Contents

1 Introduction

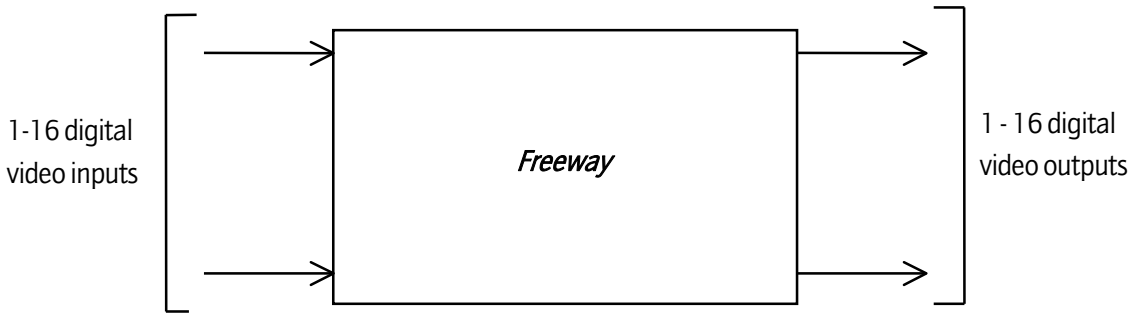
This manual covers the installation, operation and operational alignment of the serial digital video routing card (3940) for the ***Freeway*** series of routing switchers.

■ Serial digital video routing

The ***Freeway*** serial digital video router automatically accommodates data rates between 140 and 360Mbits/s and offers full, no hassle, compatibility with all digital signal formats. Reclocking architecture guarantees exemplary signal quality whilst ensuring fully transparent operation to ancillary data and embedded audio.

The main features are:

- data rates from 140 to 360Mbits/s
- automatic sensing of data rates
- dual standard operation
- adaptive cable equaliser
- re-clocking architecture



Block diagram

2 Installation and configuration

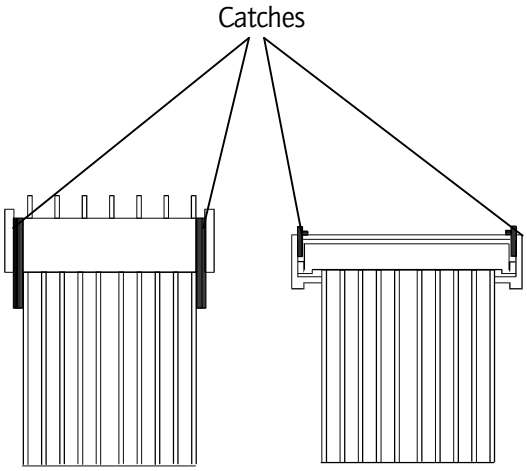
■ 2.1 Removal and replacement of module

The module can be removed and replaced from the frame, powered or un-powered, using the following procedure. When removing the bottom card it is necessary to remove the door before continuing. For removal purposes it is advisable to remove the ribbon cables first and then the cards.

- release the ribbon cables by pushing the catches up on either end of the connector as shown
- lift up the card ejector on the module and gently pull the card out

Replacement is the reverse of above:

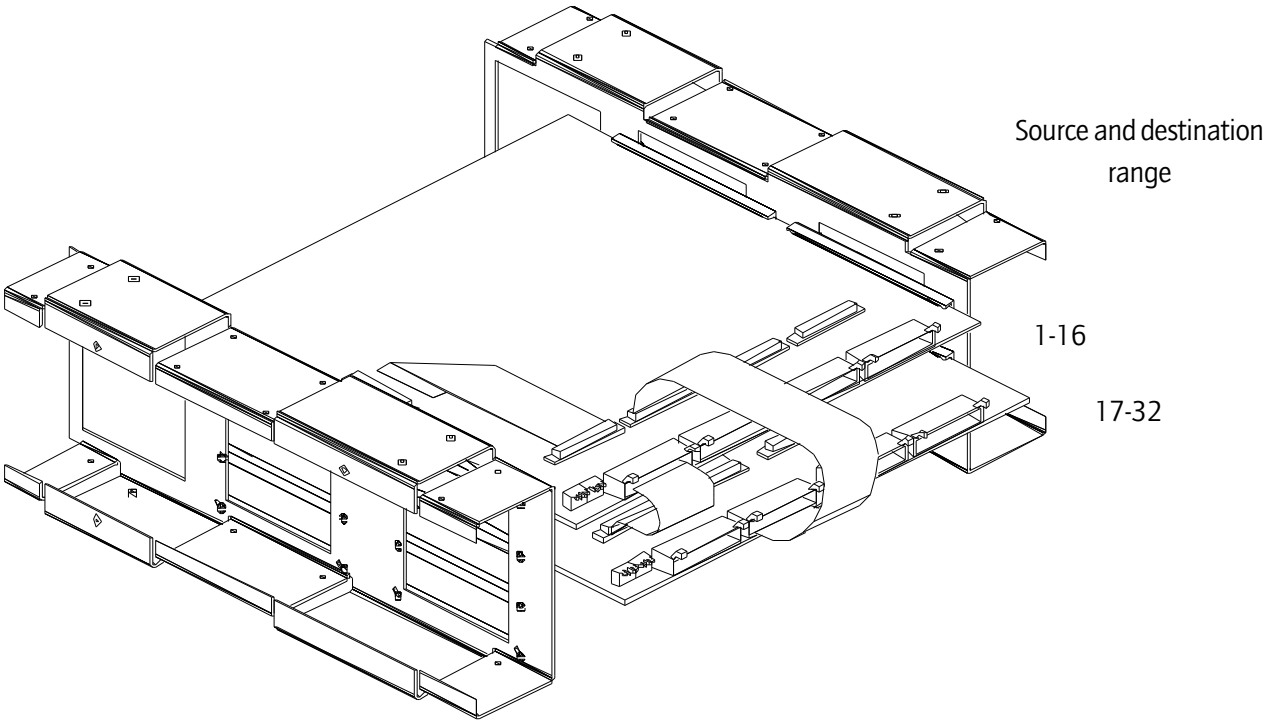
- slide the card along the guide rail of the required slot, gently pushing it fully home until it marries up with the connector on the motherboard



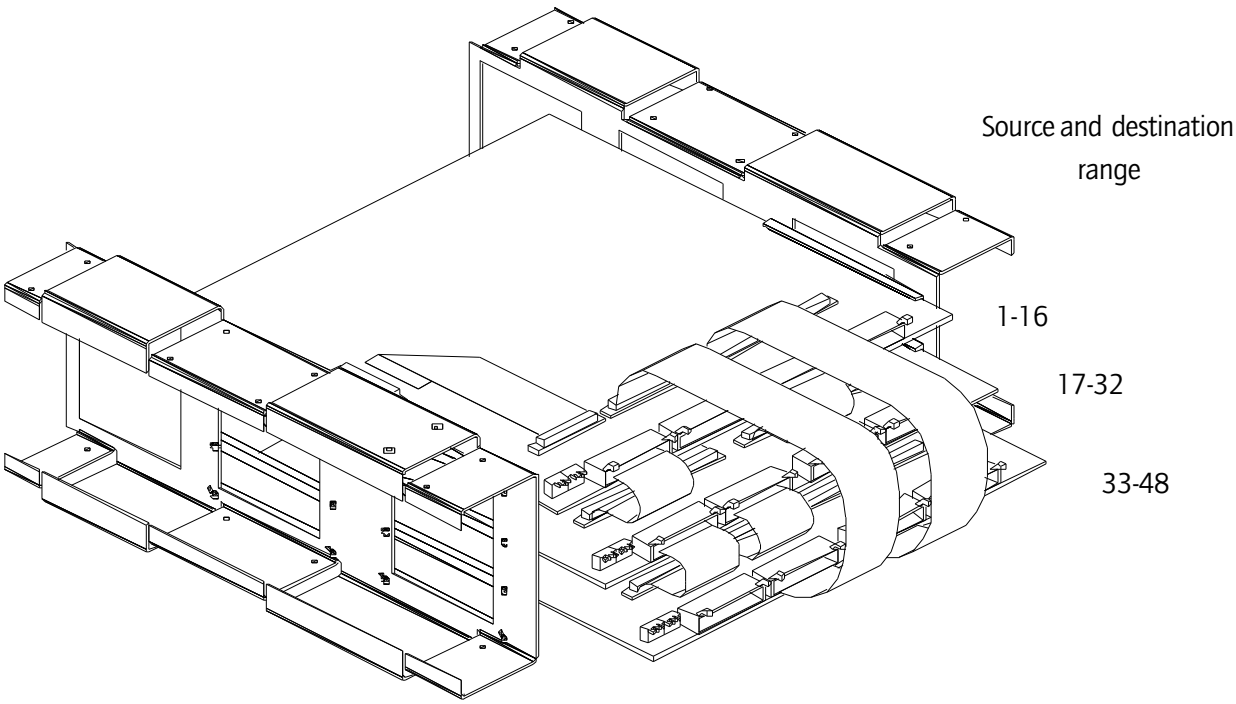
Top view Front view

■ 2.2 Expanding from 16x16 to 64x64

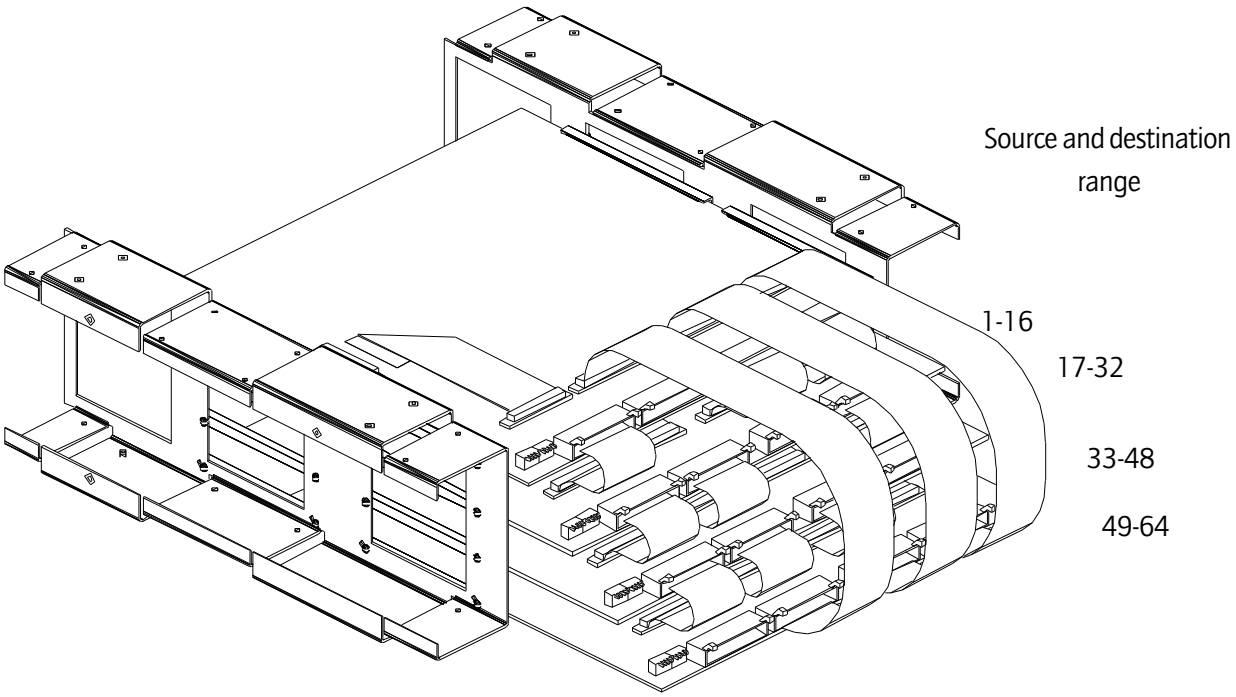
The following diagrams show the cable connections required for expanding the router from 16x16.



32x32 expansion



48x48 expansion



64x64 expansion

■ 2.3 Setting the level switch

The card edge controls and indicators on the router card are limited to the Level and Higher Destination Decode switches and the standard 3 LED array, both of which are described in part one of the ***Freeway*** Series User guide.

For separate routers to be controlled independently, each must have a different level address set. This operation is achieved by means of the DIL switch marked level on the front of each ***Freeway*** card.

The levels are set thus:

SW 1	SW 2	SW 3	SW 4	Level No
0	0	0	0	1
1	0	0	0	2
0	1	0	0	3
1	1	0	0	4
0	0	1	0	5
1	0	1	0	6
0	1	1	0	7
1	1	1	0	8

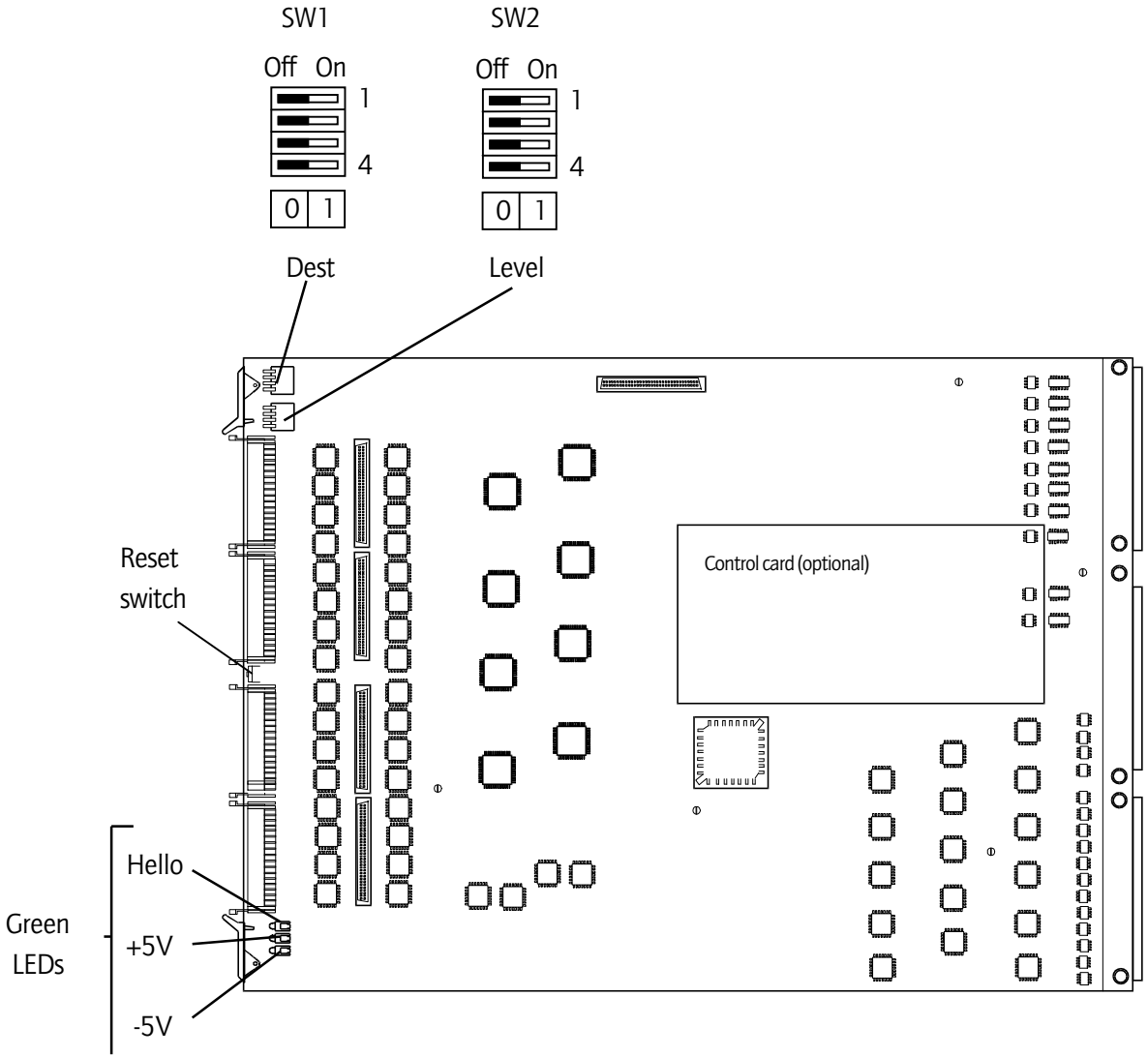
The maximum total number of independent levels is 8. A typical system might be arranged like this:

Level 1 Serial Digital Video

Level 2 Analogue Video

Level 3 AES Digital Audio

Level 4 Stereo Analogue Audio


SW1
Off On
1
4
0 1
Dest
SW2
Off On
1
4
0 1
Level
Reset
switch
Control card (optional)
Green
LEDs
Hello
+5V
-5V

■ 2.4 Setting the destination assign switch

What's the purpose of the switch marked 'HIGHER DEST DECODE'? Well, because we make all ***Freeway*** modules the same, in a router bigger than 16x16, you have to 'tell' each card what range of sources and destinations it's assigned to. That's the purpose of this switch. The range is assigned thus:

SW 1	SW 2	SW 3	SW 4	Source and destination Range
0	0	x	x	1-16
1	0	x	x	17-32
0	1	x	x	33-48
1	1	x	x	49-64

■ 2.5 LED indications

Two of the three LEDs simply indicate that power is arriving at the board. ***Freeway*** routers all operate from two rails only (where others are needed these are generated on the ***Freeway*** cards themselves). The two rails are +5V and -5V.

The third LED is labelled 'HELLO'. This is useful in determining if the control system has spoken to a particular board and, specifically, to tell you if you set the 'level' and 'higher dest decode' switches correctly.

When the control system sends a command (say in response to a button push), the appropriate part of the router responds, depending on how the board configuration switches are set.

If a board receives a command on which it should act, it 'winks' the 'HELLO' LED. Meaning, *'Hello, I've just received a command that's relevant according to my programmed place in the scheme of things.'*

2.6 Resetting the module

There are physically two RESET switches available to perform a hard reset of the Freeway controller. One is located on the edge of the 2440 sub-module and the other is remotely located on the front edge of the SDV card on which the 2440 is sited. Pressing either has the same effect.

Initiating a hard reset is akin to powering down and powering up the control frame. The controller re-boots and follows the usual power-up sequence. It should be noted that the panels will shut down and then be restored after initialisation has completed. It should also be noted that resetting the active controller in a dual control environment will cause system changeover.

If no changes have been made to the database then no crosspoints will be changed.

However, crosspoint settings may change if the level type for a level was changed prior to the reset as during initialisation the crosspoints are set according to the level type for that level.

It is also advisable to perform a reset after database parameters are changed as certain changes only take effect after a reset, i.e. changing level type, panel type, source overrides, and controllable destinations.

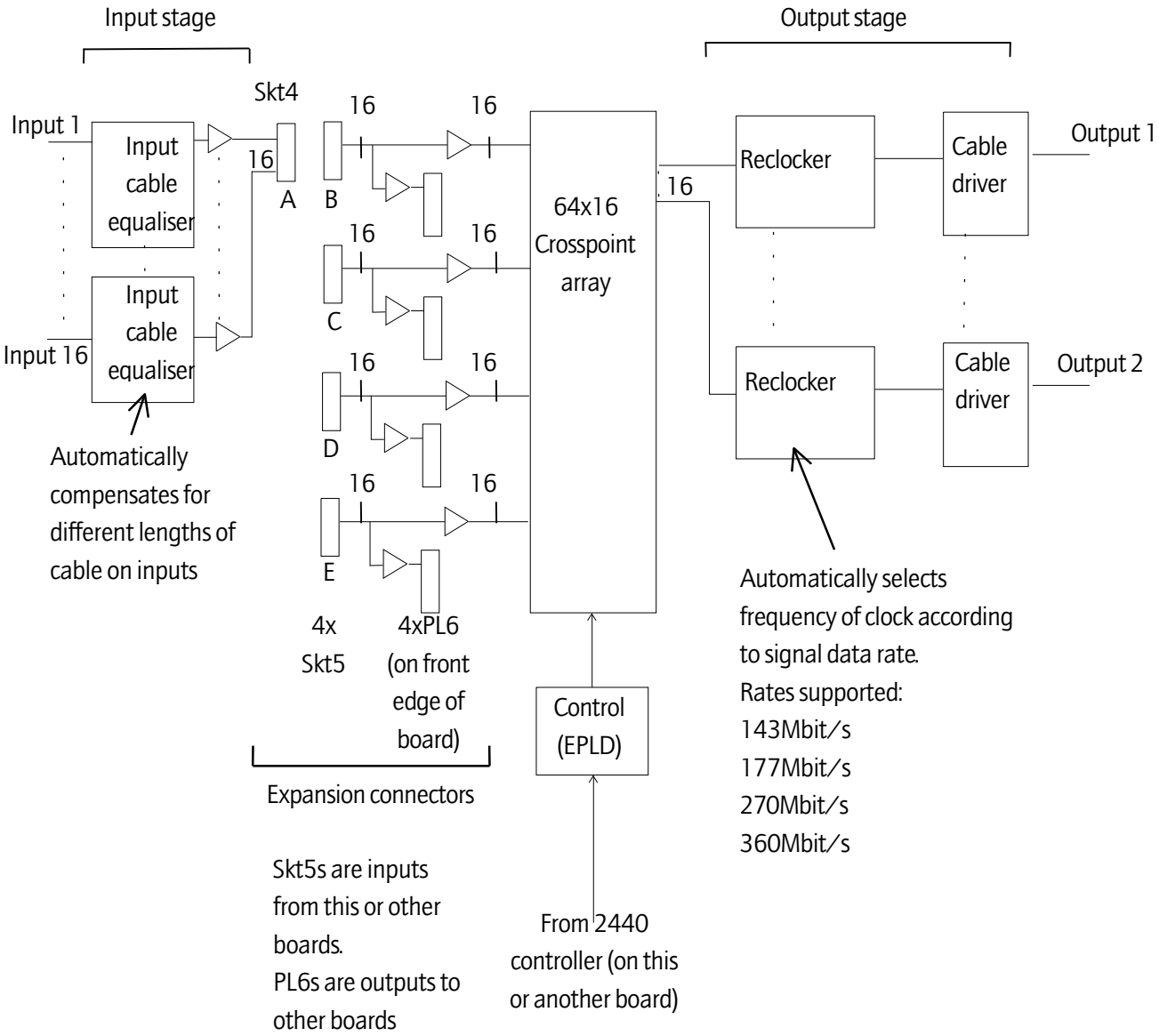
3 Theory of operation

The 16 inputs are buffered using the receiver/equaliser and then routed by the 64x16 crosspoint array. Control logic buffers the destination and source addresses and provides the strobes to the crosspoint array to set the routes.

These are then reclocked during the output stage to the input frequency. The frequency of the clock is automatically selected according to the signal data rate. The signals are then buffered out via the cable driver.

Ribbon cables are fitted depending on the board usage according to the following table:

Input/Output	Position
1-16	A to B
17-32	A to C
33-48	A to D
49-64	A to E



Internal block diagram

4 Problem solving

The green LEDs on the routing card are off?

There is no power on the card.

- check that there is power from the PSUs
- check cable interconnections
- ensure that the card is properly seated in the frame

The HELLO LED on the card is off?

No command has been received by the board.

- check the power
- check that the 'level' and 'higher dest decode' switches are set correctly
- check cable interconnections

The ERROR LED is lit on the 2440 control card?

There is a handshake error

- check that the DIL switch on the control card is set correctly

5 Specification

■ Inputs

Type:	Unbalanced NRZI coded serial data
Standard :	Serial EBU Tech 3267E. SMPTE 259M-ABCD
Impedance:	75Ω
Data rate:	140 to 360Mbits/s
Return loss:	>13dB 10MHz to 360MHz
Amplitude:	800mV p-p nominal
DC offset:	<5V
Equaliser:	Adaptive automatic for up to 250m cable (Belden 8281, PSF 1/2M or equivalent)

■ Outputs

Type:	Unbalanced NRZI coded serial data
Standard:	Serial EBU Tech 3267E. SMPTE 259M-ABCD
Impedance:	75Ω
Data rate:	140 to 360Mbits/s
Return loss:	>13dB 10MHz to 360MHz
Amplitude:	800mV p-p ±10%
Overshoot:	<7%
DC offset:	<5V

■ Performance

Data acquisition period: 20ms

Rise and fall time:	<0.5ns (rise and fall shall not differ by more than 0.25ns) 20% to 80%
Jitter:	<0.5ns (<0.75ns with >200m input cable)

■ Optional hardware

There exist some order codes which relate to optional extras and spare parts. These are detailed below:

Extra PSU	FRE-OPTN-1940
Extra μP card	FRE-OPTN-1940

Spare parts

SDV signal card	FRE-SPAR-3940
SDV rear connector card	FRE-SPAR-1740
AES signal card	FRE-SPAR-4940
AES rear connector card	FRE-SPAR-1463
Analogue video signal card	FRE-SPAR-3740
Analogue video rear connector card	FRE-SPAR-1740
Stereo analogue audio signal card	FRE-SPAR-4740
Stereo analogue audio rear connector card	FRE-SPAR-1747
AES Reference generator card	FRE-SPAR-4941
***Freeway* Frame**	FRE-SPAR-6540
Unbalanced AES rear panel	FRE-SPAR-1749
Replacement User Manual	FRE-SPAR-0000