

8 Channel V.110 Data Card Operation Manual

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STATUTORY NOTICES

APPROVALS

The V.110 Data Card, DTE82, is approved for indirect connection to Telecommunication Systems under the General Approval Number NS/G/1234/J/100003. This card does not contain safety isolation barriers, and any apparatus connected to it must conform with the safety requirements of the General Approval.

The safety status of the interface is SELV.



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8 Channel V.110 Data Card

1. General

The DTE82 consists of a DT586 - 8 Channel Universal Data Card fitted with DT945 V.110 firmware. This card provides transmission for up to eight data + signalling channels with individual data rate selection of up to 64kbit/s. Each of the channels may be carried in separate 64kbit/s timeslots or selected groupings of channels may be carried in single timeslots provided the combined intermediate rate bandwidth does not exceed 64kbit/s.

The rate adaptation and framing for the data channels conforms to CCITT V.110 and ECMA-102, for all data rates except 38400bit/s and 64000bit/s which are outside these recommendations.

Additional features include the combining of off-card 32k ADPCM voice channels with up to 4 channels of on-card data into one timeslot for voice + data applications.

The external interfaces to the card may be either V.24/V.28, V.36/V.11 or X.21/V.11 which are provided by a choice of I/O adapter. The DT588 provides eight V.24 channels the DT589 provides four V.36 channels and the DT593 provides eight X.21 channels.

WARNING

This channel card must *not* be used with the DT280 Universal I/O Adapter. If this I/O adapter is present when the channel card is powered up, permanent damage will result.

2. Specifications

Meets CCITT Blue Book recommendation V.110 and Standard ECMA-102 for rate adaptation.

Meets CCITT Blue Book recommendations V.24 with V.28 levels, V.36 with V.11 levels and X.21 with V.11 levels.

V.24 and V.36 circuits are supported depending on the I/O adapter fitted:-
102,103,104,105,106,107,108,109,114 and 115 on all channels.

113 and 128 is additionally supported on Channel 1.

X.21 circuits supported are TD, RD, S, C and I

Data rates in bit/s:

Synchronous	Asynchronous	Intermediate rate
	300	8000
600	600	8000
1200	1200	8000
2400	2400	8000
4800	4800	8000
9600	9600	16000
19200	19200	32000
38400	38400	64000
48000		64000
56000		64000
64000		64000

The maximum combined intermediate data rate for all channels when active is 512kbit/s, eight timeslots.

Delays

Maximum delay: $0.822\text{ms} + (28 \div \text{data rate in kbit/s})$.

e.g. 47.5ms @ 600bit/s, 1.26ms @ 64kbit/s.

This delay assumes maximum input buffer delay and worst case cross-connection delay.

Typical Power Requirements

8 Watts per card with the V.24 (DT588) or X.21 (DT593) I/O adapter.

7.5 Watts per card with the V.36 (DT589) I/O adapter.

3. Glossary of Terms

- CCITT - The Consultative Committee for International Telegraph and Telephones
- Cct 102 - SG-Signal Ground/Common Return
- Cct 103 - TD-Transmitted Data (to DCE)
- Cct 104 - RD-Received Data (from DCE)
- Cct 105 - RTS-Request To Send (to DCE)
- Cct 106 - RFS-Ready For Sending (from DCE)
- Cct 107 - DSR-Data Set Ready (from DCE)
- Cct 108 - CDSL-Connect Data Set to Line or DTR-Data Terminal Ready (to DCE)
- Cct 109 - RLSD-Data channel Received Line Signal Detector (from DCE)
- Cct 113 - Transmitter signal element timing (to DCE)
- Cct 114 - Transmitter signal element timing (from DCE)
- Cct 115 - Receiver signal element timing (from DCE)
- Cct 128 - Receiver signal element timing (to DCE)
- DCE - Data Control Equipment, 8 Channel Universal Data Card.
- DTE - Data Terminal Equipment, any equipment connected to the V.110 Data Card's V.24 V.36 or X.21 interface.
- TS - 64kbit/s timeslot within the 2048kbit/s PCM system

4. Multiplexer compatibility

4.1 2400 and 2100 Operation

The 8 Channel V.110 Data Card is supported by 2400/2100 firmware DT910/3, DT911/1 and DT915/1 or later with the following restrictions:

No real time clock support - The on-card real time clock is not updated with the host multiplexer time and will free-run.

No intelligent fault mapping - all faults reported in logging mode to the terminal will show 'intelligent fault' and not the true fault text. The associated smart fault number should be interpreted using the fault table in section 10. Table 1-1.

System controller relays - active faults on the 8 Ch V.110 Data card will not activate any relays on the system controller. Firmware DT910/4, DT911/1 and DT915/2 or later supports this feature.

4.2 3000 Operation

The 8 Channel V.110 Data Card is fully supported by 3000 series firmware DT981/2 or later with the following restriction:

No intelligent fault mapping - all faults logged to the terminal will show 'intelligent fault' and not the true fault text. The associated smart fault number should be interpreted using the fault table in section 10. Table 1-1. Firmware DT981/3 or later supports full fault text mapping.

4.3 Inter-working with other channel cards

The DTE82 is designed to accept 32k ADPCM voice data from the 8 Ch 2/4 Wire ADPCM channel card (DTE92/93), and signalling data from the 24 Ch E&M card (DTE62). It is advisable to ensure if inter-working is required, that the operator is conversant with the use of these cards.

The DTE82 does not affect backplane signalling streams hence any signalling associated with another card e.g. DTE93 may be retained.

5. Operation

All channels are independently configurable for a variety of operating modes and selections, these can be saved in two separate configurations using the smart menuing system provided with this card. Some additional settings are selected by on-card links.

Each channel may be used for either synchronous or asynchronous operation in one of the following operating modes:

Inactive

Standard

Data-link Only

'Inactive' mode occurs whenever the channel is not assigned to a backplane timeslot. No transfer of data or signalling takes place.

'Standard' mode conveys the status of ccts 108 and 105 with the data.

'Data-link Only' mode does not convey ccts 108 and 105, but sets all local circuits active.

A further setting for the 'Standard' and 'Data-link Only' modes determines whether cct 108 is used as the control for data connection.

Synchronous data rates supported are 600, 1200, 2400, 4800, 9600, 19200, 38400, 48000, 56000 and 64000bit/s.

Asynchronous data rates supported are 300, 600, 1200, 2400, 4800, 9600, 19200 and 38400bit/s. The character length may be 5, 6, 7 or 8 bits. 1 or 2 stop bits and the parity may be selected to be none, even or odd.

The operator has complete control over which channels are allocated (assigned) to which backplane timeslot, and in what order. Rigorous checks by the smart menuing system ensure no illegal or unattainable configurations arise.

6. Channel Operating Modes

The following section describes each channel operating mode in some detail with suggested uses and a logical state diagram. Any channel may operate in one of two modes - additionally combined with ADPCM voice data.

6.1 Standard

'Standard' mode conveys the status of ccts 108 and 105 with the data, and additionally reflects the state of cct 105 to 106, with the inclusion of a remote sync indication from the remote DTE82 channel. At the remote end, cct 108 becomes cct 107, and cct 105 becomes cct 109.

A configurable setting, 'V.110 data mode', defines whether cct 108 is used for data connection. When the 108 setting is active, the channel conforms most closely to section 4, operating sequences, of CCITT recommendation V.110. This sub-mode also provides maximum inter-operability with other V.110 based equipment and is recommended for use in that application. A timer, value 10 seconds, is started on entry to 'Connect To Line' state, this governs how long the channel search for the next stage of connection. If this expires because of no received synchronisation, the fault 'Channel X Alarm' will be raised, where 'X' is the relevant channel number. If during data transfer the remote DTE82 channel indicates it has lost received sync, the fault 'Channel X Remote Alarm' will be raised, where 'X' is the relevant channel number.

When the V.110 data mode is set to 'Immediate', the move into a data transfer state is immediate, and alternates between two active states depending upon the received V.110 framing.

Data and ccts 108 and 105 status are transmitted at all times. This sub-mode will be most useful when circuit status needs to be transmitted with the data, but strict V.110 operating sequences need not apply. This sub-mode has a further benefit in that a synchronisation loss in one direction does not effect the data transfer in the other, whereas the 108 mode above will cause a disconnection of both. A timer, value 10 seconds, is started on first entry to 'No Received Sync' state. If this expires because of no received synchronisation, the fault 'Channel X Alarm' will be raised, where 'X' is the relevant channel number. If during 'In Received Sync' the remote DTE82 channel indicates it has lost received sync, the fault 'Channel X Remote Alarm' will be raised, where 'X' is the relevant channel number. Subsequent entries to 'No Received Sync' state will raise the 'Channel X Alarm' immediately.

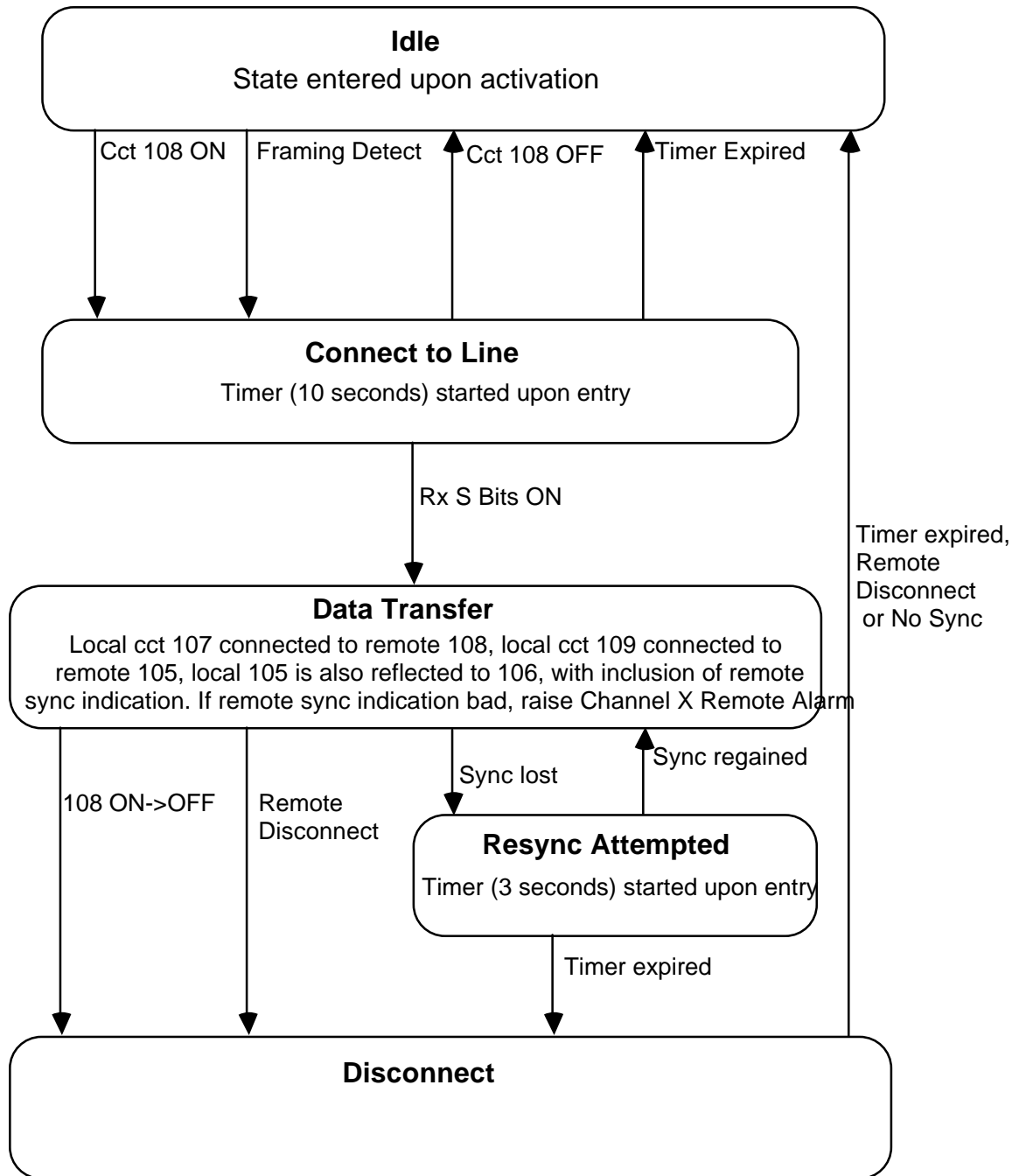


Figure 1-1 Standard mode - CCT 108

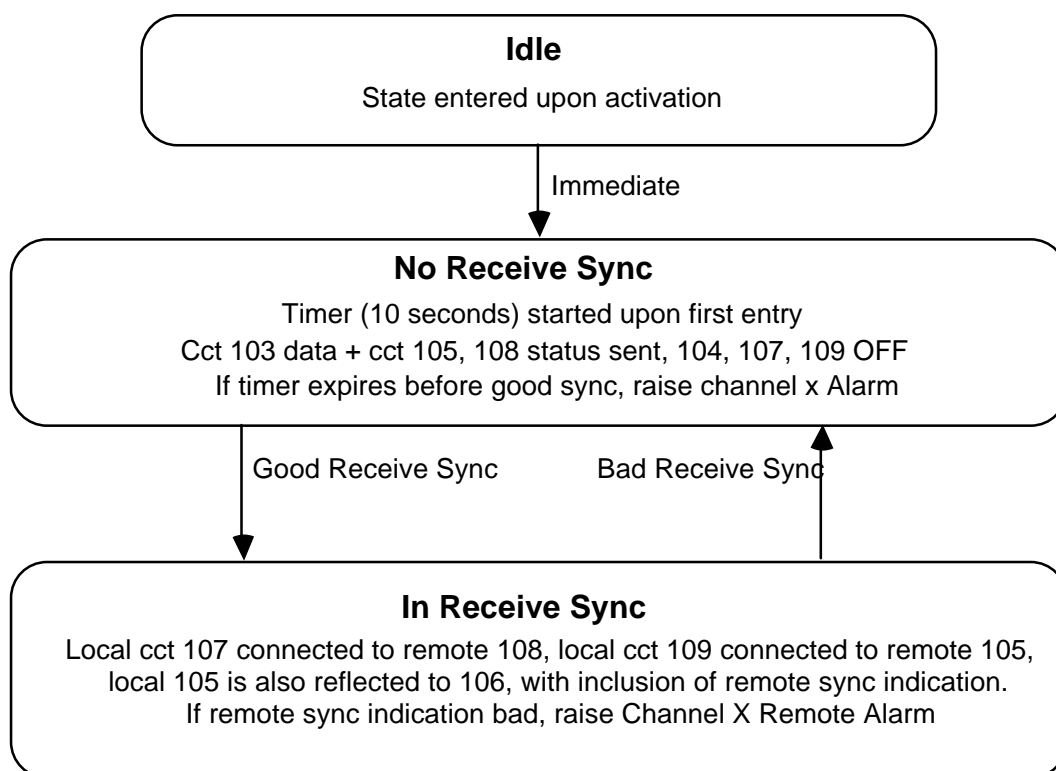


Figure 1-2 Standard mode - Immediate

6.2 Data-link Only

'Data-link Only' mode does not convey the control ccts, but sets all local output circuits (ccts 106, 107 and 109) active at all times. The analogy for this mode is just connecting wires to ccts 103 and 104 as in a null-modem cable.

The same option of cct 108 use is available for Data-link Only mode. When the 108 setting is active, the output of V.110 framing is controlled by cct 108 in a 'Connect Data Set to Line' usage. This will be most useful in a data-only application where the output of framing or data transfer needs to be controlled by the DTE. An example would be a point-to-multipoint data system, where a central node (master) would broadcast to any number of remotes (slaves), with only one slave responding at a time. This can be achieved by the use of a 3000 series system controller's multipoint facilities. A timer, value 10 seconds, is started on entry to 'No Received Sync' state. If this expires because of no received synchronisation, the fault 'Channel X Alarm' will be raised, where 'X' is the relevant channel number. If during 'In Received Sync' the remote DTE82 channel indicates it has lost received sync, the fault 'Channel X Remote Alarm' will be raised, where 'X' is the relevant channel number.

When the V.110 Data Mode is set to immediate, the move into a data transfer state is immediate, and alternates between two active states depending upon the received V.110 framing. Data is transmitted at all times. This sub-mode will be most useful when only data needs to be transmitted, but strict V.110 operating sequences need not apply. This sub-mode has a further benefit in that a synchronisation loss in one direction does not effect the data transfer in the other. A timer, value 10 seconds, is started on first entry to 'No Received Sync' state. If this expires because of no received synchronisation, the fault 'Channel X Alarm' will be raised, where 'X' is the relevant channel number. If during 'In Received Sync' the remote DTE82 channel indicates it has lost received sync, the fault 'Channel X Remote Alarm' will be raised, where 'X' is the relevant channel number. Subsequent entries to 'No Received Sync' state will raise the Channel X Alarm immediately.

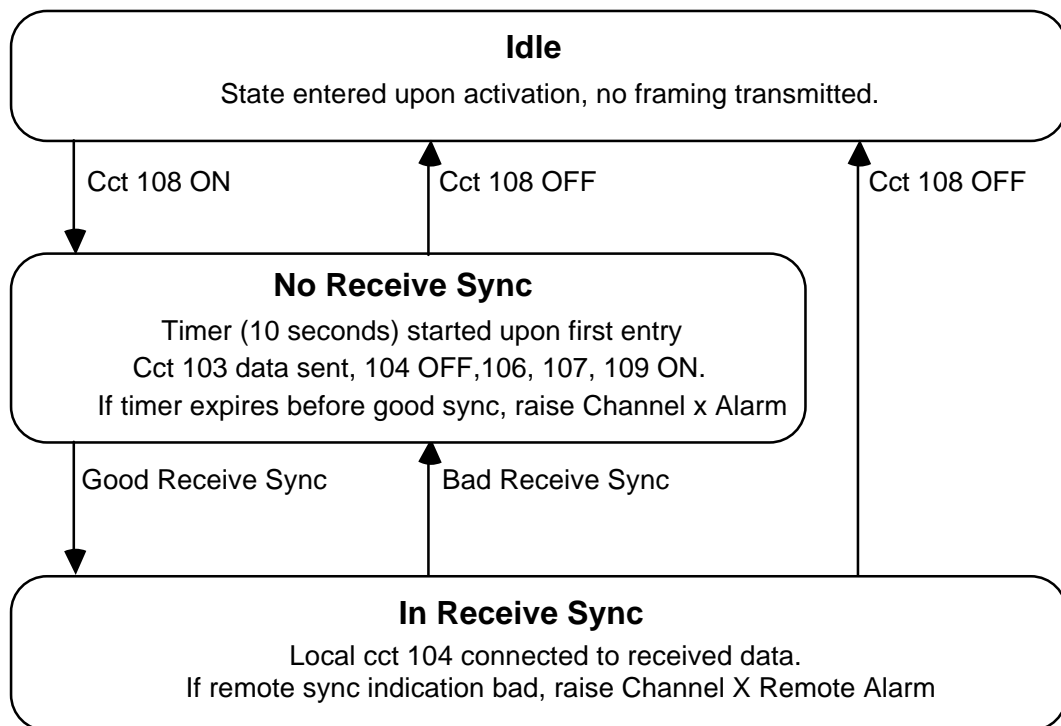


Figure 1-3 Data-link only mode - CCT 108

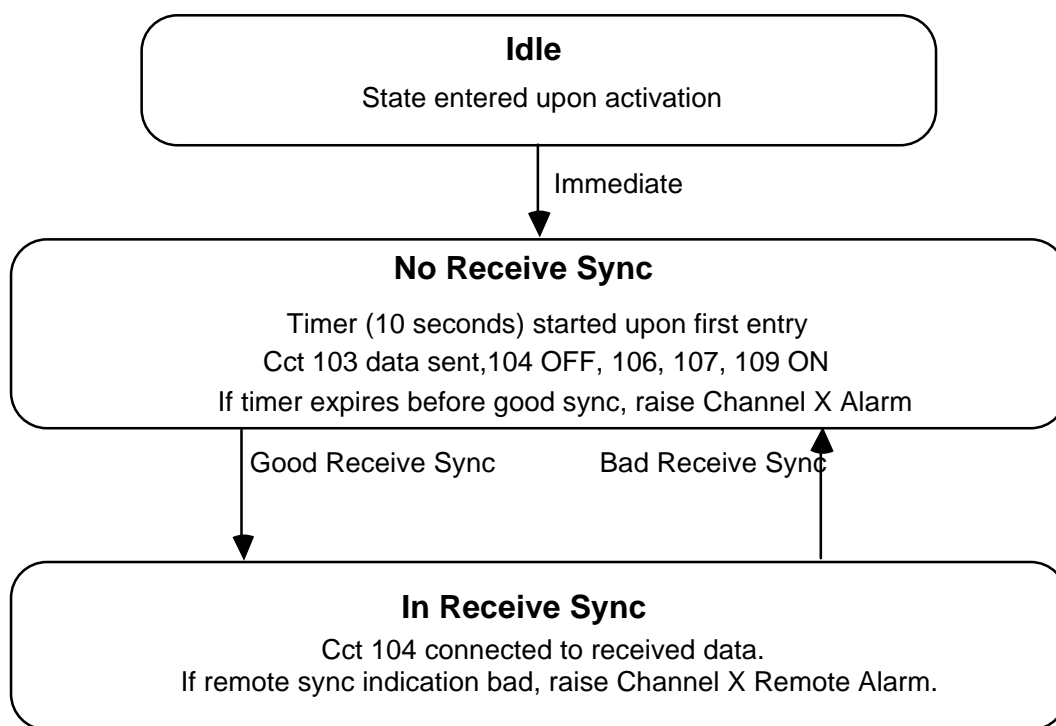


Figure 1-4 Data-link only mode - Immediate

7. Smart Operation

Nearly all operator configuration, maintenance and fault interactions with the 8 Channel V.110 Data card are carried out via the 'Smart' menuing system. These menus are accessed from the top level menu of the system control card firmware through the 'Smart' option, by selecting the individual smart card position the operator wishes to control.

7.1 Menu Selections

Commands are accessed in the same manner as the system control card firmware. The upper case letter in a menu should be entered to gain access to lower menus and commands. Menu selection letters may be strung together, including special control characters. Configuration data selections may be strung together separated by commas.

A <CR> without entry keeps the original value, an <Esc> exits out from that level. Both can be strung together any number of times to implement a sequence of config i/p where an <Esc> exits out from that level, not just that input.

All numeric input can be in decimal, hexadecimal or binary, with a suffix of H or B for hexadecimal or binary respectively. Decimal will be assumed if no suffix is added e.g. 00000100 without the suffix 'B' would be interpreted as 100 decimal instead of 4 in binary as intended.

7.2 Special Control Characters

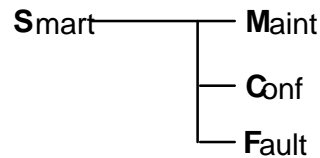
There are a number of special control characters available to the operator whilst within the smart card menus:

- ! This character will exit a menu level and return the operator to the top level menu of the smart card.
- Esc The Escape key will exit any command and present the current menu selections from which the command was called. If the operator is already at a menu level, the entry of Esc will exit that current menu level to the one above. If this is the uppermost level, the control of the smart card will cease and the system control card root menu will be displayed.
- Ctrl+X Control+X will immediately exit control of the smart card.
- Ctrl+S Control+S will stop the terminal display from sending any further characters until Ctrl+Q has been entered.
- Ctrl+Q Control+Q continues the display of characters after Ctrl+S has been entered.
- Ctrl+A Provides an immediate display of channel assignment, and does not effect any operator input in progress. If Ctrl + A is entered when the smart card menu is in the configuration area, the display will show the channel assignment for the configuration in the edit buffer. If Ctrl+A is entered in maintenance or fault menu areas, it will display the configuration currently running. If, due to pending operator activity the data is unavailable, the message 'Channel Assignment data not available' will be displayed.

8. Smart Menu

This section details all of the menu options for the 8 Channel V.110 Data card.

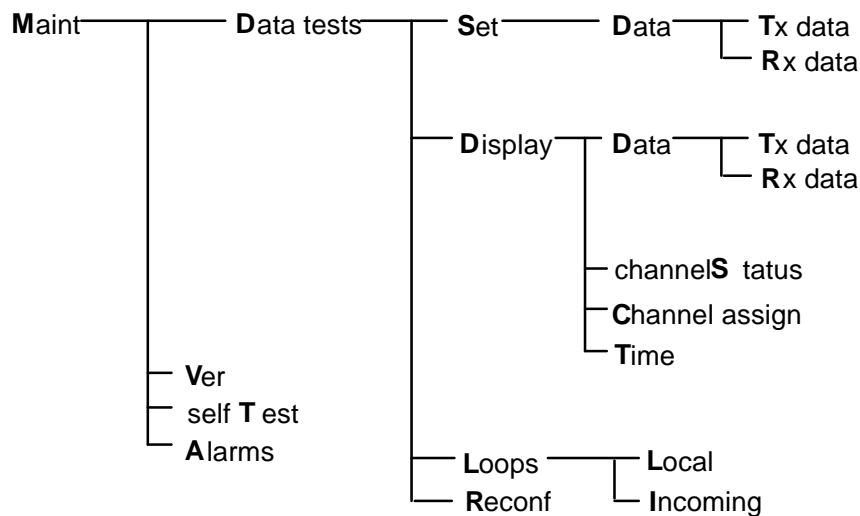
Root Menu



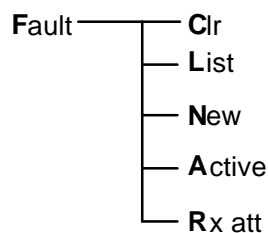
(S) **Maint** | **Conf** | **Fault** >

This is the top level menu, and is always displayed at the commencement of communications with the card. The 'S' menu line prefix indicating a smart menuing system

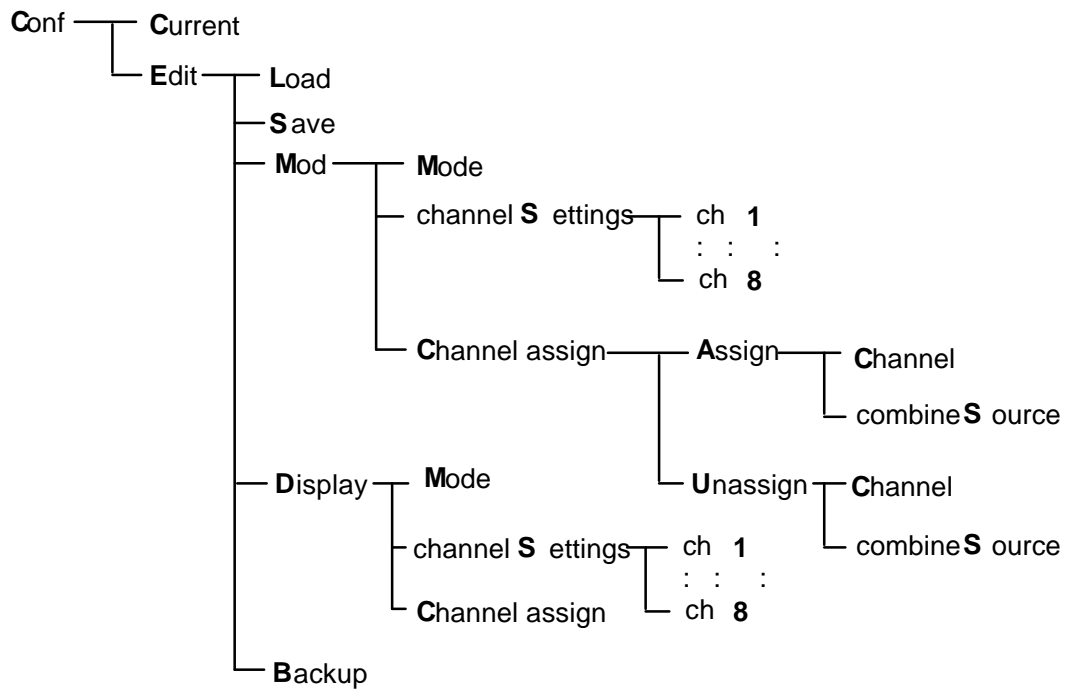
Maintenance Menu



Fault Menu



Configuration Menu



9. Creating and Running Configurations

Introduction

There are two configuration fields available plus a default. All modifications are undertaken in an edit field which can be loaded from any valid configuration, or the default configuration. The default configuration is held in ROM and therefore cannot be altered. The procedure using 'Edit', 'Load', 'Save', 'Modify' and 'Display' commands is exactly the same as for the system controller card.

Smart channel cards have no battery backed memory, a copy of all configurations saved must be held in the battery backed memory of the system controller card. Smart channel cards save their configurations when requested, by using the 'Backup' command, to the battery backed memory on the system controller card.

From a power up condition, the system controller will initialise the channel card and download any configurations previously saved from the card. When the operator loads a configuration for editing, this is from the local volatile memory and not the battery backed memory on the system controller card.

The timeslot numbering refers to the port in which the card is placed e.g. P1 if in port 1, P2 if in port 2 etc.

9.1 Running a Configuration

The running of a configuration is determined from the system controller menu commands and depends in which multiplexer the card is fitted:

In a 2100 or 2400 multiplexer, whenever the system controller is instructed to run a configuration, the same command is sent to any smart channel cards in the chassis, e.g. running configuration 1 on the system controller will run configuration 1 on all smart cards. On the 8 Ch Universal Data card there are only 2 configurations and running configurations 3, 4 will cause configurations 1 and 2 to be run on the smart card respectively. Configs 5 to 8 will repeat configs 1 to 4.

In a series 3000 multiplexer, the configuration to be run by the smart card is determined by the configuration menu on the system controller card. The operator can select configurations 1 to 4 to be run, however if 3 or 4 is selected 1 or 2 will be run respectively.

If the smart card is requested to run a corrupt configuration, the default will be run in it's place although the 'Current' command will indicate 1 or 2, with the appropriate configuration corrupt fault active.

9.2 Default Configuration

The EPROM based configuration values of the default have been selected to provide a stable, inactive state for the card whenever a valid operator configuration is not available.

The default is run initially upon power-up, and whenever a non-existent or corrupt configuration is requested to be run.

The Default Configuration is:

Channel Settings:

Channel operating mode	Standard Mode
Transmission mode	Asynchronous
Data rate	2400
Character length	8
Stop bits	1
Parity	None
V.110 data mode	Immediate

Aggregate Timeslot Settings:

Backplane assignment	None
Channel assignment	None
Combined source assignment	None

Combined channel(ADPCM) Settings:

Backplane assignment	None
----------------------	------

9.3 Configuring Channels

It is recommended that the operator uses the following approach when creating configurations for the 8 Channel Universal Data card to avoid confusion and errors: Firstly select and configure all channel settings, e.g. data rate, sync/async. Assign the channels to each chosen backplane timeslot in turn, including any combine sources at this time. If a channel is not assigned to a backplane timeslot it will remain inactive. If it is assigned, it will be active with the selected operating mode.

It is important to note that the order of channel assignment determines the order the channels occupy within the backplane timeslot. An additional consideration when assigning channels is that an explicit channel un-assignment needs to be made before re-assignment. The Ctrl+A feature is useful at this time to view the current configuration.

All configuration menus have checks to ensure illegal operator inputs cannot be made. Some configuration options offered to the operator will depend upon what was earlier selected. If any particular option is unused or unavailable due to other choices, it's value is not changed in any way, hence configuration data is not 'lost'. The only exceptions to this are data rate and channel mode: If previously 300bps/async was set and sync mode is now selected the rate will be increased to 600bps. If previously 48000, 56000 or 64000 bps/sync was set and async mode is now selected the rate will be reduced to 38400 bps. If 64000 bps is selected the operating mode will change to 'Data-link Only'.

These changes are automatic and immediate.

9.4 Multiple Channels

As may be appreciated from V.110, it is possible to assign more than one channel, up to eight, to a single backplane timeslot, each channel being totally independent of its neighbours.

In order to determine how many channels will fit into one timeslot, it is necessary to identify the 'Intermediate Rate' associated with each channel's data rate. The following table shows the relationship:

Data Rate	Intermediate Rate	No. of Backplane Bits
300	8000 bit/s	1
600	8000 bit/s	1
1200	8000 bit/s	1
2400	8000 bit/s	1
4800	8000 bit/s	1
9600	16000 bit/s	2
19200	32000 bit/s	4
38400	64000 bit/s	8
48000	64000 bit/s	8
56000	64000 bit/s	8
64000	64000 bit/s	8

Consideration should also be taken of any 'Combine source' use, as this will limit any associated channel(s) to a maximum data rate of 19200 (4 bits).

9.5 Combining Voice and data

The 'Combine Source' option allows four bits of off-card data to be combined or extracted with up to four channels of V.110 data. As the backplane signalling for the assigned timeslot is not affected, it is possible to convey any TS16 signalling along with the data.

The combined source data always occupies the upper four bits of the backplane timeslot, with the lower four free for V.110 use. The notation A or B used when specifying the source position, indicates which nibble will be selected from the source timeslot: A = bits 1 to 4 and B = bits 5 to 8. This will therefore determine which 32k ADPCM channel is used. The combined source option requires an additional timeslot to be allocated to the V.110 card carrying the combined source data as shown in the examples in Figure 1-5. Note that it is not necessary to have the V.110 and voice cards in the same port and that it is possible to allocate the second voice circuit to another timeslot on the same V.110 card.

The configurable options are the source timeslot and channel, A or B, of the off-card data, and the destination of the resulting combined data.

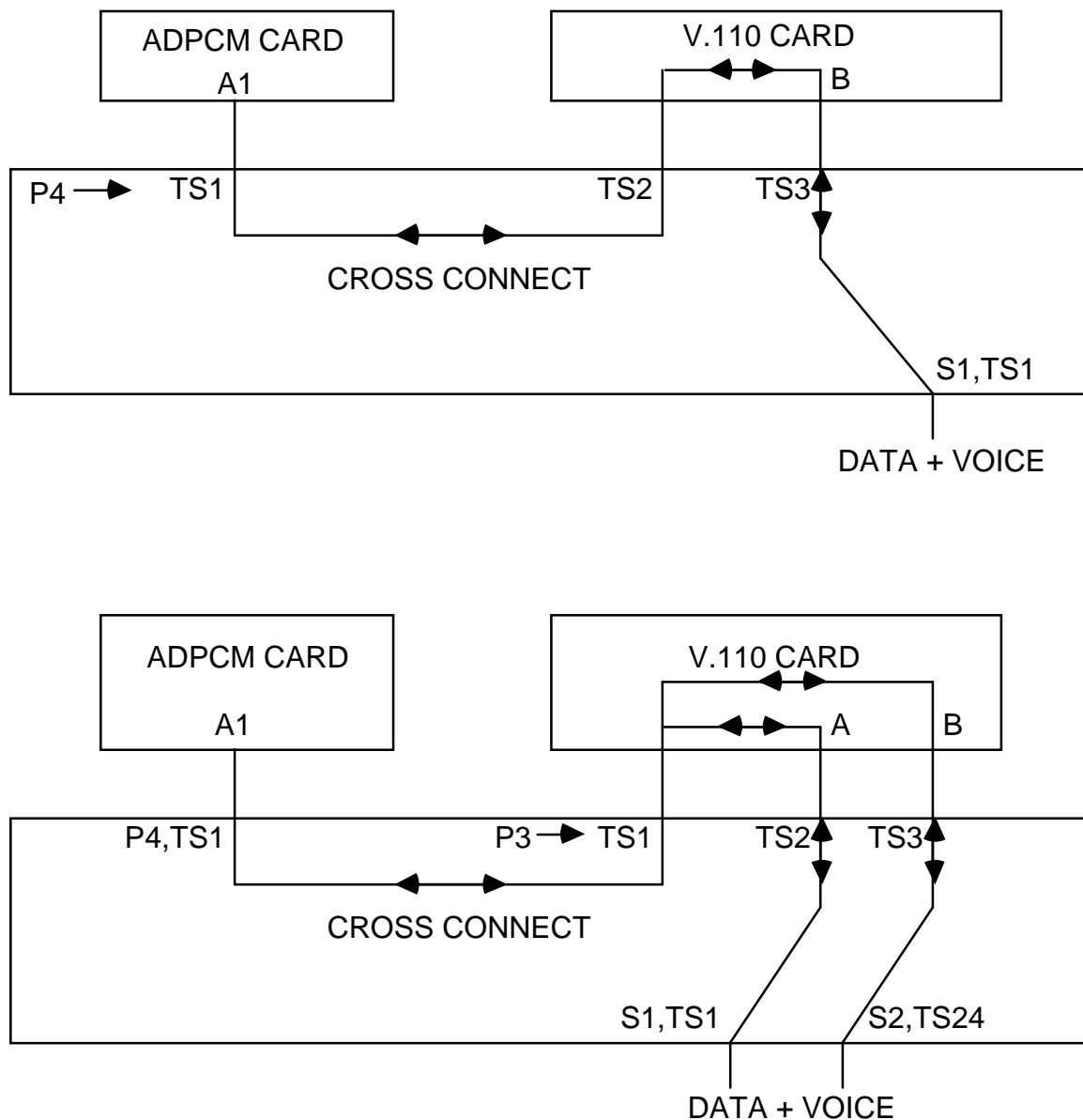


Figure 1-5 Examples of 'Combine Source' timeslot allocation

9.6 Configuration Commands

(S) **Maint** | **Conf** | **Fault** >C

(C) **Current** | **Edit** >

Current

(S) **Maint** | **Conf** | **Fault** >C

(C) **Current** | **Edit** >C

configuration 1

(C) **Current** | **Edit** *>

Valid display is: configuration 1, configuration 2 or Default.

Edit

(S) **M**aint | **C**onf | **F**ault >C
(C) **C**urrent | **E**dit >E
(CE) **L**oad | **S**ave | **M**od | **D**isplay | **B**ackup >

Load

(S) **M**aint | **C**onf | **F**ault >C
(C) **C**urrent | **E**dit >E
(CE) **L**oad | **S**ave | **M**od | **D**isplay | **B**ackup >L
Configuration no | **D**efault >1
Warning - Configuration current
(CE) **L**oad | **S**ave | **M**od | **D**isplay | **B**ackup *>L
Configuration no | **D**efault >2
Warning - Configuration corrupt
(CE) **L**oad | **S**ave | **M**od | **D**isplay | **B**ackup *>

Valid input is 1, 2 or D. A warning is issued if the selected configuration is currently running or is corrupt.

Save

This will save the configuration currently held in the Edit buffer. Valid input for configuration number is 1 or 2

(S) **M**aint | **C**onf | **F**ault >C
(C) **C**urrent | **E**dit >E
(CE) **L**oad | **S**ave | **M**od | **D**isplay | **B**ackup >S
Configuration no >1
Warning - Configuration current
Continue **Y**es | **N**o >Y
Warning - Timeslot mismatch
Continue **Y**es | **N**o >Y
Warning - IO mismatch
Continue **Y**es | **N**o >Y
Backup to save all to host
(CE) **L**oad | **S**ave | **M**od | **D**isplay | **B**ackup *>

Warnings are displayed if there is a potential timeslot or I/O mismatch, or the selected configuration is currently running.

A reminder is given to the operator to use the 'Backup' command if a permanent save is required. The 'Save' command will also cause all loops and set data to be removed if the configuration is current.

9.6.1 Modify

This option allows the operator to set up the required configuration for the card.

Some menu options refer to 'LUM' signalling modes, these should be ignored and *not* selected as they have not been implemented.

(S) **M**aint | **C**onf | **F**ault >C
(C) **C**urrent | **E**dit >E
(CE) **L**oad | **S**ave | **M**od | **D**isplay | **B**ackup >M
(CEM) **M**ode | channel **S**ettings | **C**hannel assign >

9.6.2 Modify - Mode

This option is associated with LUM operation and should be ignored. The following display would result if selected.

(S) **M**aint | **C**onf | **F**ault >C
(C) **C**urrent | **E**dit >E
(CE) **L**oad | **S**ave | **M**od | **D**isplay | **B**ackup >M
(CEM) **M**ode | channel **S**ettings | **C**hannel assign >M
1 Aggregate
2 Local
LUM signalling mode Local >2
Backplane signalling timeslot 31 >15
(CEM) **M**ode | channel **S**ettings | **C**hannel assign *>

9.6.3 Modify - Channel Settings

(S) **M**aint | **C**onf | **F**ault >C
(C) **C**urrent | **E**dit >E
(CE) **L**oad | **S**ave | **M**od | **D**isplay | **B**ackup >M
(CEM) **M**ode | channel **S**ettings | **C**hannel assign >S
(CEMS) ch1 | ch2 | ch3 | ch4 | ch5 | ch6 | ch7 | ch8 >1
1 Synchronous
2 Asynchronous
Transmission mode Synchronous >2
1 300
2 600
3 1200
4 2400
5 4800
6 9600
7 19200
8 38400
Data rate 4800 >2

1 Five
 2 Six
 3 Seven
 4 Eight
 Character length Eight >2
 1 One
 2 Two
 Stop bits One >2
 1 None
 2 Odd
 3 Even
 Parity Odd >2
 1 Data-link Only
 2 Standard
 3 LUM Auto Answer
 4 LUM Auto Redial
 5 LUM Manual Redial
 Channel operating mode Standard >2
 1 External
 2 Assumed ON
 Cct 108 use Assumed ON >2
 (CEMS) ch1 | ch2 | ch3 | ch4 | ch5 | ch6 | ch7 | ch8 *>2
 1 Synchronous
 2 Asynchronous
 Transmission mode Asynchronous >1
 1 600
 2 1200
 3 2400
 4 4800
 5 9600
 6 19200
 7 38400
 8 48000
 9 56000
 10 64000
 Data rate 2400 >10
 1 Data-link Only
 Channel operating mode Data-link Only >1
 1 Cct 108
 2 Immediate
 V110 data mode Cct 108 >1
 (CEMS) ch1 | ch2 | ch3 | ch4 | ch5 | ch6 | ch7 | ch8 *>

Selections offered to the operator depend upon the previous setting e.g. If synchronous mode is set then only sync rates and settings are offered.

Error - 'Intermediate rate cannot change for assigned channel' may be displayed upon selection of the data rate, if the operator attempts to change the data rate of an assigned channel such that a change in

intermediate V.110 rate will occur. If this is required, the channel must be un-assigned, modified, and then re-assigned.

9.6.4 Modify - Channel Assignment

This allows the operator to direct the channels to particular timeslots on the multiplexer backplane. These will be the timeslots allocated to the card in the port in which it is installed and assigned in the 'Assigned circuits' parameter of the main multiplexer configuration.

Channels are automatically assigned to timeslots from bit 1 upwards. It is not possible for example to have channels in bits 2 and 3 with nothing in 1.

```
(S) Maint | Conf | Fault >C
(C) Current | Edit >E
(CE) Load | Save | Mod | Display | Backup >M
(CEM) Mode | channel Settings | Channel assign >C
(CEMC) Assign | Unassign >A
backplane timeslot >25
(CEMCA) Channel | combine Source >C
channel >1
channel >2
channel >3
channel >[Esc]
(CEMCA) Channel | combine Source *>S
combine source timeslot, position >17,B
(CEMCA) Channel | combine Source *>
```

This will allow four bits of information to be combined with the channel data as described in section 9.5.

Un-assignment of a timeslot is the same except that 'U' should be entered to un-assign a timeslot previously assigned.

Upon selection of the channel number or source timeslot, the following messages may be displayed:

- Error - Insufficient aggregate capacity. The Aggregate timeslot cannot accept the requested channel assignment as previous assignments have not left enough capacity.
- Error - Insufficient aggregate quantity. No more backplane timeslots of either aggregate or combine source type are available for use. Maximum of 8 for aggregate and 4 for combine source.
- Error - Timeslot type mismatch. The requested aggregate or combine source (ADPCM) timeslot is already assigned as another type.

e.g. TS17 selected for backplane aggregate, but already selected for ADPCM.

- Error - Channel already assigned. The requested channel for assignment has already been assigned to an aggregate.
- Error - Channel not assigned. The requested channel for un-assignment has not yet been assigned to an aggregate.
- Error - Source already assigned. The requested source for assignment has already been assigned to an aggregate.
- Error - Source not assigned. The requested source for un-assignment has not yet been assigned to an aggregate.

9.6.5 Display

(S) **M**aint | **C**onf | **F**ault >C
(C) **C**urrent | **E**dit >E
(CE) **L**oad | **S**ave | **M**od | **D**isplay | **B**ackup >D
(CED) **M**ode | channel **S**ettings | **C**hannel assign >

Display - Channel Settings

Displayed data shows the configuration for the selected channel.

(S) **M**aint | **C**onf | **F**ault >C
(C) **C**urrent | **E**dit >E
(CE) **L**oad | **S**ave | **M**od | **D**isplay | **B**ackup >D
(CED) **M**ode | channel **S**ettings | **C**hannel assign >S
(CEDS) ch1 | ch2 | ch3 | ch4 | ch5 | ch6 | ch7 | ch8 >1
Transmission mode Asynchronous
Data rate 600
Character length Eight
Stop bits One
Parity Odd
Cct 108 use Assumed ON
(CEDS) ch1 | ch2 | ch3 | ch4 | ch5 | ch6 | ch7 | ch8 *>2
Transmission mode Synchronous
Data rate 64000
Channel operating mode Data-link Only
V.110 data mode Immediate
(CEDS) ch1 | ch2 | ch3 | ch4 | ch5 | ch6 | ch7 | ch8 *>

Display - Channel Assignment

Displays the channel assignment of the configuration in the edit buffer.

(S) **M**aint | **C**onf | **F**ault >C

(C) **C**urrent | **E**dit >E

(CE) **L**oad | **S**ave | **M**od | **D**isplay | **B**ackup >D

(CEM) **M**ode | channel **S**ettings | **C**hannel assign >C

```
| TS09 | TS10 | TS12 | TS14 | TS25 | TS26 | TS27 | TS28 |
12345678 12345678 12345678 12345678 12345678 12345678 12345678 12345678
CCCCAAAA C BBBB CCCCCC CCCC AAAA BBBB CCCCCCCC CCCCCCCC
      1111      1111                0000      0000
11227777 3...7777 444455.. 6666.... ....9999 ....9999 77777777 88888888
```

(CEM) **M**ode | channel **S**ettings | **C**hannel assign *>

The first row of the display shows the timeslot number in use.

The second row of the display shows the eight bits in the timeslot.

The third row displays 'C' for a channel or 'A' or 'B' for the upper/lower ADPCM circuit.

The fourth row is the '10's' digit of the combine timeslot number.

The fifth row shows the channel number and the 'unit's' digit of the combined timeslot.

In the above display for example, timeslot 9 is carrying the data for channels 1 and 2 plus the A channel of an ADPCM voice circuit sourced from timeslot 17.

9.7 Backup

This command allows the operator to save all the configurations to the system controller. Messages give an indication of progress. If both configurations are the same then this need only be sent once and the message will be 'sending 1,2'. Once the configurations have been backed up to the system controller, should power be lost or the V.110 card removed, the card will be automatically re -configured upon restoration of power or replacement of the card.

Corrupt configurations will not be saved.

(S) **M**aint | **C**onf | **F**ault >C

(C) **C**urrent | **E**dit >E

(CE) **L**oad | **S**ave | **M**od | **D**isplay | **B**ackup >B

sending 1 ...

sending 2 ...

(CE) **L**oad | **S**ave | **M**od | **D**isplay | **B**ackup *>

10. Faults and Alarms

The 8 Ch V.110 Data card indicates it's status via a number of methods:

On-card LEDs.

On-card fault reports.

System controller fault reports.

System controller alarm relays.

All indications are as a result of a fault being raised or cleared. The possible faults and their actions for this channel card are shown in the Fault Table 1-1.

Refer to the appropriate system controller handbook sections for further information on system controller fault reports and alarm relays.

The form of the system controller fault report will be dependent upon the System controller firmware level as detailed in section 4.

The LEDs on the card are positioned along the front edge of the PCB with the LED for channel 1 at the bottom.

Note: The first few faults raised after the card has powered up will be logged with an invalid time-stamp. Future faults are logged with a correct time-stamp after the system has updated the real time clock on the card.

10.1 Fault Commands

(S) **Maint** | **Conf** | **Fault** >F

(F) **Clr** | **List** | **New** | **Active** | **Rx att** >

Clr

This command will clear all entries from the fault store.

(S) **Maint** | **Conf** | **Fault** >F

(F) **Clr** | **List** | **New** | **Active** | **Rx att** >C

(F) **Clr** | **List** | **New** | **Active** | **Rx att** *>

List

This command will list all entries in the fault store, newest faults last.

```
(S) Maint | Conf | Fault >F
(F) Clr | List | New | Active | Rx att >L
0 Ocrd ,23 Config 1      , Time 31,3,8,48
1 Clrd ,23 Config 1      , Time 31,3, 9, 10
0 Ocrd ,24 Config 2      , Time 31,3,9,10
(F) Clr | List | New | Active | Rx att *>
```

New

This command will list all entries in fault store since last 'New' command, newest faults displayed last.

```
(S) Maint | Conf | Fault >F
(F) Clr | List | New | Active | Rx att >N
0 Ocrd ,23 Config 1      , Time 31,3,8,48
1 Clrd ,23 Config 1      , Time 31,3, 9, 10
0 Ocrd ,24 Config 2      , Time 31,3,9,10
(F) Clr | List | New | Active | Rx att *>
```

Active

This command will list all entries in the fault store which are currently active (Ocrd), newest faults displayed last.

```
(S) Maint | Conf | Fault >F
(F) Clr | List | New | Active | Rx att >A
0 Ocrd ,24 Config 2      , Time 31,3,8,48
(F) Clr | List | New | Active | Rx att *>
```

Rx att

Performs a receive attention function on all active faults, acknowledging their presence, and removing their alarm relay driving conditions. The RxAt tag will also be applied to 'Information faults' e.g. config running.

```
(S) Maint | Conf | Fault >F
(F) Clr | List | New | Active | Rx att >R
2 RxAt ,24 Config 2      , Time 31,3,8,48
2 RxAt ,13 Channel 5 Loop , Time 31,5,10,15
(F) Clr | List | New | Active | Rx att *>
```

Fault	Relays			LED Indicators								NCS	SM
	P	S	S Y S	1	2	3	4	5	6	7	8		
CIRCUIT GROUP													
Channel 1 Alarm	*			1								11	1
Channel 2 Alarm	*				2							11	2
Channel 3 Alarm	*					3						11	3
Channel 4 Alarm	*						4					11	4
Channel 5 Alarm	*							5				11	5
Channel 6 Alarm	*								6			11	6
Channel 7 Alarm	*									7		11	7
Channel 8 Alarm	*										8	11	8
Channel 1 Loop	*			1								15	9
Channel 2 Loop	*				2							15	10
Channel 3 Loop	*					3						15	11
Channel 4 Loop	*						4					15	12
Channel 5 Loop	*							5				15	13
Channel 6 Loop	*								6			15	14
Channel 7 Loop	*									7		15	15
Channel 8 Loop	*										8	15	16
Ch 1 Rem Alarm	*			1								15	35
Ch 2 Rem Alarm	*				2							15	36
Ch 3 Rem Alarm	*					3						15	37
Ch 4 Rem Alarm	*						4					15	38
Ch 5 Rem Alarm	*							5				15	39
Ch 6 Rem Alarm	*								6			15	40
Ch 7 Rem Alarm	*									7		15	41
Ch 8 Rem Alarm	*										8	15	42
MISC GROUP													
System Restart	*	*	*	#	#	#	#	#	#	#	#	5	17
Unconfigured	*	*	*									5	18
Conf Rx Fail		*										7	19
Conf Tx Fail		*										7	20
Self Test Fail	*	*	*									6	21
Rx Attention												0	22
Config 1												0	23
Config 2												0	24
Conf 1 Corrupt	*	*	*									5	27
Conf 2 Corrupt	*	*	*									5	28
IO Mismatch		*										16	31
TS Mismatch		*										16	32

Table 1-1 Fault Table

Key:-

- P** = Prompt alarm relay.
- S** = Service alarm relay.
- SYS** = System alarm relay.
- NCS** = Network Alarm level. Every fault has an associated alarm level indicating it's relative severity. For further details refer to the system controller and Network Control System documentation.
- SM** = Smart fault number. Any system controller not supporting the smart fault mapping feature will display a reported fault as 'intelligent fault' + the smart number. The smart number can then be used with the above table to identify the fault.
- #** = Although not explicitly tied to the fault, 'System Restart' will light all LEDs for the duration of 'Self Test'.

10.2. Fault Descriptions

Channel 1-8 alarms will be raised if the V.110 framing is lost or not gained before the expiry of a timer. This may be removed if framing is regained or cct 108 becomes inactive. Refer to the relevant section on channel operating modes for the exact meaning and context.

Channel 1-8 Loop will be raised if a maintenance loop, 'Incoming' or 'Local' is applied to the channel. This fault will be cleared if no loops remain e.g. after the 'Reconf' command.

Ch 1-8 Rem Alarm will be raised if, during a data transfer state, the V.110 framing of the remote channel is lost. Refer to the relevant section on channel operating mode for the exact meaning and context.

System Restart will be raised if a temporary power failure or a microprocessor watchdog occurs. Its effects (relays) will be removed after approximately 20 seconds.

Unconfigured will be raised whenever the card has no current command from the system controller to run a configuration. This normally occurs only after restart.

Conf Rx/Tx Fail will be raised if the communications between the card and system controller deteriorate. The fault will automatically clear after approximately 20 seconds.

Self Test Fail will be raised whenever a fault has been detected by the self test routine.

Rx Attention will be raised if the operator performs a local receive attention action via the smart fault menu.

Config 1 indicates configuration 1 is currently running.

Config 2 indicates configuration 2 is currently running.

Config 1 Corrupt will be raised if corruption has been detected for configuration 1. This fault will always be initially present at power-up and restarts.

Config 2 Corrupt will be raised if corruption has been detected for configuration 2. This fault will always be initially present at power-up and restarts.

TS Mismatch will be raised if a discrepancy occurs between the configuration's requirement for a backplane timeslot, and the timeslot actually allocated, e.g. if an allocated timeslot is not used. This fault will be removed if the mismatch is removed.

IO Mismatch will be raised if a discrepancy occurs between the configuration's requirement for I/O adapter facilities, and the I/O adapter detected. This fault will be removed if the mismatch is removed.

11. Maintenance

Introduction

A number of maintenance commands are available to the operator via the smart menus to enable a reasonable level of maintenance and diagnostic activity to be carried out.

Whenever 'Set data' or 'Loops', Incoming or Local are used, the channel on which the action is carried out will utilise a 'maintenance' mode where the V.110 framing will be forced on and ccts 106, 107, and 109 forced off and transmitted 's' bits forced 'ON' regardless of the current mode of operation. When the loop/set data is removed after the 'Reconf' command or saving to current configuration, the channel will be reset to it's previous/new mode of operation.

Displaying data or channel status does not affect the mode of operation but the associated qualifications should be noted.

11.1 Maintenance Commands

(S) **M**aint | **C**onf | **F**ault >M
(M) **D**ata tests | **V**er | self **T**est | **A**larms >

11.1.1 Data tests

This menu level will present options for setting and displaying channel data, setting loops, and removing all loops and set data.

(S) **M**aint | **C**onf | **F**ault >M
(M) **D**ata tests | **V**er | self **T**est | **A**larms >D
(MD) **S**et | **D**isplay | **L**oops | **R**econf >

Set Data

This command sets the supplied data value and applies it to the selected channel in the direction specified. Tx is direction Universal Data card to aggregate, where the mode Standard Immediate will override the current selection to force V.110 framing. Rx is direction Universal Data card to the I/O interface.

The user is able to set a Tx and/or Rx fixed data value for any channel.

It must be noted that this facility may be restricted due to loops applied, and sync/async setting: Continuous output at high asynchronous data rates is not assured: Data alignment is not guaranteed in synchronous mode.

During Set Data operation, the channel's operating mode will be 'maintenance' i.e. forced to data transfer state to avoid confusing results.

(S) **M**aint | **C**onf | **F**ault >M
(M) **D**ata tests | **V**er | self **T**est | **A**larms >D
(MD) **S**et | **D**isplay | **L**oops | **R**econf >S
(MDS) **D**ata >D
(MDSD) **T**x data | **R**x data >T
channel >1
data >04H
(MDSD) **T**x data | **R**x data *>

Valid values for channels 1 to 8 for data are 0 to FFH, 0 to 255 and 0 to 11111111B.

The menu displayed is the same for both Tx and Rx data.

The 8 bit operator supplied value will be modified, high order bits removed first, to the number of data bits required for that channel.

Display Data

The operator can display any channel's Tx data (Cct 104 o/p) or Rx data (Cct 103 i/p) in hexadecimal format. The format is the same as that used on the System Controller, with ** indicating changing data.

It must be noted that this facility will be restricted due to any loops applied and the sync/async setting: In synchronous mode, data alignment is not guaranteed: In asynchronous mode, during Standard/108 channel operating mode, data alignment is not guaranteed. Note also that at 64kbit/s the data will appear 'reversed' to that displayed on the system controller.

```
(S) Maint | Conf | Fault >M
(M) Data tests | Ver | self Test | Alarms >D
(MD) Set | Display | Loops | Reconf >D
(MDD) Data | channel Status | Channel assign | Time >D
(MDDD) Tx data | Rx data >R
channel >1
**,02H,55H
(MDSD) Tx data | Rx data *>
```

Displays data in Hex format, ** if data is not stable for 1 second or less. Any key terminates the display. Direction is referenced to V.110 Data card, Tx data is from the I/O interface, Rx data is from the aggregate V.110 frame.

11.1.2 Display Channel Status

The operator can display the status of one channel on the terminal at a time. Escape stops the display.

The display format is such that a scrolling record is created with a header displayed at the start and every 20 lines.

The sample point for each line is immediately prior to the line being displayed on the terminal.

```
(S) Maint | Conf | Fault >M
(M) Data tests | Ver | self Test | Alarms >D
(MD) Set | Display | Loops | Reconf >D
(MDD) Data | channel Status | Channel assign | Time >S
```

channel >1

11.1.3 Display Channel assignment

Displays the channel assignment of the configuration currently running. Ctrl+A may be used at any time when in the maintenance or fault menus to obtain this display without interfering with operation.

(S) **Maint** | **Conf** | **Fault** >M

(M) **Data tests** | **Ver** | **self Test** | **Alarms** >D

(MD) **Set** | **Display** | **Loops** | **Reconf** >D

(MDD) **Data** | **channel Status** | **Channel assign** | **Time** >C

TS09	TS10	TS12	TS14	TS25	TS26	TS27	TS28
12345678	12345678	12345678	12345678	12345678	12345678	12345678	12345678
CCCCAAAA	C BBBB	CCCCCC	CCCC	AAAA	BBBB	CCCCCCC	CCCCCCC
1111	1111			0000	0000		
11227777	3...7777	444455..	6666....99999999	77777777	88888888

(MDD) **Data** | **channel Status** | **Channel assign** | **Time** *>

11.1.4 Time

This displays the time currently set on the smart card in format: Week, Day, Hour, Minute, and the date in format: Day, Month, Year. The time and date are automatically set by the system controller.

(S) **Maint** | **Conf** | **Fault** >M

(M) **Data tests** | **Ver** | **self Test** | **Alarms** >D

(MD) **Set** | **Display** | **Loops** | **Reconf** >D

(MDD) **Data** | **channel Status** | **Channel assign** | **Time** >T

current time is week 19, wk.day 4, hour 15, minute 7

current date is day 11, month 5, year 94

(MDD) **Data** | **channel Status** | **Channel assign** | **Time** *>

11.2 Loops

Two types of Data loop are supported: X.150 2b and X.150 3b. Loop 2b is termed 'Local Loop' and 3b 'Incoming Loop'. Each can be set independently. Both Local and Incoming Loops can be applied on up to 8 channels. All combinations of Loops and Channels are permitted, except that loop 2b and 3b at the same time on the same channel is invalid. All loops are removed using the 'Reconf' command.

During Loop operation, the V.110 framing will be forced ON regardless of the channel's state (i.e. forced to 'maintenance' mode).

Onward data and signalling will be forced to '1', inactive for the duration of the loop.

No loops are available for the backplane interface from within the card, these can be set using the system controller maintenance facilities.

```
(S) Maint | Conf | Fault >M
(M) Data tests | Ver | self Test | Alarms >D
(MD) Set | Display | Loops | Reconf >L
(MDD) Local | Incoming >
```

Local loop

```
(S) Maint | Conf | Fault >M
(M) Data tests | Ver | self Test | Alarms >D
(MD) Set | Display | Loops | Reconf >L
(MDL) Local | Incoming >L
channel >2
(MDL) Local | Incoming *>
```

An error message will be displayed if a loop for the selected channel has already been applied, and the application will be prohibited.

Incoming loop

```
(S) Maint | Conf | Fault >M
(M) Data tests | Ver | self Test | Alarms >D
(MD) Set | Display | Loops | Reconf >L
(MDL) Local | Incoming >I
channel >2
(MDL) Local | Incoming *>
```

An error message will be displayed if a loop for the selected channel has already been applied, and the application will be prohibited.

Reconf

This command (Re-configure) removes all loops and set data, returns all channels to the previous mode of operation.

```
(S) Maint | Conf | Fault >M
(M) Data tests | Ver | self Test | Alarms >D
(MD) Set | Display | Loops | Reconf >R
(MD) Set | Display | Loops | Reconf *>
```

11.3 Version

This command displays the hardware, firmware, and I/O adapter type, along with their names in full. The software version will be displayed first.

```
(S) Maint | Conf | Fault >M
(M) Data tests | Ver | self Test | Alarms >V
DT945/1 8 CH V110 Firmware
DT586 8 CH Universal Data
DT588 8 CH V.24 I/O Adapter
(M) Data tests | Ver | self Test | Alarms *>
```

11.4 Self test

This command enables the operator to activate the 'Self Test' routine . The success or failure of this test is reported. A fault is raised if a failure has occurred, or cleared if the test was successful, but previously had failed. The test is identical to the power-on Self Test and will involve loss of any data for the duration of the test.

```
(S) Maint | Conf | Fault >M
(M) Data tests | Ver | self Test | Alarms >S
Self test passed
(M) Data tests | Ver | self Test | Alarms *>
```

Performs one self test cycle. Alternative result is:

```
Self test failed
```

If the self test fails, a fault will be raised, but the current configuration will be unchanged.

11.5 Alarms

This command turns on all LEDs for approximately 5 seconds, before they revert to their current states. There will be no loss of data during this test.

```
(S) Maint | Conf | Fault >M
(M) Data tests | Ver | self Test | Alarms >A
(M) Data tests | Ver | self Test | Alarms *>
```

12. Management data access

Channel 5 or Channel 6 may be selected via links to connect to the management data bus on the backplane. This enables network management data to be carried via the V.110 channels. This facility is available with either the 8 channel V.24 or 4 channel V.36 I/O adapter fitted. If the V.24 I/O adapter is being used, and channel 5 or 6 is connected to the management bus, this channel will no longer be available at the I/O adapter. When used for management these channels must be set to asynchronous and data link modes with the data rate set to be compatible with the NCS.

The interface to the management bus has anti-echoing to prevent the data received on the V.110 channel from being re-transmitted i.e. echoed back.

12.1 Links

TL1 and TL2

The links TL1 and TL2 are test links and must be left in position 1-2.

LK1

Jumper not fitted.

LK2

This link is used to select channel 5 or 6 to interface to the backplane management data bus. It is used in conjunction with LK8 and LK9. Receive data is always present at this link regardless of the position of LK8 and LK9.

1-2 channel 6 connected to management bus M4.

3-4 channel 6 connected to management bus M3.

5-6 channel 5 connected to management bus M2.

7-8 channel 5 connected to management bus M1.

2-4 channel 6 isolated from management bus.

6-8 channel 5 isolated from management bus.

LK3

Jumper not fitted.

LK6

Jumper should be fitted in position 1-2.

LK7

Jumper should be fitted in position 1-2.

LK8

This selects the source of transmit data for channel 6.

1-2 - Transmit data selected from I/O adapter.

2-3 - Transmit data selected from management bus via LK2.

LK9

This selects the source of transmit data for channel 5.

1-2 - Transmit data selected from I/O adapter.

2-3 - Transmit data selected from management bus via LK2.

LK10

Jumper should be fitted in position 1-2.

LK11

Jumper should be fitted in position 1-2.

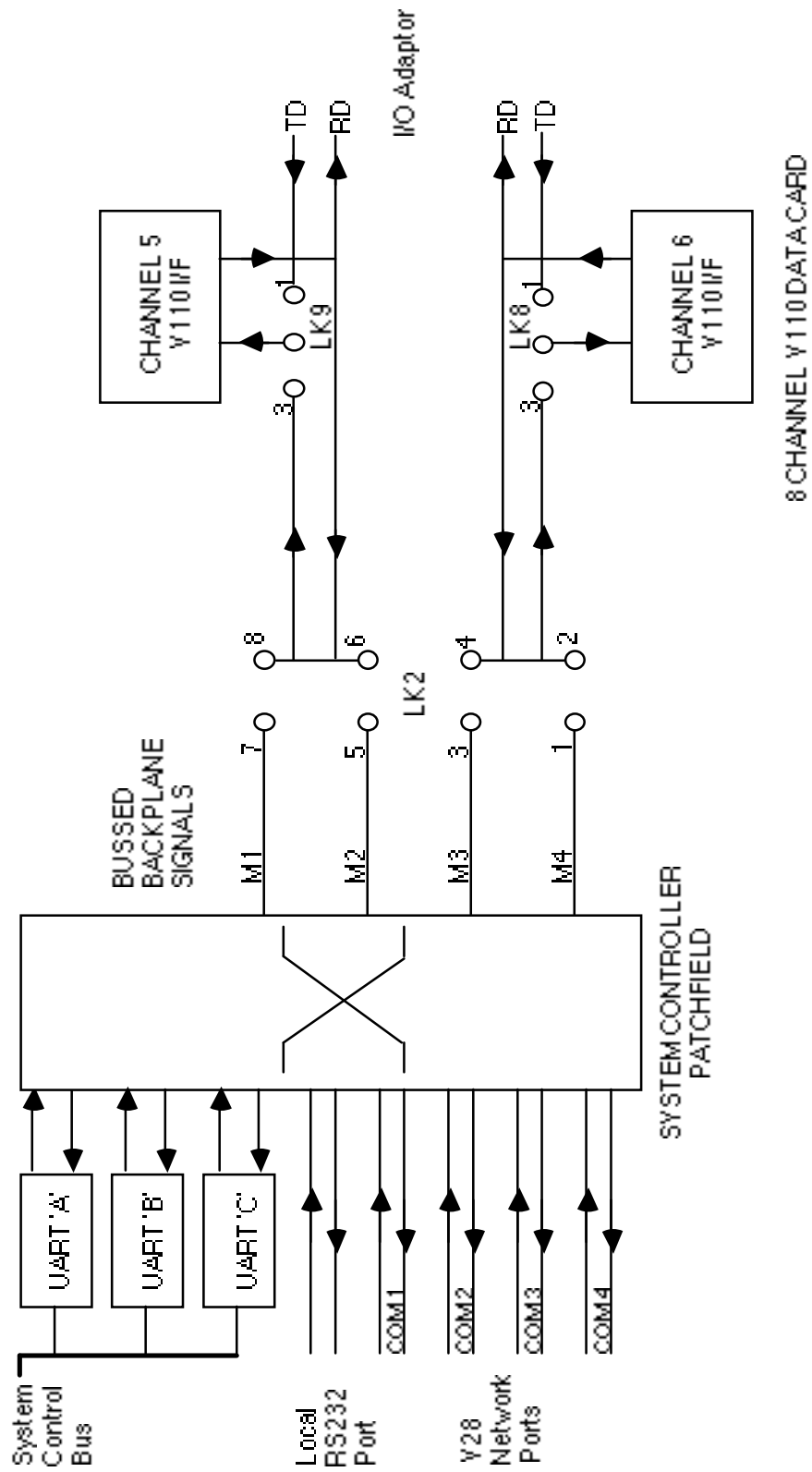


Figure 1-6 Management Routing Diagram

13. Connections to I/O Adapter

The connections to the I/O adapter on the DIN connector are as follows:-

1a	1b		1c	
2a	2b		2c	SG5
3a	3b	RC5	3c	DSR5
4a	4b	DTR5	4c	TD5
5a	5b	RTS5	5c	RLSD5
6a	6b		6c	TC5
7a	7b		7c	RFS5
8a	8b		8c	RD5
9a	9b		9c	
10a	10b		10c	SG6
11a	11b	RC6	11c	DSR6
12a	12b	DTR6	12c	TD6
13a	13b	RTS6	13c	RLSD6
14a	14b		14c	TC6
15a	15b		15c	RFS6
16a	16b		16c	RD6
17a	17b		17c	
18a	18b		18c	SG7
19a	19b	RC7	19c	DSR7
20a	20b	DTR7	20c	TD7
21a	21b	RTS7	21c	RLSD7
22a	22b		22c	TC7
23a	23b		23c	RFS7
24a	24b		24c	RD7
25a	25b		25c	
26a	26b		26c	SG8
27a	27b	RC8	27c	DSR8
28a	28b	DTR8	28c	TD8
29a	29b	RTS8	29c	RLSD8
30a	30b		30c	TC8
31a	31b		31c	RFS8
32a	32b		32c	RD8

Connection 1a is the bottom left hand pin.

Channels 1-4 are presented on the DIN connector as TTL levels for use by the I/O adapter and so are not shown above. Channels 5-8 are presented as V.28 levels on the DIN connector.

14. 8 Channel V.24 I/O Adapter DT588

The DT588 I/O adapter interfaces to the 8 channel V.110 data card and provides interfaces to eight V.24 channels. With the inputs open circuit the state of TD will be 1 and RTS and DTR will be OFF.

14.1 Links

LK1 and LK2

Jumper should be fitted in position 1-2.

LK3 and LK4

Jumper should be fitted in position 1-2.

14.2 I/O Connections

The connections on the 78 way high density 'D' connector are as follows:

Signal	Circuit	Channel 1	Channel 2	Channel 3	Channel 4
TD	103	1	6	11	16
RD	104	2	7	12	17
RTS	105	21	26	31	36
RFS	106	22	27	32	37
DSR	107	40	45	50	55
DTR	108	41	46	51	56
RLSD	109	42	64	69	74
TCLK	114	60	65	70	75
RCLK	115	61	66	71	76
SG	102	25	47	52	57

Signal	Circuit	Channel 5	Channel 6	Channel 7	Channel 8
TD	103	62	67	72	77
RD	104	63	68	73	78
RTS	105	43	48	53	58
RFS	106	44	49	54	59
DSR	107	23	28	33	38
DTR	108	24	29	34	39
RLSD	109	3	8	13	18
TCLK	114	4	9	14	19
RCLK	115	5	10	15	20
SG	102	25	30	35	57

15. 4 Channel V.36 I/O Adapter DT589

The DT589 I/O adapter interfaces to the 8 channel universal data card and provides interfaces to four V.36 channels. The state of the TD and RTS inputs when open circuit is selectable by links. The DTR input will be off when open circuit.

15.1 Links

LK1

This link is used to select the state of RTS (circuit 105) when the input is open circuit. With pins 1 and 2 linked and 3 and 4 linked RTS will be 1. With pins 1 and 3 linked and 2 and 4 linked RTS will be 0.

LK2

This link is used to select the state of TD when the input is open circuit. With pins 1 and 2 linked and 3 and 4 linked TD will be 1. With pins 1 and 3 linked and 2 and 4 linked TD will be 0.

LK3, LK4 and LK5

Jumper should be fitted in position 1-2.

LK6,LK7 and LK8

Jumper should be fitted in position 1-2.

15.2 I/O Connections

The connections on the 78 way high density 'D' connector are as follows:

Signal	Circuit	Channel 1		Channel 2		Channel 3		Channel 4	
		a	b	a	b	a	b	a	b
TD	103	62	1	67	6	72	11	77	16
RD	104	63	2	68	7	73	12	78	17
RTS	105	43	21	48	26	53	31	58	36
RFS	106	44	22	49	27	54	32	59	37
DSR	107	23	40	28	45	33	50	38	55
DTR	108	24	41	29	46	34	51	39	56
RLSD	109	3	42	8	64	13	69	18	74
TCLK	114	4	60	9	65	14	70	19	75
RCLK	115	5	61	10	66	15	71	20	76
SG	102	25		47		52		57	

16. 8 Channel X.21 I/O Adapter DT593

There are no configurable links on this adapter.

The state of TD will be 1 and C will be OFF when open circuit.

16.1 I/O Connections

The connections on the 78 way high density 'D' type connector are as follows:

Signal	Channel 1		Channel 2		Channel 3		Channel 4	
	a	b	a	b	a	b	a	b
TD	1	21	3	23	6	26	8	28
RD	2	22	4	24	7	27	9	29
C	40	60	43	63	46	65	49	68
I	41	61	44	64	47	66	50	69
S	42	62	5	45	48	67	10	30
SG	25		25		25		25	
Signal	Channel 5		Channel 6		Channel 7		Channel 8	
	a	b	a	b	a	b	a	b
TD	11	31	14	34	16	36	19	58
RD	12	32	15	35	17	37	20	39
C	51	70	53	73	56	76	71	74
I	52	(SG)	54	(SG)	57	(SG)	77	(SG)
S	13	72	55	75	18	38	59	78
SG	33		33		33		33	

NB: (SG) = The 'Indicate' signal for channels 5,6,7 and 8 is transmitted at V.10 levels. If a V.11 receiver is used at the remote end the 'b' input on the cable must be connected to Signal Ground, pin 25 or 33 on the 78 way connector. If cable assembly 1567 is used, this termination will already have been carried out within the assembly.

Twisted pair cable should be used for this connection.

17.. Cable Assemblies

Cable assemblies are available from Cray Communications which will connect to the 78 way 'D' type connector and provide a standard interface on a rack mounted distribution panel as follows:

17.1 Cable assembly 1565

This assembly is used to connect to the DT589 4 channel V.36 I/O adapter. 4 off 37 way female 'D' type connectors are provided on the distribution panel with the following pin assignments.

Signal	Pin		Signal	Pin	
	a	b		a	b
TD	4	22	DTR	12	30
RD	6	24	RLSD	13	31
RTS	7	25	TCLK	5	23
RFS	9	27	RCLK	8	26
DSR	11	29	SG	19	

17.2 Cable assembly 1566

This assembly is used to connect to the DT588 8 channel V.24 I/O adapter. 8 off 25 way female 'D' type connectors are provided on the distribution panel with the following pin assignments.

Signal	Pin	Signal	Pin
TD	2	DTR	20
RD	3	RLSD	8
RTS	4	TCLK	15
RFS	5	RCLK	17
DSR	6	SG	7

17.3 Cable assembly 1567

This assembly is used to connect to the DT593 8 channel X.21 I/O adapter. 8 off 15 way female 'D' type connectors are provided on the distribution panel with the following pin assignments.

Signal	Pin		Signal	Pin	
	a	b		a	b
TD	2	9	C	3	10
RD	4	11	I	5	12
S	6	13	SG		8

The indicate signal for channels 5 to 8 is transmitted at V.10 levels. Within cable assembly 1567, for channels 5 to 8, pin 12 of each 15 way connector is connected to pin 8 ensuring correct operation when interworking with V.11 receivers.

