1544k T1 Line Interface Card
Operation Manual

STATUTORY NOTICES

APPROVAL

The card is approved for indirect connection to Telecommunications Systems under the General Approval Number NS/G/1234/J/100003. The 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.

CE

Case Technology Ltd declare that this product conforms with the protection requirements of Council Directive 89/336/EEC on the approximation of the laws of the member states relating to electromagnetic protection.

This equipment has been tested using shielded cables supplied by Case Technology Ltd. These cables, or equivalents, must be used to ensure compliance with this declaration.

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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Contents

1 Equipment Detail

1.1. General Description

The 1544k-T1 Line Interface Card is available in two versions.

DTE74: Consists of the basic card DT580 fitted with DT935 firmware and as such will provide framed or unframed conversion of the 1544kbit/s T1 signal to a 2048kbit/s PCM line when fitted in a Cray Communications 2000 or 3000 series multiplexer. It does not provide any channel conversion.

DTE75: Consists of a DTE74 fitted with a daughter board DTE76 which additionally provides data and signalling conversion between the DS-1 channels and the multiplexer timeslots e.g. μ to A law and signalling code conversions on speech paths, and control bit interchange on data paths.

Both cards provide an interface for 1544kbit/s DS-1 signals to the multiplexer backplane where they can be dropped/inserted into a 2048kbit/s, G.703/G.704 data stream. The DS-1 signals can be carried in framed or unframed mode.

In framed mode the channel card will synchronise to either Super Frame (SF) or Extended Super Frame (ESF) formatted signals. Channels within the DS-1 signal can then be cross-connected with the multiplexer 64k timeslots.

In unframed mode all 193 bits of the DS1 signal are carried by 25 timeslots in the 2048kbit/s PCM stream.

A small amount of buffering of two frames is provided on the T1 input.

This is a smart channel card, with its own microprocessor determining operation, and is configured by menu options accessed by the 'Smart' option at the multiplexer root menu

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2 Operation

2.1 Electrical Interface

The electrical characteristics of the 1544kbit/s interface are in accordance with CCITT recommendations G.703, G.704, G.733, G.802, G.824 and AT&T Technical Advisory No.34. Transmit line length equalisation is switch selectable for the following cable types: MAT, ICOT, ABAM and PIC.

2.2 Line Codes

Line codes supported are AMI, AMI with zero suppression and B8ZS. In framed operation it is possible to convert bit 7 of an all zeros channel to a binary one state.

2.3 Frame Structure

Superframe, and Extended Superframe with CRC6, are supported as defined in CCITT recommendation G.704 Section 3.

2.4 Delay

Delay (maximum)	Framed mode	T1 to system 440µs System to T1 275µs
	Unframed mode	T1 to system 520µs System to T1 385µs

2.5 Power requirements

5 Watts per card

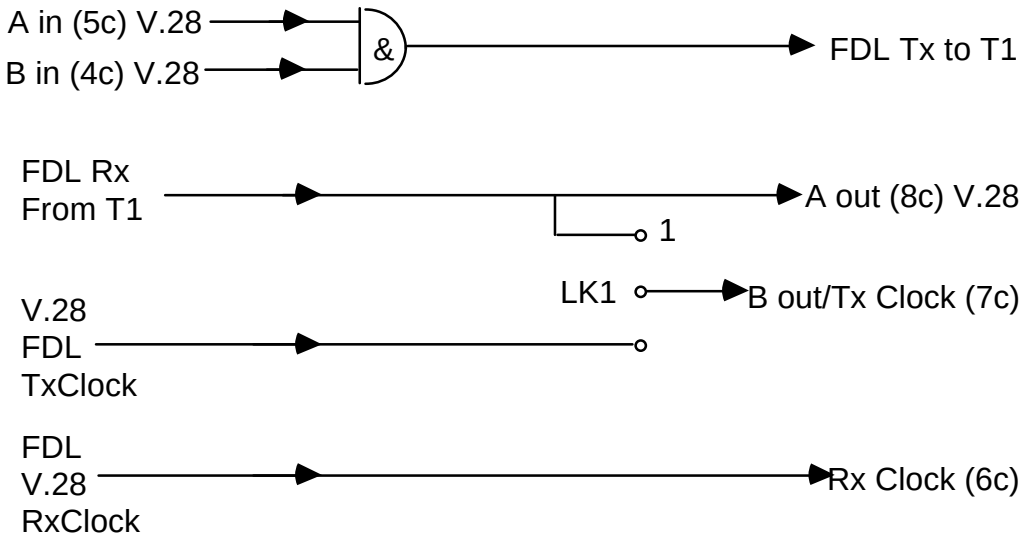
2.6 Remote Alarms

In SF mode the remote alarm generated/detected is by forcing bit 2 of every channel timeslot to 0. In ESF mode the remote alarm generated/detected is the Loss Frame Alignment (LFA) pattern in the Facility-Data Link. Both of the above are in accordance with CCITT recommendation G.704 Section 3 and G.733 Section 4. Management information if carried in the facility data link will therefore be disrupted under LFA fault conditions.

Two signals are supported at V.28 levels, 'F In' and 'F Out'. These may be used to control the remote alarm on the channel card. 'F Out' is forced to a logic 1 when a Bit 2 or LFA alarm is detected in the incoming DS-1 stream. This may be used to set the frame alarm bit on the 2000 series multiplexer outgoing 2048kbit/s PCM stream via the TS0 strapping field on the system control card. This facility is not available using the 3000 series multiplexers. 'F In' is the reciprocal of 'F Out', i.e. a logic 1 on 'F In' will cause the channel card to send a Bit 2 (SF) or LFA (ESF) alarm on the outgoing DS-1 signal. This operation can be inhibited by link LK2.

2.7 Facility Data Link

In ESF mode, the Facility Data Link (FDL) is supported at V.28 levels. The interface is a DCE with 4 kHz clocks provided for both transmit (input) and receive (output) data. In SF mode or while the LFA signal has been detected, the receive data will be forced to a logic one. The facility data link may be used to carry network management data, however the card will not respond to any maintenance messages carried by the data link. A fixed patchfield is supported as follows:



For asynchronous data, e.g. network management, two data inputs and two data outputs are supported, designated A and B. Data appearing on either the A or B inputs will be transmitted on the FDL. Any data received on the FDL will be transmitted on A output and, depending on the setting of LK1 will also be transmitted on B.

For synchronous data LK1 should be set to select 'Tx Clock', the card will then present a V.24 interface as follows:-

A in = cct 103. A out = cct 104.

B out/Tx Clock = cct 114. Rx Clock = cct 115

Unused inputs may be left unconnected.

2.8 Multiplexer Synchronisation

The recovered 1544kHz clock is divided down to 8kHz and can be routed to either of the backplane 8k1 or 8k2 signals via LK3. In addition to the above, a 1544kHz clock is also presented at the I/O connector at TTL levels with an output impedance of 75 ohms. This clock may be sourced from the recovered clock or the multiplexer system timing. Provision is made to accept an external 1544kHz timing signal at TTL level with an impedance of 75 ohms, this may also be used to provide the 8kl or 8k2 synchronising source. The transmit timing for the outgoing T1 PCM is always taken from the multiplexer system clock.

2.9 Control and Status Port functions

For normal operation control port 1 should be set to FFH, all other configuration settings and status displays are made through the 'Smart' operation. The status port is used to display the card identity in the 'Equipment map'.

3 Smart Operation

These menu selections are accessed from the top menu of the multiplexer software through the 'Smart' option.

3.1 Menu Selections

Commands are accessed in the same manner as the main multiplexer control firmware. The upper case letter in a menu should be entered to get to the lower menus and commands.

3.2 Special Control Characters

There are three special control characters which are available to the users, these are:

!	This character will exit any command and return the operator direct to the root level menu of the smart card.
Esc	Operation of 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, then entry of the escape character will exit the current menu and present the next higher menu level. If the operator is at the root menu then the control of the card will cease and the multiplexer root menu will be displayed.
Ctrl+X	Control+X will exit control of the smart channel card and return to the multiplexer root menu.

Through the menu selections available, the operator can configure the differing modes of operation and set various loops. Typing ahead of the menus displayed by the T1 card should be avoided, as this may cause a menu lock up of the card. This can be cleared by Ctrl+X and then re-entering the smart menu.

3.3 Configuration of a smart channel card

There are four configuration fields available, plus a default field. All modifications are undertaken in an edit field which can be loaded from any valid configuration or the default configuration. The default configuration is ROM based and therefore cannot be altered.

Smart channel cards have no battery backed memory and thus from a power fail condition their configuration data would normally be lost. To prevent this, smart channel cards save their configurations when requested to non volatile memory on the system controller.

From a power up condition, the multiplexer will initialise all smart channel cards and pass any configuration data previously saved. When the operator requests to load a configuration, this is from the local volatile memory.

3.4 Running a Configuration

The running of a configuration is determined from the system controller menu commands and is dependent upon which multiplexer the card is fitted to.

In 2000 series multiplexers, whenever the system controller is instructed to run a configuration a command is sent to any smart cards in the chassis. Running configurations 1-4 on the main system controller will run configurations 1-4 on the smart card. If 5 to 8 are run, 1-4 will be run on the smart card e.g. 5 on the multiplexer = 1 on the smart card.

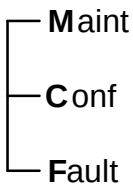
In 3000 series multiplexers and a 2400 fitted with DT912 firmware, the configuration to be run by the smart card is determined by a configuration set-up menu on the system control card. In this case the operator will be given a choice of four to be run. If the system controller is running a configuration for which the smart channel cards configuration is invalid, then the default configuration will be run on that channel card.

3.5 Fault Monitoring

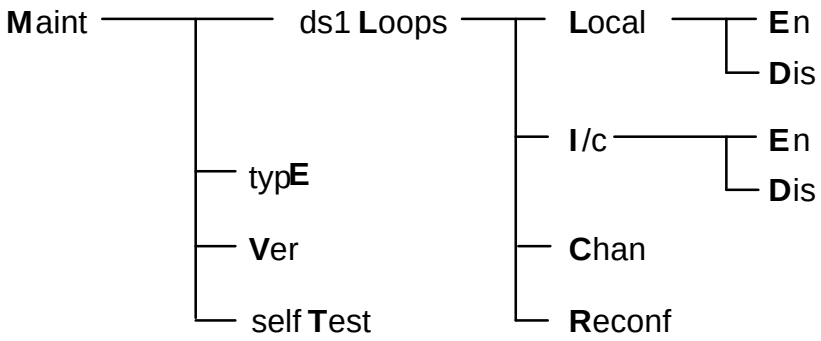
Fault monitoring is undertaken locally, and the operator has the ability to list and clear faults in the same manner as the multiplexer control software. All fault information from smart channel cards is passed back to the multiplexer which, if in logging mode, will be displayed to the operator. In 2000 series multiplexers, the multiplexer has no knowledge as to the type of fault present, and to this end the smart channel card fault information is displayed only as a 'Smart' fault number. If the operator wishes to know the exact nature of the fault, then local fault information on the card should be viewed. In 3000 series multiplexers the fault will be displayed with the correct fault text. The currently active faults on the channel card may be viewed from the system control card or from the smart menu fault option.

3.6 Menu Structure

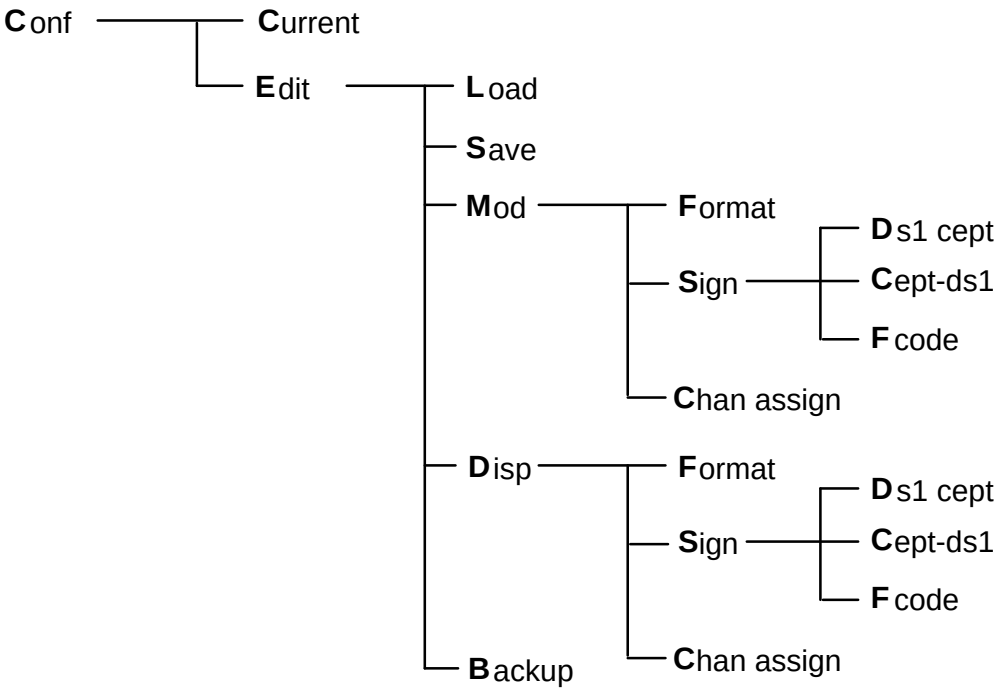
3.6.1 Root menu



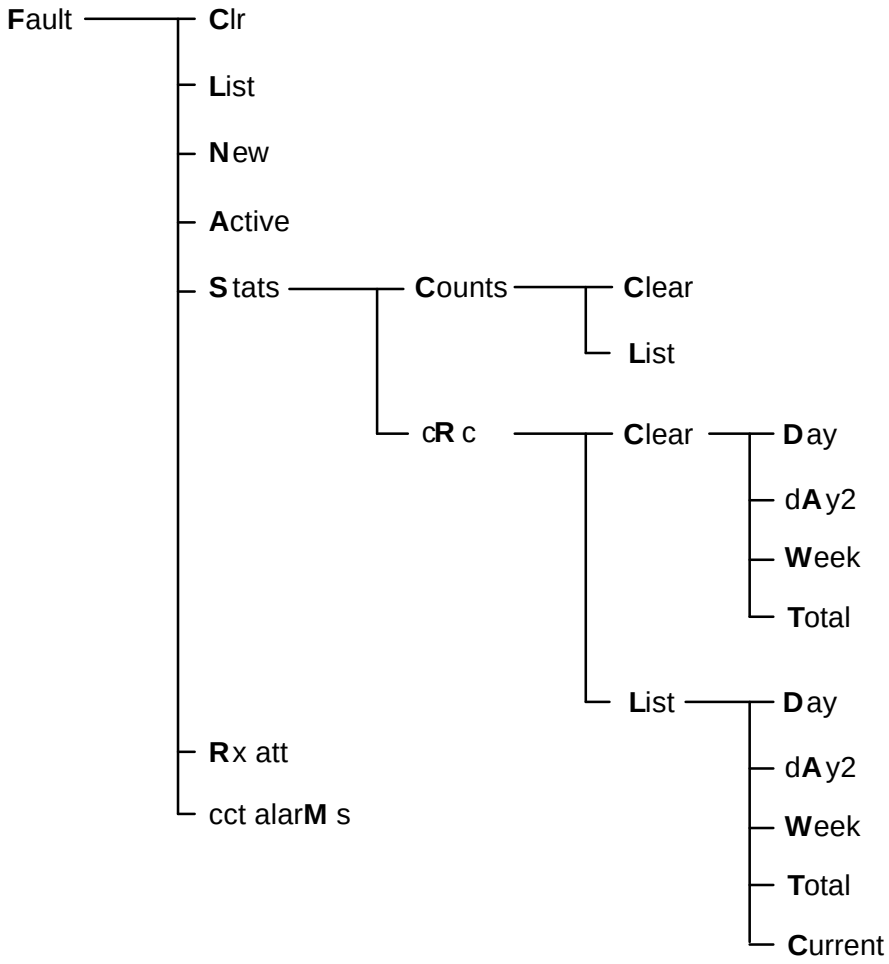
3.6.2 Maintenance menu



3.6.3 Configuration Menu



3.6.4 Fault menu



The following is a description of the menu commands that are available to the operator. Note that throughout the menus, 'channel' refers to the DS-1 data and 'timeslot' refers to the multiplexer backplane data.

3.7 Maintenance commands

Local DS1 Loop

This command will allow the operator to enable and disable a local loop on the DS1 PCM stream. Data from the card transmit logic will be looped back to its receive logic. The card will transmit unframed AIS on its DS1 port when local loop is selected. Note that a Local loop may also be set by the multiplexer 'Maintenance' 'Circuit loop' command, and if this is enabled, the loop cannot be disabled by the smart menu.

Enabling a local loop will disable a current incoming loop.

To enable a local loop:-

(S) **M**aint | **C**onf | **F**ault >M
(SM) ds1 **L**oops | typ**E** | **V**er | self **T**est >L
(SML) **L**ocal | **I**/c | **C**han | **R**econf >L
(SMLL) **E**n | **D**is >E

To disable a local loop:-

(SML) **L**ocal | **I**/c | **C**han | **R**econf >L
(SMLL) **E**n | **D**is >D

Incoming DS1 Loop

This command will allow the operator to enable and disable a loop on the incoming DS1 PCM stream. An incoming loop can only be enabled if the multiplexer circuit loop is disabled. Enabling an incoming loop will disable a current local loop.

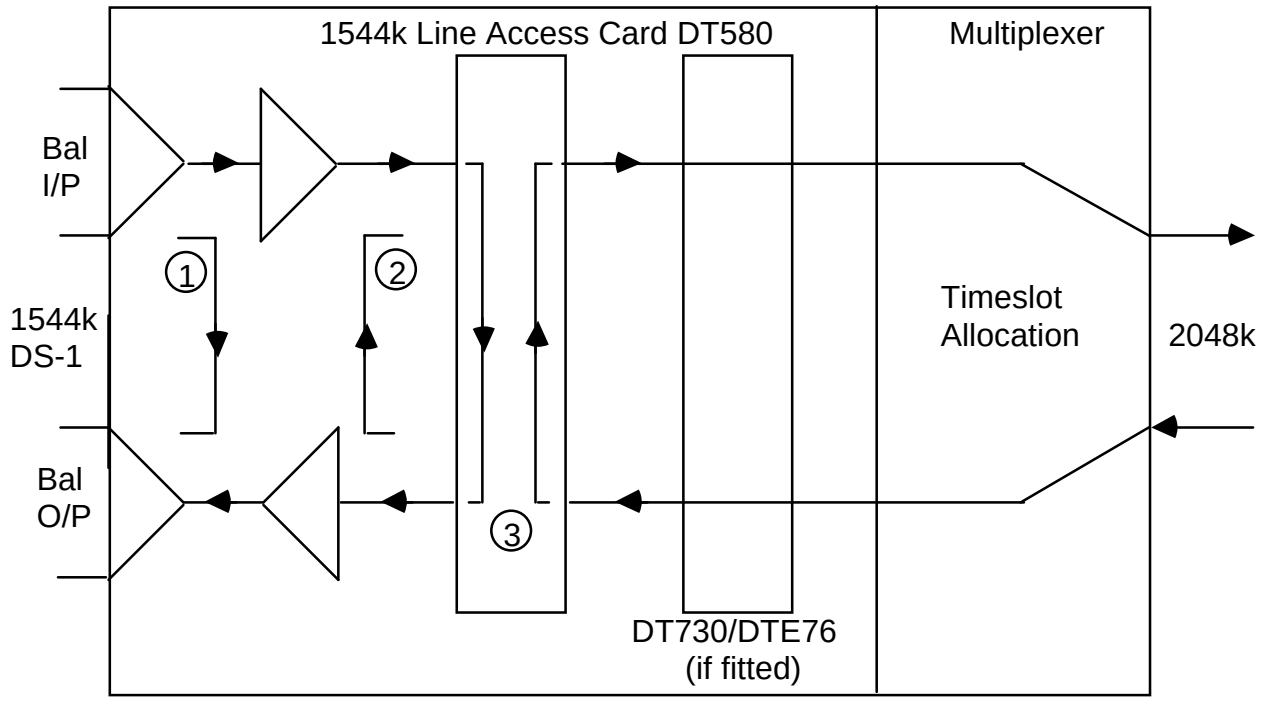
(SML) **L**ocal | **I**/c | **C**han | **R**econf >I
(SMLI) **E**n | **D**is > E
(SMLI) **E**n | **D**is *> D

Channel Loop

This command allows the operator to loop individual DS1 channels. Channel loops are not supported in unframed mode because individual channels are not decoded. When looped, the incoming DS1 channel is looped back to the outgoing channel. If the DS1 channel has been cross-connected to a multiplexer timeslot, then data dropped from the multiplexer will be looped back as well. To remove any channel loops, 'Reconfigure', must be selected. Note that normal DS1 fault action will overwrite any loop on the multiplexer timeslots, i.e. incoming frame sync will still force all ones into the timeslots assigned to the multiplexer.

(SML) **L**ocal | **I**/c | **C**han | **R**econf >C

chan >1



Position of Loops

1. Incoming PCM Loop. Loops the incoming PCM back to the outgoing line. AIS inserted on allocated timeslots.
2. Local Loop. Loops the outgoing PCM back to the PCM input. Unframed AIS is transmitted to line.
3. Channel Loop. Bi-directional per channel loop.

Reconfigure

This command will remove all loops except the multiplexer circuit loop.

(SML) **L**ocal | l/c | **C**han | **R**econf >R

Equipment Type

This command will give the card type as follows:

(SML**)** **L**ocal | **I**/c | **C**han | **R**econf >
(SM) ds1 **L**oops | typ**E** | **V**er | self **T**est >E
DT580 1544k line access card
or
DT580 1544k line access card, Transcoda (DT730)

Equipment Version

This command will display the software version as follows:

(SM) ds1 **L**oops | typ**E** | **V**er | self **T**est >V
DT935/3

Self Test

This command will cause the card to run self test. During self test, a local loop will be applied for five seconds. To determine whether self test has failed the operator must look in the 'Active Faults' display for the 'self test Fail' fault.

Configuration Commands

The card supports configuration menus that operate in the same manner as the multiplexer. There is no 'Run' command however as the multiplexer issues the configuration run commands.

(S) **M**aint | **C**onf | **F**ault >C
(SC) **C**urrent | **E**dit >

Current Configuration

This command displays the currently running configuration. If the multiplexer has requested the card to run a corrupt configuration, then the card will run its default configuration.

(SC) **C**urrent | **E**dit >C
conf 1

Loading a Configuration

This command will allow the operator to load any of the configuration fields or the default into the edit buffer for modification. A checksum test is performed on the field requested, if it is in error the operator will be informed that the field is corrupt.

(SC) **C**urrent | **E**dit >E
(SCE) **L**oad | **S**ave | **M**od | **D**isp | **B**ackup >L
conf no | **D**efault >D

Saving a Configuration

This command will allow the operator to save the edit buffer locally in volatile memory as a valid configuration.

(SCE) **L**oad | **S**ave | **M**od | **B**ackup >S
conf no >1

Backing up Configurations

This command will allow the operator to pass back all valid configurations to the system controller for storage in non-volatile memory. When configurations are found to be equivalent, only one copy is backed up.

(SCE) **L**oad | **S**ave | **M**od | **Di**sp | **B**ackup >B
sending 1,2,4
sending 3

Setting the Frame and Line Code options

(SCE) **L**oad | **S**ave | **M**od | **D**isp >M
(SCEM) **Fo**rmat | **S**ign. | **C**han assign >F
frame mode:
1 (SF)
2 (ESF)
3 (unframed)
mode = 1 >1

If ESF mode has been selected, the operator will be asked to enable or disable CRC alarm reporting. If enabled, the incoming CRC will be used in the frame synchronisation algorithm and a fault will be logged when CRC calculations show an error rate of 1 in 10^{-6}. This facility should be disabled on 'noisy' T1 lines to reduce the frame resync time.

CRC opt:
1 (en)
2 (dis)
opt = 1 >2

The operator will next be prompted for the line coding options. If framed mode has been selected above, then the following will be displayed:

line code:
1 (B8ZS)
2 (AMI)
3 (AMI/ZS)
mode = 1 >1

Option 3 is AMI Zero Suppression. If selected, bit 7 of an all zeros channel will be forced to a 'one' on the outgoing channel. In unframed mode, if the previous line code was 3 (AMI/ZS) it will appear as 2 (AMI) when unframed mode is selected. It will however revert back to 3 (AMI/ZS) if a framed mode is re-selected.

line code:
1 (B8ZS)
2 (AMI)
mode = 1 >1

The next option selects the source for the 8kHz sync signal to the multiplexer.

8k source:
1 (recov clk)
2 (ext clk)
source = 1 >1

The next selection is only displayed if a framed mode *and* recovered clock have been chosen. If an unframed mode and recovered clock have been chosen then the 8k sync fail option is predefined as DS1 loss and not displayed.

8k sync fail opt:
1 (DS1 loss)
2 (1 or F sync loss)
3 (2 or yellow alm)
opt = 1 >2

The last option selects the alarm delay times. The 'set delay' is the length of time DS1 frame sync loss must persist before the ,red alarm' fault is generated, and the fault codes are output. The 'clear delay' is the time the 'frame sync loss' fault must be inactive before the 'red alarm' fault clears.

alm delay (0 - 9) :
x 0.5s = 0 >1
red alarm clear (5 - 20):
x 1s = 5 >6

Setting the Signalling Options

On selecting this option a further sub-menu will be presented. If the transcoda module DTE76 is not fitted, a warning will be given when any of the signalling commands are selected and the command will abort.

(SCEM) **F**ormat | **S**ign. | **C**han assign >S
(SCEMS) **D**s1-cept | **C**ept-ds1 | **F**code >

Setting the Signalling Maps

The operator may modify the current data or reload the table with default values. The presentation will be as below if ESF mode has been selected where there are four available signalling bits (ABCD) in the ESF structure. When changing from SF to ESF mode the default signalling table should be loaded. When prompted for the 'Default | no.' this is the starting code for the display. Selecting default will start from zero however any start number may be entered. The signalling code required for conversion may be entered in Binary, Decimal or Hexadecimal.

(SCEMS) **D**s1-cept | **C**ept-ds1 | **F**code >D
Default | no >D
(SCEMS) **D**s1-cept | **C**ept-ds1 | **F**code *>D
Default | no >0
ESF
(ABCD)CEPT abcd
(0000)CEPT = 1111 >1010B
(0001)CEPT = 1111 >1101B
(SCEMS) **D**s1-cept | **C**ept-ds1 | **F**code *>C
Default | no >14
ESF
(abcd) DS1= ABCD
(1110) DS1= 1010 >0111B
(1111) DS1= 1010 >1111B

In SF mode the presentation will be as follows since there are only two available signalling bits (AB) in the SF structure.

(SCEMS) Ds1-cept | Cept-ds1 | Fcode >D
Default | no >1
SF
(AB) CEPT abcd
(01) CEPT = 1111 >1010B
(SCEMS) Ds1-cept | Cept-ds1 | Fcode *>C
Default | no >13
SF
(abcd) DS1 = AB
(1101) DS1= 10 >01B
(1110) DS1= 10 >11B
(1111) DS1= 10 >11B

Setting the Signalling Fcode

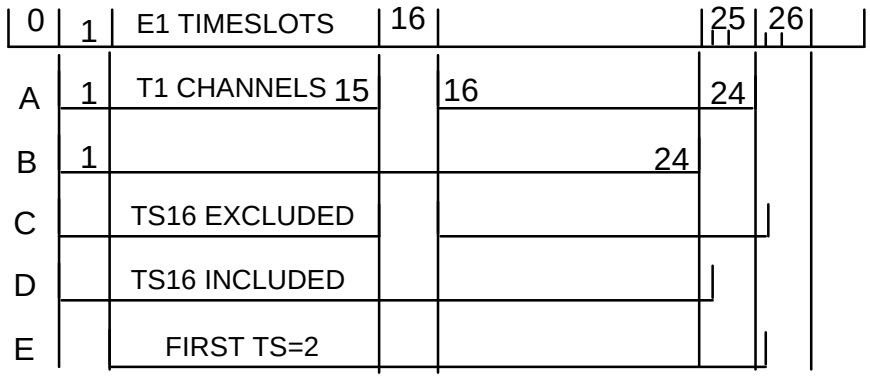
The 'Fcode' is inserted toward the multiplexer under conditions of DS1 loss etc., for circuits configured for signalling.

(SCEMS) **D**s1-cept | **C**ept-ds1 | **F**code >F
fcode = 1111 >0101B

Channel Assignment

In framed mode any channel may be connected to any timeslot, however it is usual when operating as a framed Transcoda to allocate Chan 1 to Timeslot 1 etc. with the 'Robbed Bit' signalling from the DS1 stream placed in TS16. The E1 frame structure will therefore have timeslots 1-15 and 17-25 allocated to data with signalling in TS16, a total of 25 timeslots as in 'A' below. If signalling is not required in any channel then TS16 may become a 64 kbit/s data circuit such that 24 DS1 Channels will occupy 24 E1 timeslots as in 'B' below.

In unframed mode the 24 channels (1536kbit/s) plus the framing (8kbit/s) will be transposed into 25 ascending timeslots of the E1 Frame, this may or may not include TS16 and the first timeslot may be any timeslot between 1 and 7, these two options may be selected in the 'Chan Assign' part of the menu structure. 'C' 'D' and 'E' in the following diagram show typical assignments.



Configuring Individual Channels

In framed mode this command will assign the multiplexer timeslots to the DS1 channels. If the Transcoda daughter board DTE76 is fitted, then the operator will also be prompted for the conversion mode for each channel.

Without the Transcoda module fitted, all channels received from the DS1 stream during one frame will be output to the multiplexer during the next and vice-versa for the multiplexer drop data.

Individual 64kbps channels can be cross connected from the DS1 stream to the multiplexer without restriction, however if channels are associated in an Nx64k mode then the channel order must be maintained.

Example: channels 22, 23, 24 of the DS1 stream implementing a 192kbps link may be cross connected to the multiplexer timeslots 29, 30, 31, but not timeslots 30, 31, 1 or 6,2,5 etc.

With the Transcoda module fitted Nx64k channels in the range 22 to 24 must not be cross connected to timeslots 1 to 4, and timeslots in the range 28 to 31 must not be cross connected to channels 1 to 4.

The channel assignment in framed mode without the 'Transcoda' module is as follows:

(SCEM) **F**ormat | **S**ign | **C**han assign >C
chan >1
(1) TS = 1 > 1
(2) TS = U > 4
(2) TS = 3 > U

This simply cross-connects channels to timeslots.

The channel assignment in framed mode with the 'Transcoda' module fitted is as follows:

(SCEM) **F**ormat | **S**ign | **C**han assign >C
conv mode :

1 (transparent)	transparent-signalling disabled
2 (trans + sign.)	transparent-signalling enabled
3 (µ/A)	µ/A conversion per CCITT G.711 (red book)-no signalling
4 (µ/A sign.)	µ/A conversion per CCITT G.711 (red book)-with signalling
5 (56k b1=b8)	bit 1 and bit 8 interchanged, 56k transparency
6 (56k b8=1)	As 5 but with DS-1 bit 8 forced to 1, 56k transparency
7 (trans b8=1)	DS-1 bit 8 forced to 1, bits 1 to 7 transparent
8 (special)	available for special conversions

chan >1
(1) TS,mode = U,1 >1,1
(2) TS,mode = U,1 >4,2
(3) TS,mode = 3,1 >2,1

The 56kbit modes above, allow for inter working with 56kbit systems on the DS-1 signal using bit 8 for control with E1 systems using bit 1 for control. This is achieved by rotating the 8 bits in the timeslot selected.

In unframed mode, a block offset is selectable for the 25 timeslots, enabling the first timeslot to be any between 1 and 7. The facility to include or exclude TS16 is also provided.

In unframed mode the format will be as follows:

(SCEM) **F**ormat | **S**ign | **C**han assign >C
TS16 opt:
1 (incl)
2 (excl)
opt = 1 >1
(first TS 1-7) = 1 >1
(SCEM) **F**ormat | **S**ign | **C**han assign *>C
TS16 opt:
1 (incl)
2 (excl)
opt = 1 >2
(first TS 1-6) = 1 >1

Displaying the Edit Buffer

The display menus will display the current contents of the edit buffer. The presentation of the menu and commands are as described above, however the operator is not able to modify the data.

3.8 Fault Commands

The fault commands allow the operator to display the stored and active faults and the CRC test results. Faults held by the card do not have a time/date stamp.

Listing Faults

This command will list faults held in the fault store. Faults are listed in reverse order, i.e. newest fault listed first. The operator may list all stored faults by entering just 'L' or the last few faults by entering 'Ln', where n is the number of faults to be listed.

(SF) **C**lr | **L**ist | **N**ew | **A**ctive | **S**tats | **R**x att | cct alar**M**s >L
0 Ocrd ,21 Conf 2 corrupt ,1,1,0,0
0 Ocrd ,22 Conf 3 corrupt ,1,1,0,0
1 Clrd ,22 Conf 3 corrupt ,1,1,0,0
1 Clrd ,21 Conf 2 corrupt ,1,1,0,0
(SF) **C**lr | **L**ist | **N**ew | **A**ctive | **S**tats | **R**x att | cct alar**M**s *>

(SF) **C**lr | **L**ist | **N**ew | **A**ctive | **S**tats | **R**x att | cct alar**M**s *>L2
0 Ocrd ,8 DS1 pcm loss ,1,1,0,0
0 Ocrd ,21 Conf 2 corrupt ,1,1,0,0

Displaying New Faults

This command will list all the faults which have occurred since 'List New' was last called. The oldest fault is listed first.

(SF) **C**lr | **L**ist | **N**ew | **A**ctive | **S**tats | **R**x att | cct alar**M**s >N
0 Ocrd ,8 DS1 pcm loss ,1,1,0,0
0 Ocrd ,21 Conf 2 corrupt ,1,1,0,0

Fault listing may be aborted at any time by pressing the 'Return' or 'Esc' key.

Clearing the Fault Store

The clear command will remove all fault information from the fault store.

(SF) **C**lr | **L**ist | **N**ew | **A**ctive | **St**ats | **R**x att | cct alar**M**s >C

Displaying Active Faults

This command will display all active faults on the channel card.

(SF) **C**lr | **L**ist | **N**ew | **S**tats | **R**x att | cct alar**M**s >A
0 Ocrd ,8 DS1 pcm loss ,1,1,0,0

Displaying Fault Statistics

The statistics are divided into two clear areas. The fault counts and the CRC information.

(SF) **C**lr | **L**ist | **N**ew | **A**ctive | **S**tats | **R**x att | cct alar**M**s >S

Displaying Faults Counts

The display command will give a list of all the faults and the number of times they have occurred. The counts are cleared every 24 hours at midnight or whenever the command is issued.

```
(SFS) Counts | cRc  >C
(SFSC) Clear | List  >L
 1 System restart          '000 event(s)
 2 Unconfigured            '001 event(s)
 3 Self test fail          '000 event(s)
 4 DS1 local loop          '000 event(s)
 5 DS1 i/c loop            '001 event(s)
 6 DS1 TS loop             '002 event(s)
 7 Frame sync loss         '006 event(s)
 8 DS1 pcm loss            '000 event(s)
 9 Blue alarm              '000 event(s)
10 Red alarm               '000 event(s)
11 DS1 error rate          '003 event(s)
12 Yellow alarm            '000 event(s)
13 Frame slip              '000 event(s)
14 Recov. 8k bad           '001 event(s)
15 TS mismatch             '000 event(s)
16 Conf RX fail            '000 event(s)
17 Conf TX fail            '000 event(s)
18 Receive attn            '000 event(s)
19 Fault mask              '001 event(s)
20 Conf 1 corrupt          '001 event(s)
21 Conf 2 corrupt          '001 event(s)
22 Conf 3 corrupt          '001 event(s)
23 Conf 4 corrupt          '001 event(s)
24 Config 1                '001 event(s)
25 Config 2                '000 event(s)
26 Config 3                '000 event(s)
27 Config 4                '000 event(s)
(SFSC) Clear | List *>
```

Clearing the Fault Counts

The fault counts can be cleared to zero using this command.

```
(SFSC) Clear | List  >C
(SFSC) Clear | List *>
```

Receive Attention Command

This command will cause a 'Receive attention' state on all active faults on the T1 card and reset the fault relays to the non-alarmed state. Active faults will have their status changed from 'Ocrd' to 'RxAt'.

The local receive attention command will not affect the network fault reporting.

(SF) **C**lr | **L**ist | **N**ew | **A**ctive | **S**tats | **R**x att | cct alar**M**s >R
2 RxAt ,8 DS1 pcm loss ,1,1,0,0
2 RxAt ,22 Conf 3 corrupt ,1,1,0,0
2 RxAt ,23 Conf 4 corrupt ,1,1,0,0
2 RxAt ,24 Config 1 ,1,1,0,0
(SF) **C**lr | **L**ist | **N**ew | **A**ctive | **S**tats | **R**x att | cct alar**M**s *>R

Circuit Alarms Command

This command will allow the operator to mask or disable the PCM faults on the T1 card. This will affect all aspects of PCM fault generation from relay driving through to message generation and network fault levels. The system faults will however be unaffected by this action. Whilst the faults are masked there will be an active fault called 'Fault mask'. This fault will drive the 'Service' alarm relay.

3.9 Displaying the CRC results

Day

This command will give a list of the current days data from the next valid full fifteen minutes through to the current 15 fifteen minute period for the last 24 hours. This data will be transferred into the day2 store at midnight every day.

Any data which is corrupt will be marked with an asterisk.

(SFS) **C**ounts | c**R**c >R
(SFSR) **C**lear | **L**ist >L
(SFSRL) **D**ay | d**A**y2 | **W**eek | **T**otal | **C**urrent >D

Time	Errored Seconds	Medium Errored Seconds	Severe Errored Seconds	Unavail Time Seconds	CRC Count
01:45,	00000,	00000.	00000,	00000,	00000
02:00,	00000,	00000,	00000,	00000,	00000
02:15,	00000,	00000,	00000,	00000,	00000
02:30,	00000,	00000,	00000,	00000,	00000
02:45,	00000,	00000,	00000,	00000,	00000
03:00,	00000,	00000,	00000,	00000,	00000
03:15,	*00000,	*00000,	*00000,	*00000,	*00000
		etc.			
00:30,	00005,	00000,	00000,	00000,	00200
00:45,	00005,	00005,	00000,	00000,	00000

(SFSRL) **Day** | d**A**y2 | **W**eek | **T**otal | **C**urrent *>

Day2

This command will display the CRC data collected for the previous days 24 hour period from midnight . Any corrupt or unconfirmed data will be marked with an asterisk.

(SFSRL) **D**ay | d**A**y2 | **W**eek | **T**otal | **C**urrent >A

Time	Errored Seconds	Medium Errored Seconds	Severe Errored Seconds	Unavail Time Seconds	CRC Count
00:00,	00000,	00000,	00000,	00000,	00000
00:15,	00023,	00010,	00001,	00000,	02004
00:30,	00000,	00000,	00000,	00000,	00000
00:45,	00000,	00000,	00000,	00000,	00000
01:00,	00000,	00000,	00000,	00000,	00000
	etc.				

(SFSRL) **D**ay | d**A**y2 | **W**eek | **T**otal | **C**urrent*>

Week

This command will list the previous weeks CRC data starting with the next current valid day and going through the last seven days.

(SFSRL) **D**ay | d**A**y2 | **W**eek | **T**otal | **C**urrent >W

Day	Errored Seconds	Medium Errored Seconds	Severe Errored Seconds	Unavail Time Seconds	CRC Count
2,	00000,	00000,	00000,	00000,	00000
3,	00000,	00000,	00000,	00000,	00000
4,	00000,	00000,	00000,	00000,	00000
5,	00000,	00000,	00000,	00000,	00000
6,	00000,	00000,	00000,	00000,	00000
7,	00000,	00000,	00000,	00000,	00000
1,	00000,	00000,	00000,	00000,	00000

(SFSRL) **D**ay | d**A**y2 | **W**eek | **T**otal | **C**urrent *>

Total

This command displays the total CRC data counts since the last time the store was cleared. It will also display the time when the store was last cleared.

(SFSRL) **D**ay | d**A**y2 | **W**eek | **T**otal | **C**urrent >T
Total CRC Errors = 123, Since12,03,17,35
(SFSRL) **D**ay | d**A**y2 | **W**eek | **T**otal | **C**urrent *>

Current

This command will constantly display the current CRC data in real time. Every time a fifteen minute boundary is crossed the display will step on one line and constantly display the next fifteen minutes of data. The time display will update as the time increases until the next fifteen minutes are reached when the display will scroll one more line.

Control of the unit can be regained by pressing any key.

(SFSRL) **D**ay | d**A**y2 | **We**ek | **T**otal | **C**urrent >C

Time	Errored Seconds	Medium Errored Seconds	Severe Errored Seconds	Unavail Time Seconds	CRC Counts
01:30,	*00000,	*00000,	*00000,	*00000,	*00000
01:32,	00000,	00000,	00000,	00000,	00000

Clearing the Day CRC Data stores

This command will individually clear the CRC stores and reset them to zero. If the 'Total' store is cleared the time which this occurred will be set.

3.10 Links

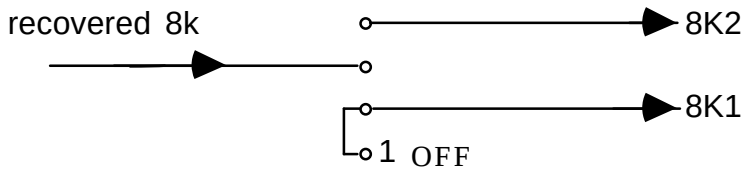
TL1 This must be set to position 1 for normal operation.

TL2 This must be set to position 1 for normal operation.

LK1 This should be set to position 1 for asynchronous data to be carried by the FDL, and to position 3 for synchronous data.

LK2 This should be set to position 3 in order for 'F' in to set the remote frame alarm, and to position 1 for normal operation.

LK3 This selects 8K1 or 8K2 as shown below.



To disable both 8k1 and 8k2 the link should be set to position 1.

LK4 This selects the 1544kHz clock output source. Position 3 selects system clock, position 1 selects recovered clock.

3.11 Switches

S1 controls the transmit line equaliser circuit. Settings for this switch are as follows:

S1/3	S1/2	S1/1	Line length selected (feet)				Cable type
C	C	C	0	to	220	(G.703)	MAT & ICOT
C	C	O	220	to	440		MAT & ICOT
C	O	C	440	to	655		MAT & ICOT
C	O	O	0	to	133		ABAM & PIC
O	C	C	133	to	266		ABAM & PIC
O	C	O	266	to	399		ABAM & PIC
O	O	C	399	to	533		ABAM & PIC
O	O	O	533	to	655		ABAM & PIC

Alarm Contacts

Isolated change-over relays contacts are provided to indicate prompt and service alarms are as shown in the fault tables for the different modes of operation.

3.12 Alarm Indicators

LED indicators are provided to indicate the following:

TOP

1.	Bit 2 / LFA Alarm	Yellow
2.	Loop Activated or any other fault	Red
3.	Frame Slip	Red
4.	Frame Sync Loss	Red
5.	AIS Incoming	Red
6.	DS1 Loss	Red

4 I/O Connections

4.1 Introduction

The I/O connections on the multiplexer backplane are as follows. Viewed from the rear pin 1c is the bottom right hand pin of the DIN 41612 connector. Numbers in brackets indicate connections on the 50 way Amphenol connector used on the universal I/O adapter DT280 or 2100. An adapter type DT262 may be provided for use in the 2100.

(50)	32b		(25)	32c	
(49)	31b		(24)	31c	
(48)	30b		(23)	30c	
(47)	29b		(22)	29c	
(46)	28b		(21)	28c	
(45)	27b		(20)	27c	
-	26b	Earth/Ground	-	26c	SG
-	25b	*	-	25c	*
(44)	24b		(19)	24c	
(43)	23b		(18)	23c	
(42)	22b		(17)	22c	F out (V.28)
(41)	21b		(16)	21c	
(40)	20b		(15)	20c	
(39)	19b	1544k Clock Input	(14)	19c	F in (V.28)
-	18b	Earth/Ground	-	18c	SG
-	17b	*	-	17c	*
(38)	16b	1544k Clock Output	(13)	16c	
(37)	15b		(12)	15c	
(36)	14b	PCM out (B)	(11)	14c	PCM out (A)
(35)	13b		(10)	13c	
(34)	12b	PCM in (B)	(9)	12c	PCM in (A)
(33)	11b		(8)	11c	
-	10b	Earth/Ground	-	10c	SG
-	9b	*	-	9c	*
(32)	8b	Prompt (NC)	(7)	8c	A out (V.28)
(31)	7b	Prompt (NO)	(6)	7c	B out/TxCLK (V.28)
(30)	6b	Prompt (COM)	(5)	6c	RxCLK (V.28)
(29)	5b	Service (NC)	(4)	5c	A in (V.28)
(28)	4b	Service (NO)	(3)	4c	B in (V.28)
(27)	3b	Service (COM)	(2)	3c	
(26)	2b	Earth/Ground	(1)	2c	SG
-	1b	*	-	1c	*

* Bussed signals DO NOT make connections to these.

4.2 I/O Panel DT262. Pin connections

PCM - 15 way 'D' type connector (female)

1	PCM Out 'a')	Balanced pair Tx.
9	PCM Out 'b')	" " "
3	PCM In 'a')	Balanced pair Rx
11	PCM In 'b')	" " "

Clock - 9 way 'D' type connector (male)

2	1544k Clock Input
4	1544k Clock Output
7	Earth
8	Signal Ground

Alarm - 15 way 'D' type connector (male)

1	V.28 'A' out
2	V.28 'B' out
3	V.28 RxClk output
4	V.28 'B' in
5	V.28 'A' in
6	V.28 'F' in
7	V.28 'F' out
8	Signal Ground
9	Signal Ground
10	Prompt Alarm - Common
11	Prompt Alarm - N/O
12	Prompt Alarm - N/C
13	Service Alarm - Common
14	Service Alarm - N/O
15	Service Alarm - N/C

4.2 Barriered I/O Panel DT583. Pin connections

PCM - 15 way 'D' type connector (female)

1	PCM Out 'a')	Balanced pair Tx.
9	PCM Out 'b')	" " "
3	PCM In 'a')	Balanced pair Rx
11	PCM In 'b')	" " "

5 Fault Tables

5.1 Fault Table for T1 when in framed mode.

FAULT	P	S	Y	INDICATORS 1	2	3	4	5	6	ALARMS Bl	Yw	Ts	NT	SM
PCM GROUP														
DS1 PCM loss	*	*							*		*	*	7	8
Blue alarm AIS		*						*				*	16	9
Red alarm	*	*					*				*	*	9	10
DS1 error rate		*			*								9	11
Yellow alarm		*		*									16	12
Frame slip		*				*							10	13
Recov. 8K bad		*			*								14	14
TS mismatch		*			*								16	15
DS1 local loop		*			*					*			12	4
DS1 i/c loop		*			*								12	5
DS1 TS loop		*			*								15	6
Frame sync loss		*			*								14	7
SYSTEM GROUP														
System restart	*	*	*		*						*	*	5	1
Unconfigured	*	*	*		*						*	*	5	2
Self test fail	*	*	*		*								6	3
Conf Rx fail	*	*	*		*								7	16
Con Tx fail	*	*	*		*								7	17
Receive attn													0	18
Fault mask		*			*								15	19
Conf 1 corrupt	*	*	*		*								5	20
Conf 2 corrupt	*	*	*		*								5	21
Conf 3 corrupt	*	*	*		*								5	22
Conf 4 corrupt	*	*	*		*								5	23
Config 1													0	24
Config 2													0	25
Config 3													0	26
Config 4													0	27

The alarms are defined as:-

Yw = Yellow outgoing alarm on the DS1 line.

Bl = Blue outgoing alarm on the DS1 line.

TS = Fixed codes on the multiplexer 2048k. This will consist of the 'Fcode' code used for signalling and all 1's in the data. The facility

data link bit will also be forced to a logical one. These fixed codes will be delayed by the period set in the red alarm delay.

P = Prompt relay. S = Service relay. Y = sYstem relay

NT = Network management fault level. SM = Smart fault No.

5.2 Fault Table for T1 when in unframed mode.

FAULT				INDICATORS						ALARMS				
	P	S	Y	1	2	3	4	5	6	Bl	Yw	Ts	NT	SM
PCM GROUP														
DS1 PCM loss	*	*							*		*	*	7	8
Blue alarm AIS		*						*				*	16	9
Red alarm	*	*					*				*		9	10
DS1 error rate		*			*								9	11
Yellow alarm		*		*									16	12
Frame slip		*				*							10	13
Recov. 8K bad		*			*								14	14
TS mismatch		*			*								16	15
DS1 local loop		*			*					*			12	4
DS1 i/c loop		*			*							*	12	5
SYSTEM GROUP														
System restart	*	*	*		*						*	*	5	1
Unconfigured	*	*	*		*						*	*	5	2
Self test fail	*	*	*		*								6	3
Conf Rx fail	*	*	*		*								7	16
Con Tx fail	*	*	*		*								7	17
Receive attn													0	18
Fault mask		*			*								15	19
Conf 1 corrupt	*	*	*		*								5	20
Conf 2 corrupt	*	*	*		*								5	21
Conf 3 corrupt	*	*	*		*								5	22
Conf 4 corrupt	*	*	*		*								5	23
Config 1													0	24
Config 2													0	25
Config 3													0	26
Config 4													0	27

The alarms are as defined for framed mode except:-

TS = Fixed code in the allocated timeslots of the multiplexer 2048k output. This will consist of all 1's in the data.