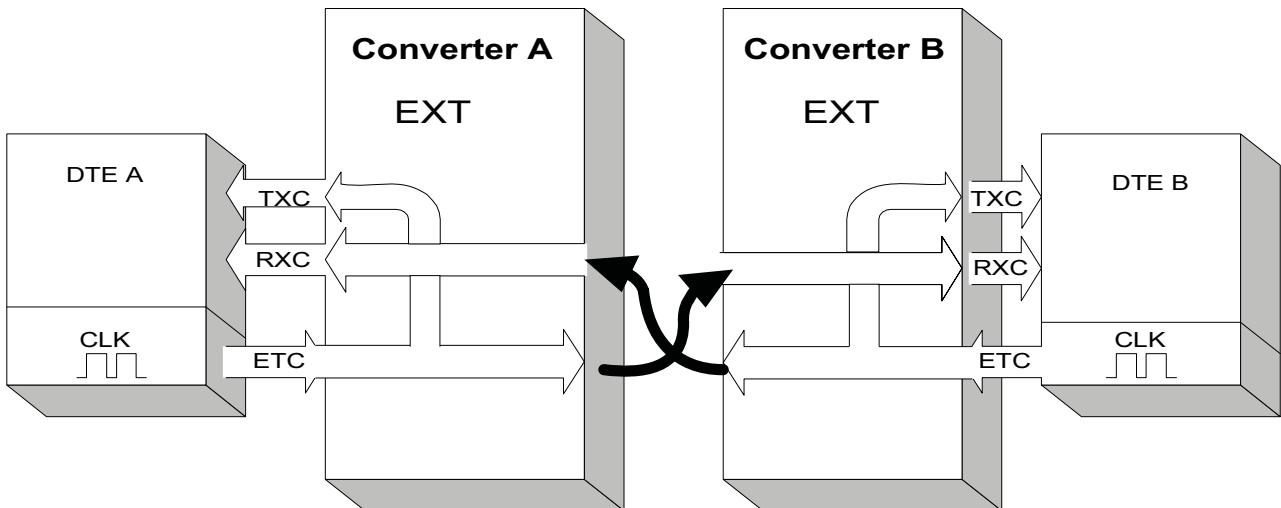


Common clock from DTE A

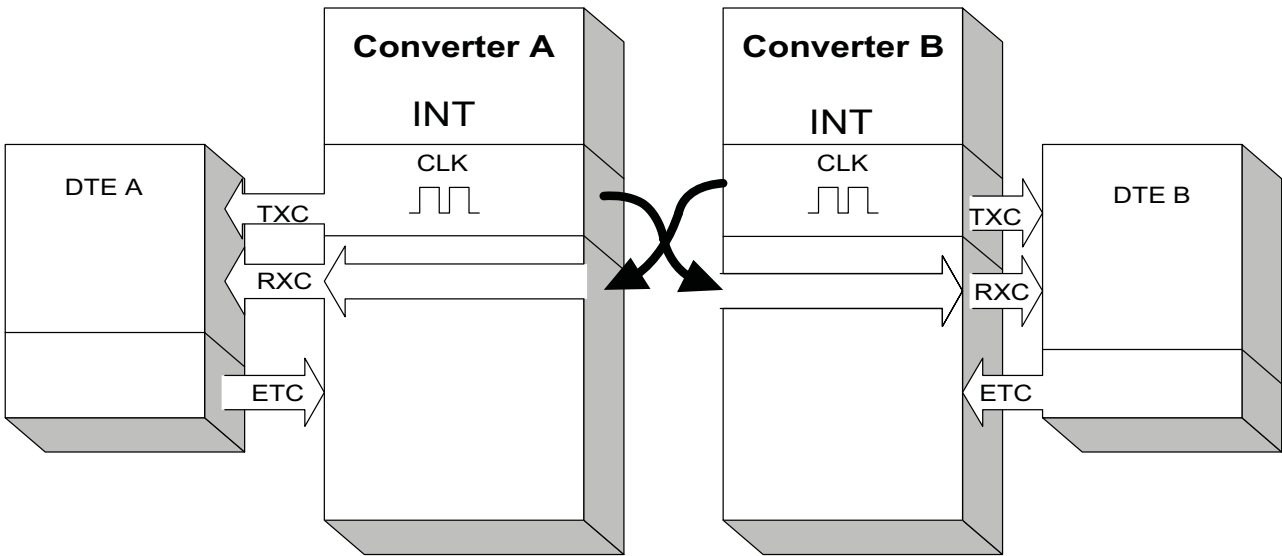
Setting alternatives with separate clock sources



Separate clocks from DTE A and converter B



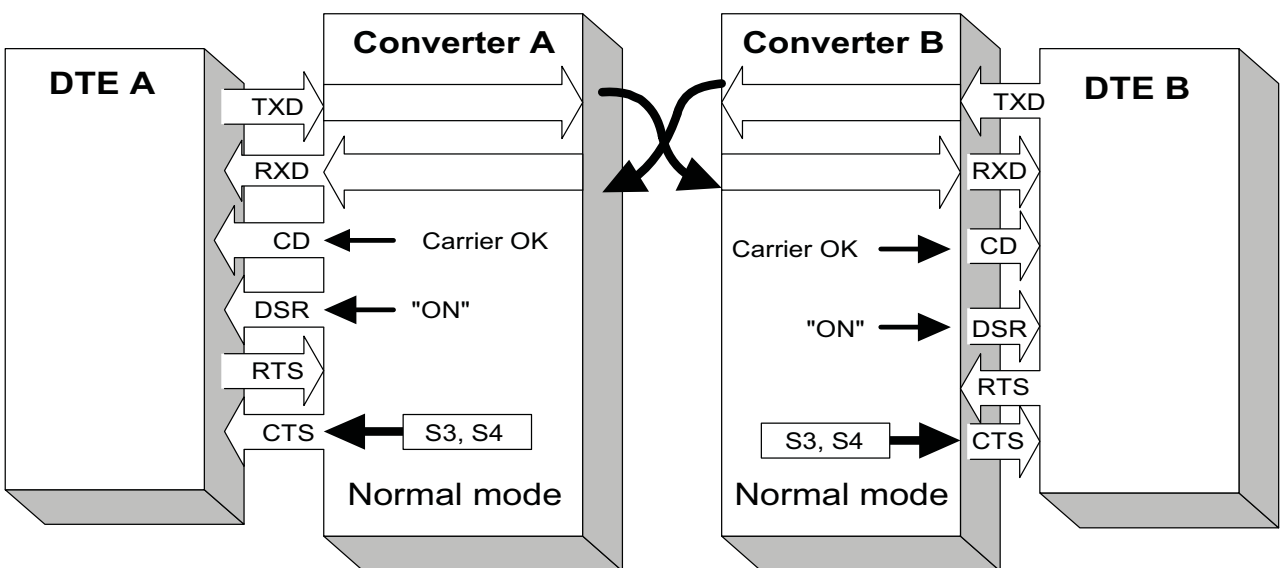
Separate clocks from DTE A and DTE B



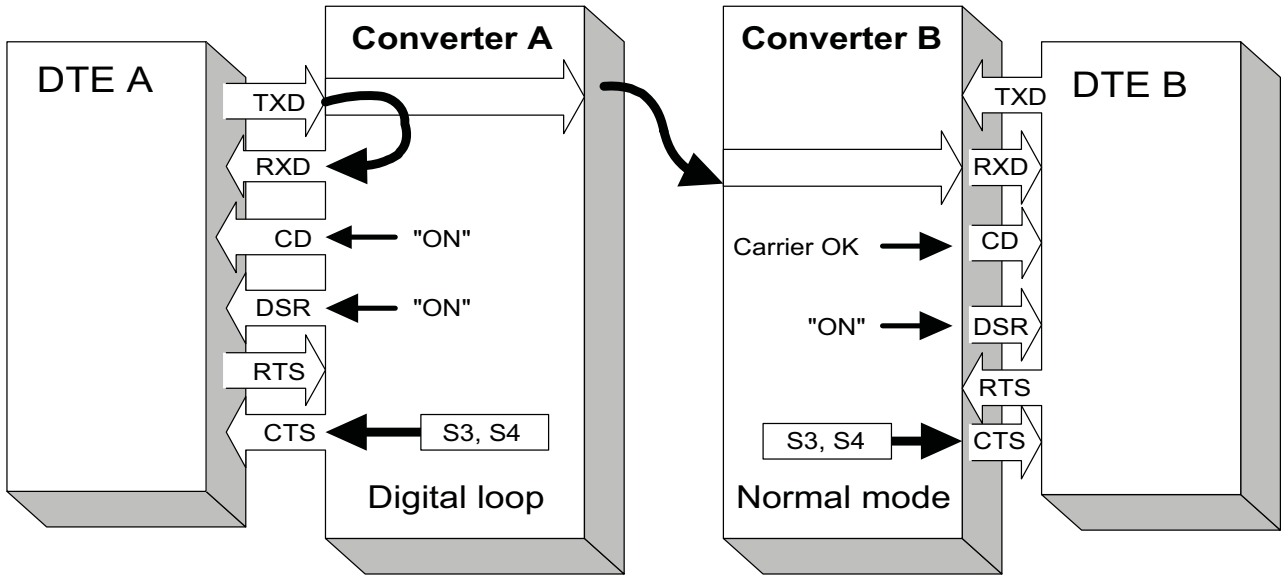
Separate clocks from converters A and B

Loops

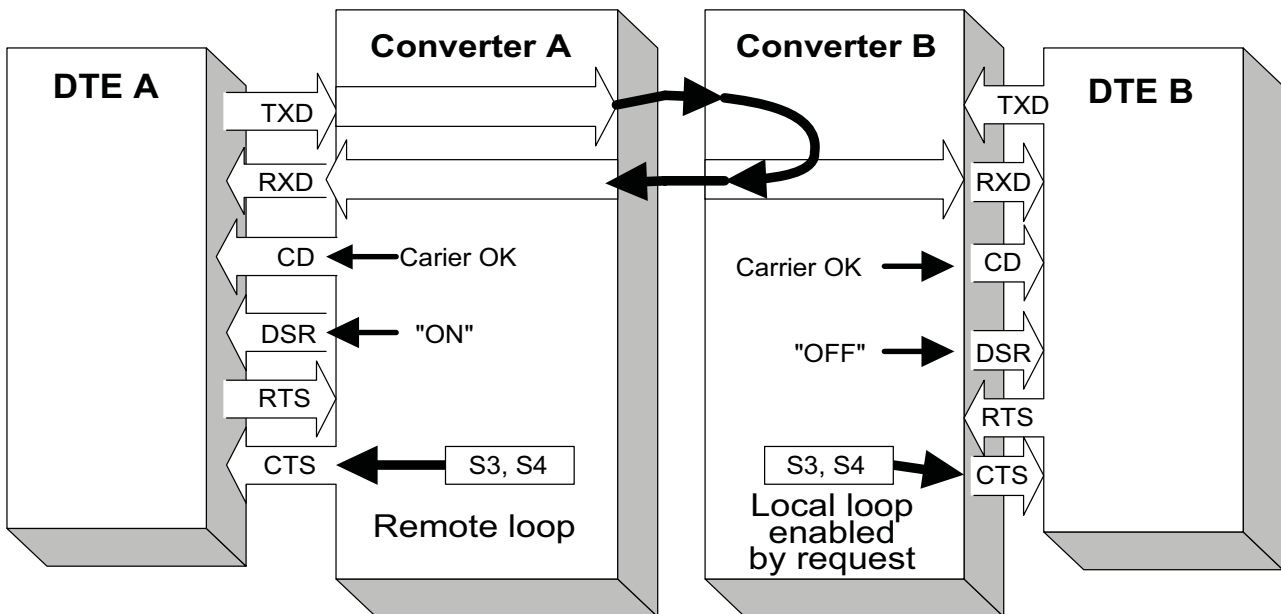
Normal mode



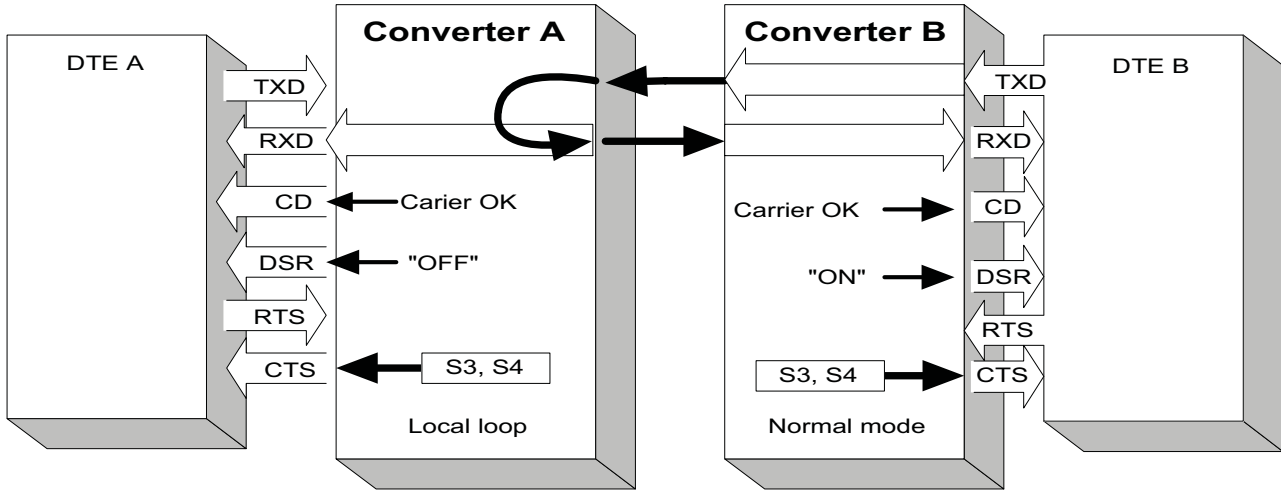
Digital loop



Remote loop



Local loop

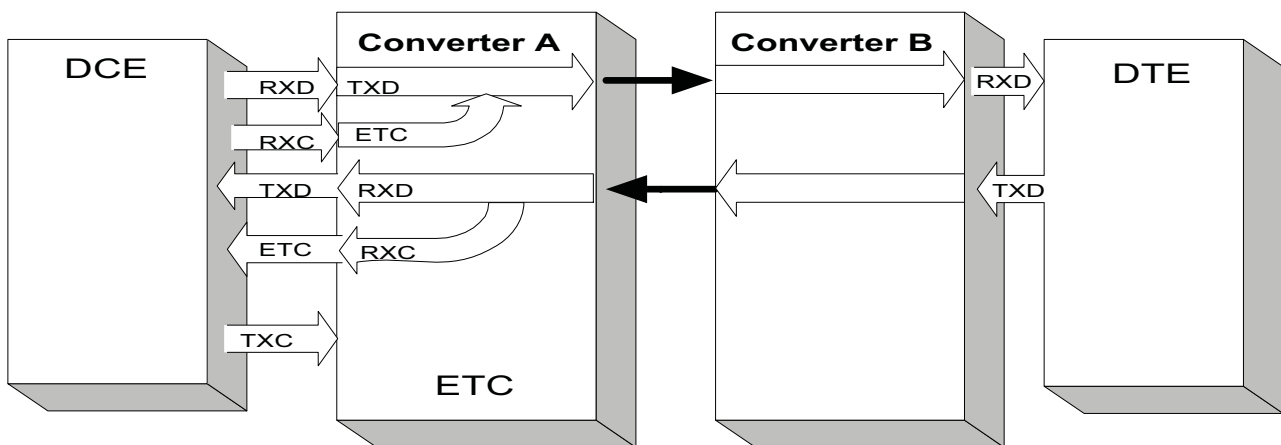


DTE emulation

Two clock inputs - reception and transmission (ERC and ETC) are provided for connecting PCM64 converter over the digital interface (V.35, RS-530, or RS-232) to DCE devices in the synchronous mode.

DTE1 emulation mode

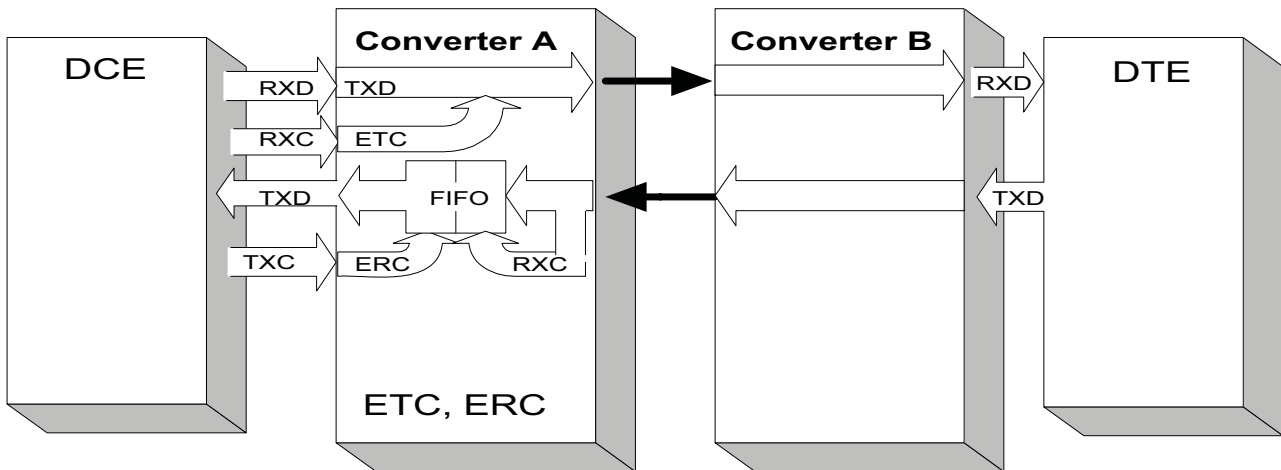
The DTE1 emulation mode is used when connecting to DCE devices, which have the external synchronization from the digital port (RS-232, V.35, RS-530) mode. In this case a pair of devices connected over the digital port (RS-232, V.35, RS-530) translates the clock frequency from one line into the other.



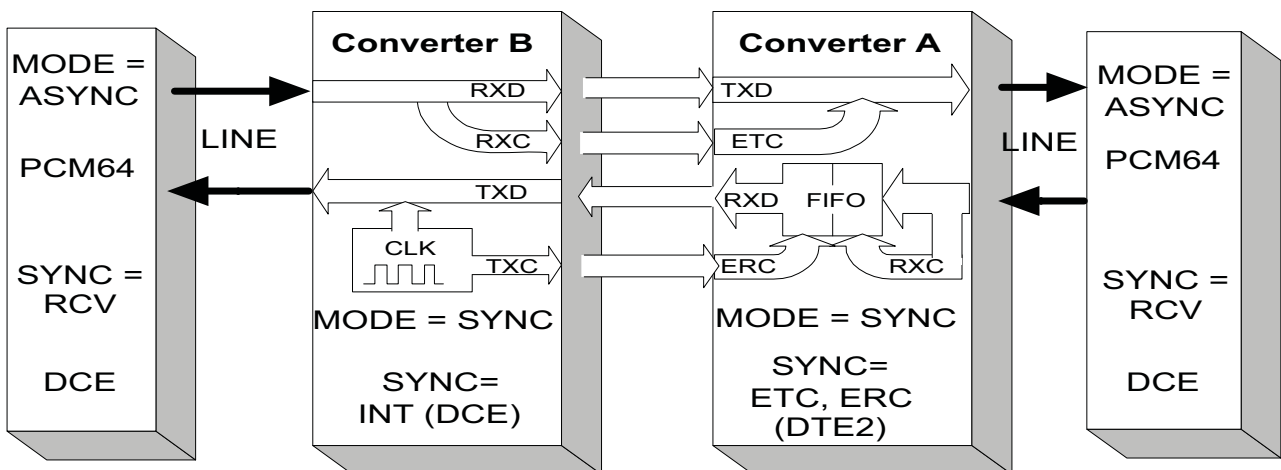
DTE1 emulation mode using external receiver clock

DTE2 emulation mode

The DTE2 emulation mode is used when connecting to DCE devices, which do not have external synchronization from the digital port (RS-232, V.35, RS-530) mode. In this case the PCM64 converter receives data to the digital port according to the clock received on the ETC input, and transmits according to the clock received on the ERC input. The FIFO buffer is used to correct data phase at the RXD digital port output in relation to ERC clock. For the correct operation of the buffer (no overflows and underflows) the clock frequency received from the line must be the same as the frequency at the ERC input. This condition is maintained when the data transmission link has a common clock source. Otherwise there may be periodic errors related to FIFO buffer overflows and underflows. The frequency of these errors depends on the discrepancy value between these two frequencies.



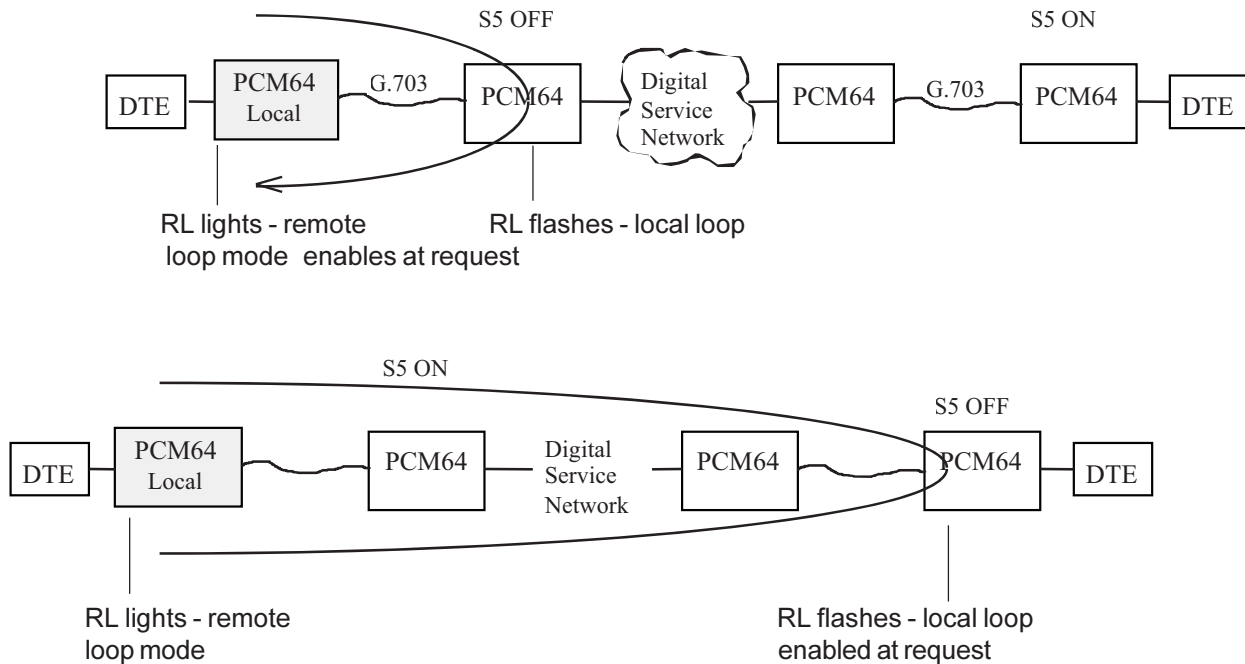
DTE2 emulation mode using external transmitter and receiver clock



Application example of DTE2 emulation mode for G.703 line extension between two PCM64 converters, which transmit asynchronous data. The clock source is the internal clock of converter B.

Remote loop selection

In complex configurations, when several PCM64 modems are connected in a sequence, the DIP switch S5 may be used to specify a LAN section to be checked in the remote loop mode.



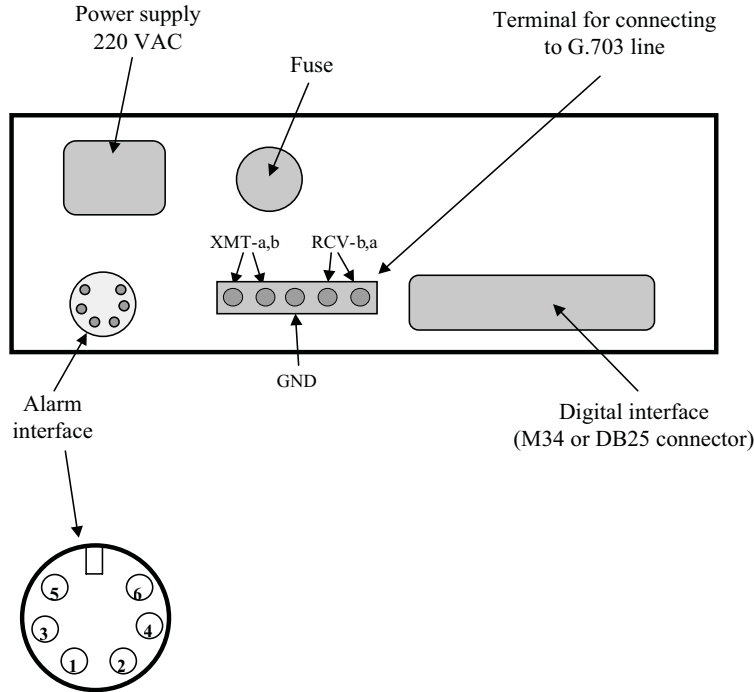
Emergency alarms

The emergency alarm interface is used for turning on an external executive unit (ringer, buzzer, console indicator, etc.) during emergency – loss of bearer, power failure, and other errors indicated by the “ERR” LED on the front panel. This is enabled by “dry” (not connected to any electrical circuit of the device) relay contacts.

In the normal state contact 3 is connected to contact 1. In the emergency state contact 3 disconnects from contact 1 and connects to contact 2 (the “alarm” state).

Rear panel connectors

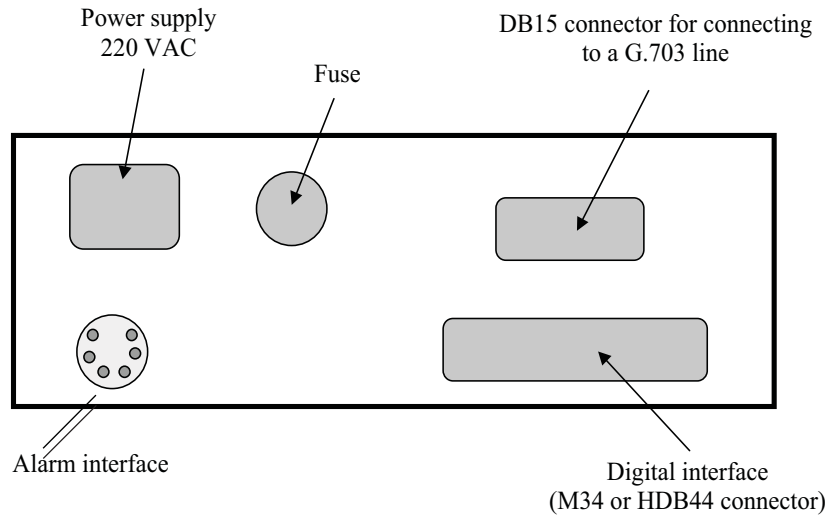
PCM64 model



Contact

- | | |
|---|---|
| 1 | Connected to contact (3) during normal operation. Disconnects during error |
| 2 | Disconnected during normal operations. Connected to contact (3) during error. |
| 3 | Middle contact |

PCM64C model



DB15 connector pinout diagram for the G.703.1 interface of model PCM64C

DB15 pin	Signal	Direction
1	XMT - a	Transmit
9	XMT - b	Transmit
3	RCV - a	Receive
11	RCV - b	Receive
5	TSYNC - a	Receive
13	TSYNC - b	Receive
7	RSYNC - a	Receive
15	RSYNC - b	Receive
2	GND	
10	GND	

DB25 connector pinout diagram for RS-232 and RS-530 interfaces

Cont. DB25	RS-530	RS-232	Direction.
2	TXD-a	TXD	Receive
14	TXD-b	—	Receive
3	RXD-a	RXD	Transmit
16	RXD-b	—	Transmit
24	ETC-a	ETC	Receive
11	ETC-b	—	Receive
21	ERC-a	ERC	Receive
18	ERC-b	—	Receive
15	TXC-a	TXC	Transmit
12	TXC-b	—	Transmit
17	RXC-a	RXC	Transmit
9	RXC-b	—	Transmit
4	RTS-a	RTS	Receive
19	RTS-b	—	Receive
20	DTR-a	DTR	Receive
23	DTR-b	—	Receive
6	DSR-a	DSR	Transmit
22	DSR-b	—	Transmit
5	CTS-a	CTS	Transmit
13	CTS-b	—	Transmit
8	CD-a	CD	Transmit
10	CD-b	—	Transmit
1,7	GND	GND	—

M34 connector pinout diagram for the V.35 interface

Contact	Signal	Direction
P	TD-a	Receive
S	TD-b	Receive
R	RD-a	Transmit
T	RD-b	Transmit
U	ET-a	Receive
W	ET-b	Receive
BB	ERC-a	Receive
Z	ERC-b	Receive
Y	TC-a	Transmit
AA	TC-b	Transmit
V	RC-a	Transmit
X	RC-b	Transmit
C	RTS	Receive
H	DTR	Receive
E	DSR	Transmit
D	CTS	Transmit
F	DCD	Transmit
A	CGND	—
B	SGND	—

Cable diagrams

V.35 cable for connecting to the DCE using external transmitter clock

(DTE1 emulation mode)

PCM64 M34 (male)			DCE M34 (male)	
TXD-a	P	←	R	RXD-a
TXD-b	S	←	T	RXD-b
RXD-a	R	→	P	TXD-a
RXD-b	T	→	S	TXD-b
ETC-a	U	←	V	RXC-a
ETC-b	W	←	X	RXC-b
RXC-a	V	→	U	ETC-a
RXC-b	X	→	W	ETC-b
TXC-a	Y	Not connected		
TXC-b	AA	Not connected		
ERC-a	BB	Not connected		
ERC-b	Z	Not connected		
RTS	C	←	F	CD
DTR	H	←	E	DSR
DSR	E	→	H	DTR
CD	F	→	C	RTS
GND	A	↔	A	GND
GND	B	↔	B	GND

V.35 cable for connecting to the DCE using external receiver and transmitter clocks

(DTE2 emulation mode)

PCM64 M34 (male)			DCE M34 (male)	
TXD-a	P	←	R	RXD-a
TXD-b	S	←	T	RXD-b
RXD-a	R	→	P	TXD-a
RXD-b	T	→	S	TXD-b
ETC-a	U	←	V	RXC-a
ETC-b	W	←	X	RXC-b
RXC-a	V		Not connected	
RXC-b	X		Not connected	
TXC-a	Y		Not connected	
TXC-b	AA		Not connected	
ERC-a	BB	←	Y	TXC-a
ERC-b	Z	←	AA	TXC-b
RTS	C	←	F	CD
DTR	H	←	E	DSR
DSR	E	→	H	DTR
CD	F	→	C	RTS
GND	A	↔	A	GND
GND	B	↔	B	GND