

4/8 Channel L/D (Subs) Card Reference Manual

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STATUTORY NOTICES

All PCB assemblies contain Electrostatic Sensitive Devices (ESDs) which may be permanently damaged if incorrectly handled. This equipment must be handled in accordance with BS5783 code of practice for the handling of electrostatic sensitive devices.

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4/8 Channel 2-wire L/D (Subs) Card

1. Description

The basic 2-Wire Loop Disconnect (Subs) Card DT535, provides an interface for four 2-wire subscriber lines using loop disconnect signalling, with the option to expand to a total of eight interfaces using the 4 channel 2-wire loop disconnect (subs) module DT765. In all configurations firmware DT972 must be fitted to the card.

A DTE67 - 4 Channel Card comprises a DT535 fitted with DT972 Firmware.

A DTE68 - 8 Channel Card comprises a DT535 fitted with a DT765 module and DT972 Firmware.

2. Operation

The circuit drops digital data from the assigned timeslots and converts this data to VF signals for receive output on the appropriate 2-wire lines. VF transmit input signals on the 2-wire lines are converted into digital data and this is inserted back into the assigned timeslots.

Signalling data is dropped from timeslot 16 and is used to control ringing voltage applied to the appropriate 2-wire lines (receive signalling). This ringing voltage is generated externally from the card by a Ringing Generator Card DT579 or DT186 fitted in the chassis or by an other external source.

The card detects subscriber line loop conditions and inserts this in the form of digital data back into timeslot 16 (transmit signalling).

The card requires a nominal -48VDC battery (range -40.5 to -60V) to operate i.e. either a battery powered chassis, or a mains powered chassis with an additional -48VDC supply connected.

The incoming DC 0V *must* be connected to the chassis for the card to operate correctly.

3. Specifications

The card meets the requirements of CCITT Specifications G.713 and G.715.

Ringling Voltage: 125V RMS AC (max.)*
Input Voltage Range: -40.5 to -60VDC
Power Consumption (typical max.): 7.7W (8 circuits), 7.1W (4 circuits)

*Note that the open circuit Ringling Generator voltage may be as high as 150V RMS but only 125V may be switched through this card.

Delays, including system delays, jitter buffer etc.

A-A: 890 μ s typical
A-D (encoding): 370 μ s typical
D-A (decoding): 600 μ s typical

Return Loss (2-wire) typical:

300Hz	20dB
1000Hz	29dB
2000Hz	32dB
3000Hz	37dB
3400Hz	40dB

Return Loss (4-wire) typical: (900R in parallel with 60nF)

500Hz	52dB
1800Hz	51dB
2500Hz	45dB
3400Hz	43dB

Relative level tolerance: ± 0.3 db except encoding side -7dBr setting:
 ± 0.4 dB

4. Timeslot Assignment

Circuits on the DT765 bear the same circuit numbers as their associated circuits on the DT535 but are assigned different timeslots. The circuit on the main board is nominally the 'A' circuit i.e. this board consists of circuits 1A, 2A, 3A and 4A. Circuits on the daughter board (DT765) are numbered 1B, 2B, 3B and 4B when this board is fitted. As far as timeslot assignment and Control Ports are concerned however, 1A and 1B for example are one circuit. Control Port 1 for circuit 1 refers to circuit 1A and Control Port 2 to circuit 1B for example. If the DT765 is fitted, two timeslots may be allocated to one 'circuit', say circuit 1. The first timeslot allocated will automatically be assigned to circuit 1A and the second, highest numbered timeslot to circuit 1B. If two timeslots are assigned to any circuit, and a DT765 is not fitted, Alarm 2 will be reported by the card.

5. DC Characteristics

Each Subscriber Line Interface is fed from a constant resistance source of 1800 ohms $\pm 10\%$ at nominally -48V. The circuits are designed to function correctly with a DC resistance range, including the attached telephone set, of up to 1800 ohms. DC current limit is approximately 21mA on each circuit. In the open circuit condition, the A wire floats at approximately -10V and the B wire floats at approximately -35V. When the 2-wire connection is looped the A wire stays positive with respect to the B wire by approximately 5-15V.

6. VF Characteristics

The VF signals are encoded to CCITT recommendation G.711 using the A-law characteristics. The circuits meet the requirements of G.713 (Analogue-to-Analogue) and G.715 (Analogue-to-Digital and Digital-to-Analogue).

The nominal impedance is 900 ohms resistive in parallel with 60nF.

The control ports are used to adjust the trans-hybrid balance network. For any circuit, Control Port 1 sets the main board circuit balance network impedance, and Control Port 2 sets the associated daughter board circuit balance network impedance. The relationship between the control port setting and the balance network impedance is shown in section 8:

7. Signalling Characteristics

The equipment must be in Channel Associated Signalling (CAS) mode (selectable through the System Software) to enable signalling to be carried over timeslot 16. The codes transmitted and received in timeslot 16 are as follows unless set differently by use of Switch S1 (see 'Link and Switch Options').

Transmit direction

Idle	1101) Loop disconnect dialling will
Seize	0101) alternate between these codes.

Receive direction

Free	1101) These codes will alternate in time
Ringling	0101) with the exchange ringling cadence.

The ringling generator used with this card must provide a battery backed ringling supply of 65-150V RMS (open-circuit) sine-wave or filtered square-wave at 17-53Hz frequency. Ringling Generators DT579 and DT186 (3400 only) are available for this purpose. The DT579 fits into a vacant chassis channel card slot and the DT186 fits into the rear of the 3400 chassis. If desired, an external ringling voltage supply of characteristics conforming to the above parameters may be used.

8. Control Port

Control Port bytes are displayed in the following order:-

D7 D6 D5 D4 D3 D2 D1 D0

8.1 Control Port Settings

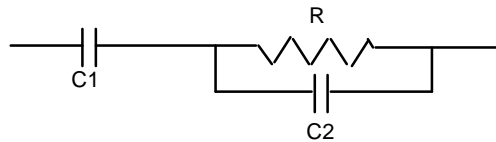
D7 - D4	Trans-hybrid Balance Network Selection (See chart below)
D3 - D0	Not Used - Set to 1

On 4 channel cards DTE 67, only Control Port 1 is used. On 8 channel cards DTE 68, Control Port 1 controls circuit 'A' and Control Port 2 controls circuit 'B'.

D7	D6	D5	D4	Trans-hybrid Balance Network		
0	0	0	0	C1 = 1 μ F,	C2 = 20nF,	R = 900R
0	0	0	1	C1 = 1 μ F,	C2 = 40nF,	R = 900R
0	0	1	0	C1 = 1 μ F,	C2 = 60nF,	R = 900R
0	0	1	1	C1 = 2 μ F,	C2 = 20nF,	R = 900R
0	1	0	0	C1 = 2 μ F,	C2 = 40nF,	R = 900R
0	1	0	1	C1 = 2 μ F,	C2 = 60nF,	R = 900R
0	1	1	0	C1 = Short circuit,	C2 = 20nF,	R = 900R
0	1	1	1	C1 = Short circuit,	C2 = 40nF,	R = 900R
1	0	0	0	C1 = Short circuit,	C2 = 60nF,	R = 900R

NOTE: Other codes are not valid.

Trans-hybrid Balance Network



9. Timeslot Control Byte

The Timeslot Control Byte, controls the gain in the transmit (analogue-to-digital) and receive (digital-to-analogue) directions as shown below. The nominal conditions of TxdB_r = 0 and RxdB_r = -7 are achieved with a Timeslot Control Byte setting of B4H (10110100B).

Receive Level					Transmit Level				
D7	D6	D5	D4	RxD _r	D3	D2	D1	D0	TxD _r
0	0	0	0	+4	0	0	0	0	+4
0	0	0	1	+3	0	0	0	1	+3
0	0	1	0	+2	0	0	1	0	+2
0	0	1	1	+1	0	0	1	1	+1
0	1	0	0	0	0	1	0	0	0
0	1	0	1	-1	0	1	0	1	-1
0	1	1	0	-2	0	1	1	0	-2
0	1	1	1	-3	0	1	1	1	-3
1	0	0	0	-4	1	0	0	0	-4
1	0	0	1	-5	1	0	0	1	-5
1	0	1	0	-6	1	0	1	0	-6
1	0	1	1	-7	1	0	1	1	-7
1	1	0	0	-7	1	1	0	0	-7
1	1	0	1	-7	1	1	0	1	-7
1	1	1	0	-7	1	1	1	0	-7
1	1	1	1	-7	1	1	1	1	-7

10. Status Ports

Status Port Bytes are displayed in the following order: -

D7, D6, D5, D4, D3, D2, D1, D0

Alarm condition is zero (0).

Status Port 1

D0	Card present (0 if present)
D1	Part of Card ID code (0)
D2	Not Used (1)
D3	Card Alarm 1: Watchdog
D4	Card Alarm 2: Timeslot allocation error
D5	Not Used (0)
D6	Not Used (0)
D7	Part of Card ID code. Cct 2 always 1. Cct 1 = 1 unless DT765 fitted. Other Ccts are not used.

Status Port 2

Circuit 1 only is used.

D0	Not Used (0)
D1	Not Used (0)
D2	Not Used (0)
D3	Not Used (0)
D4	(1)
D5	(1)
D6	(1)
D7	(0)

Note: D7-D4 are part of the card ID code.

11. Protection

The card contains no primary overload protection. This should be fitted externally from the card. Fuse resistors and surge protection semiconductors provide secondary lightning and mains crossover protection on the 2-wire interface. Should a mains crossover occur, the fuse resistors may expire and the card should be returned to Cray Communications Customer Services for repair under these circumstances.

12. Link and Switch Options

TL1, TL2 and TL3 are test links and should be set as follows:

TL1 Fitted
TL2 Not Fitted
TL3 Fitted

S1 is a bank of 8 DIL switches. Switches S1-B to S1-D inclusive are not used. Switch S1-A should be set OFF for normal operation. Switches S1-E, S1-F, S1-G, S1-H set inversion, respectively, of bits d,c,b,a of the CAS nibble if set ON.

Notes: (i) the CAS nibble is abcd (ii) the switch bank S1 may be labelled 1 to 8 instead of A to H.

13. LED Indicators

A red LED lights at the front of the card to indicate a microprocessor Watchdog alarm and this alarm is also provided in the Status Ports. This alarm occurs if a microprocessor or software related fault condition is detected or may occur if a major fault has occurred on the A/B wires of any circuit e.g. presence of a high voltage on either leg.

14. Connections

Circuit	Title	Pin No.	Circuit	Title	Pin No.
1A	A	6a (30)	3A	A	22a (42)
	B	3a (27)		B	19a (39)
	EARTH	2a (26)		EARTH	18a (-)
1B	A	6c (5)	3B	A	22c (17)
	B	3c (2)		B	19c (14)
	EARTH	2c (1)		EARTH	18c (-)
2A	A	14a (36)	4A	A	30a (48)
	B	11a (33)		B	27a (45)
	EARTH	10a (-)		EARTH	26a (-)
2B	A	14c (11)	4B	A	30c (23)
	B	11c (8)		B	27c (20)
	EARTH	10c (-)		EARTH	26c (-)

Pin numbers are those connections on the DIN41612 chassis connector.

Numbers in brackets are connections on the Universal I/O Adaptor DT280 50 Way Amphenol female connector.