INSTRUCTION MANUAL

Digital Satellite News Gathering Coder/Decoder

Firmware Version 2.0/2.3 (and later)

M2/ESN/SNG and Options

ST.TM.E5910.5

Issue 5

ENGLISH (UK)

ENGLISH (UK)

READ THIS FIRST!

If you do not understand the contents of this manual
DO NOT OPERATE THIS EQUIPMENT**.**
Training courses on DSNG equipment are available through Customer Support using the information in the Preliminary Pages of this manual. Also, translation into any EC official language of this manual can be made available, at your cost.

ITALIANO

LEGGERE QUESTO AVVISO PER PRIMO!

Se non si capisce il contenuto del presente manuale
NON UTILIZZARE L'APPARECCHIATURA**.**
Corsi di formazioni per l'apparecchio DSNG sono disponibili presso l'assistenza clienti, consultando le informazioni contenute nelle Pagine preliminari di questo manuale. È anche disponibile la versione italiana di questo manuale, ma il costo è a carico dell'utente.

SVENSKA

LÄS DETTA FÖRST!

Om Ni inte förstår informationen i denna handbok
ARBETA DÅ INTE MED DENNA UTRUSTNING**.**
Utbildningskurser för utrustningen i DSNG kan anordnas genom kundtjänst med den information som finns på de inledande sidorna i denna handbok. En översättning till detta språk av denna handbok kan också anskaffas, på Er bekostnad.

NEDERLANDS

LEES DIT EERST!

Als u de inhoud van deze handleiding niet begrijpt
STEL DEZE APPARATUUR DAN NIET IN WERKING.
Trainingscursussen voor DSNG apparatuur zijn via Klantenservice beschikbaar en informatie hierover is te vinden in de eerste pagina's van deze handleiding. U kunt tevens, op eigen kosten, een vertaling van deze handleiding krijgen.

PORTUGUÊS

LEIA O TEXTO ABAIXO ANTES DE MAIS NADA!

Se não compreende o texto deste manual
NÃO UTILIZE O EQUIPAMENTO.
O serviço de Apoio ao Cliente oferece cursos de formação sobre o equipamento DSNG, disponíveis por intermédio da informação contida nas Páginas Introdutórias deste manual. O utilizador poderá também obter uma tradução do manual para o português à própria custa.

SUOMI

LUE ENNEN KÄYTTÖÄ!

Jos et ymmärrä käsikirjan sisältöä
ÄLÄ KÄYTÄ LAITETTA.
Asiakaspalvelu tarjoaa koulutuskursseja DSNG laitteiden käytössä. Tätä koskevat tiedot ovat käsikirjan alkusivuilla. Käsikirja voidaan myös suomentaa asiakkaan kustannuksella.

FRANÇAIS

AVANT TOUT, LISEZ CE QUI SUIT!

Si vous ne comprenez pas les instructions contenues dans ce manuel
NE FAITES PAS FONCTIONNER CET APPAREIL.
Des stages de formation sur le "DSNG" sont disponibles auprès du Service de Soutien Technique à la Clientèle dont vous trouverez les coordonnées dans le Préambule de ce manuel. En outre, nous pouvons vous proposer, à vos frais, une version française de ce manuel.

DANSK

LÆS DETTE FØRST!

Udstyret må ikke betjenes
MEDMINDRE DE TIL FULDE FORSTÅR INDHOLDET AF DENNE HÅNDBOG.
Træningskurser i DSNG udstyr kan arrangeres gennem Customer Support. Der henvises til de indledende sider i denne håndbog for yderligere oplysninger herom. Vi kan også for Deres regning levere en dansk oversættelse af denne håndbog.

DEUTSCH

LESEN SIE ZUERST DIESEN HINWEIS!

Sollte Ihnen der Inhalf dieses Handbuches nicht klar verständlich sein, dann **BEDIENEN SIE DIESE GERÄTE NICHT!**
Schulungskurse zur Bedienung des DSNG bietet Ihnen unser Kundendienst. Die entsprechende Adresse entnehmen Sie bitte den ersten Seiten unseres Handbuches. Eine Übersetzung des Handbuches in diese Sprache ist gegen Berechnung lieferbar.

ΕΛΛΗΝΙΚΑ

ΔΙΑΒΑΣΤΕ ΠΡΩΤΑ ΑΥΤΟ!

Αν δεν καταλάβετε το περιεχόμενο αυτού του βοηθήματος/εγχειριδίου
ΜΗΝ ΛΕΙΤΟΥΡΓΗΣΕΤΕ ΑΥΤΟΝ ΤΟΝ ΕΞΟΠΛΙΣΜΟ.
Μαθήματα για την κατάρτιση σας στη χρήση του DSNG αυτού του εξοπλισμού διατίθενται μέσω του Customer Support - θα βρείτε τις πληροφορίες που χρειάζεστε στις Πρώτες Σελίδες αυτού του βοηθήματος. Επίσης, αυτό το εγχειρίδιο είναι διαθέσιμο σε μετάφραση σε αυτή τη γλώσσα και μπορείτε να το αγοράσετε.

ESPAÑOL

LEA ESTE AVISO PRIMERO!

Si no entiende el contenido de este manual
NO OPERE ESTE EQUIPO.
El servicio posventas (Customer Support) ofrece cursos de adiestramiento para el manejo del equipo del DSNG usando la información en las páginas preliminares de este manual. Podemos asimismo suministrarle una traducción de este manual al (idioma) previo pago de una cantidad adicional que deberá abonar usted mismo.

Issue 5 first published in 1999 by:

NDS LIMITED

1 HEATHROW BOULEVARD
286 BATH ROAD
WEST DRAYTON MIDDLESEX UB7 0DQ

UNITED KINGDOM

INTERNATIONAL TELEPHONE: +44 (0) 181 476 8000

List of Contents

About this Manual

This manual provides instructions and information for the installation, operation of the Digital Satellite News Gathering Coder/Decoder.

This manual should be kept in a safe place for reference for the life of the equipment. If passing the equipment to a third party, also pass the relevant documentation.

Issues of this manual are listed below:

Issue	Date	Software Version	Comments
1	Sept 1996	1.4	Initial release.
2	Oct 1996	1.5	Additional software features: UTC offset, error masking, low res. low delay mode, remote diagnostics, re-initialise unit.
3	Feb 1997	2.0	IRD Card option introduced.
4	Dec 1997	2.0 (and later)	Company logo and style change.
4r1	June 1998	2.0 (and later)	Fuse size changed to 5 x 20 mm and Customer Support information now includes overseas offices.
5	March 1999	2.0/2.3 (and later)	Modulator LCD menus amended to reflect S5898 version 2.3. AS/NZS 3548 compliance added. Various minor amendments.

The following associated manual is also available:

- ST.TS.E5910: DSNG Remote Control Protocol (Specification)

Revisions

It is not intended that this manual will be amended by the issue of individual pages. Any revision will be by a complete re-issue. Further copies of this manual can be ordered from the address shown on *page ii*.

Acknowledgements

General

All best endeavours have been made to acknowledge registered trademarks and trademarks used throughout this manual.

Any notified omissions will be rectified in the next issue of this manual.

Some trademarks may be registered in some countries but not in others. In general, the situation in the UK will prevail throughout NDS Broadcast manuals.

Registered trademarks and trademarks used are acknowledged below and marked with their respective symbols. However, they are not marked within the text of this manual.

Registered Trademarks

AMD® is a registered trademark of Advanced Micro Devices, Inc.

XILINX® is a registered trademark of Xilinx, Inc.

Betacam® is a registered trademark of the Sony Corporation.

Trademarks

MACH™ is a trademark of Advanced Micro Devices, Inc.

Dallas Semiconductor™ is a trademark.

Warnings, Cautions and Notes

Heed Warnings

All warnings on the product and in the operating instructions should be adhered to. The manufacturer can not be held responsible for injuries or damage where warnings and cautions have been ignored or taken lightly.

Read Instructions

All the safety and operating instructions should be read before this product is operated.

Follow Instructions

All operating and use instructions should be followed.

Retain Instructions

The safety and operating instructions should be retained for future reference.

WARNINGS....

WARNINGS GIVE INFORMATION WHICH, IF STRICTLY OBSERVED, WILL PREVENT PERSONAL INJURY OR DEATH, OR DAMAGE TO PERSONAL PROPERTY OR THE ENVIRONMENT. THEY ARE BOXED AND SHADED FOR EMPHASIS, AS IN THIS EXAMPLE, AND ARE PLACED IMMEDIATELY PRECEDING THE POINT AT WHICH THE READER REQUIRES THEM.

CAUTIONS...

Cautions give information which, if strictly followed, will prevent damage to equipment or other goods. They are boxed for emphasis, as in this example, and are placed immediately preceding the point at which the reader requires them.

NOTES...

Notes provide supplementary information. They are highlighted for emphasis, as in this example, and are placed immediately after the relevant text.

EMC Compliance

This equipment is certified to the EMC requirements detailed in *Annex B, Technical Specification*. To maintain this certification, only use the leads supplied or if in doubt contact Customer Support.

Customer Support Information

How Can We Help?

NDS provide continuous product support and services to all our customers. We provide assistance with regards to the operation and servicing of installed equipment. We also offer training, maintenance agreements, equipment loan service and provide a base repair facility.

Where to Find Us

Customer Support
NDS Broadcast
35 Parham Drive
Boyatt Wood Industrial Estate
EASTLEIGH
Hampshire
SO50 4NU
United Kingdom

International Telephone:	+44 (0) 1703 498111	
International Facsimile:	+44 (0) 1703 498102	
Internet Address:	http://www.ndsworld.com	
E-mail:	fieldservice@ndsuk.com	
U.S. Office:	+18 - 8863-70023	(8:00 – 5:00 Local Time)
Hong Kong Office:	+85 - 262-19151	(9:00 – 5:30 Local Time)

Procedure for Returning Equipment

In the event of a problem with your equipment, please contact Customer Support. If it is serious, requiring the return of all or part of the equipment for repair, then proceed as follows:

1. We will allocate you a **Returns Authorisation Number (RAN)** and ask you to complete the **Customer Repair Report**, provided at the back of this manual, as fully and clearly as possible.
2. It would help if a copy of the Customer Repair Report and RAN were faxed to us as soon as possible (at the number given above).
3. Pack the equipment to be returned in the original packing boxes, or other approved packaging materials. Ensure the completed Customer Repair Report is included with the equipment to be returned.
4. Ensure the appropriate address and information labels are attached to the packaging. This may include a Customs Declaration Form if returning equipment from overseas.

It is the responsibility of the sender to ensure the equipment arrives at Customer Support on time and in good condition.

Terms and Conditions

A copy of the standard Terms and Conditions can be obtained from Customer Support (see address above).

BLANK

Chapter 1

Introduction

Contents

List of Illustrations

List of Tables

BLANK

1.1 Scope of this Manual

1.1.1 Who this Manual is Written For

This manual is written for operators/users of the Digital Satellite News Gathering Coder/Decoder. It does not include any maintenance information which would require the removal of covers.

WARNING...

HAZARDOUS VOLTAGES ARE PRESENT WITHIN THIS EQUIPMENT AND MAY BE EXPOSED IF THE COVERS ARE REMOVED. ONLY DMV-TRAINED AND APPROVED SERVICE ENGINEERS ARE PERMITTED TO SERVICE THIS EQUIPMENT.

CAUTION...

Unauthorised maintenance or the use of non-approved replacements may affect the equipment specification and invalidate any warranties.

1.1.2 Firmware Versions

This manual has been written to cover the functionality of software release version **2.0/2.3 and later**.

This manual will continue to be relevant to subsequent firmware issues where the functionality of the equipment has not changed. Where a new issue of firmware changes the functionality, a new issue of this manual will be provided.

NOTE...

The software version of the DSNG Codec can be found by selecting the Status / System screen (see *Chapter 3, Local Control and Operation*). This version number is the version of software running on the MuxMod Card which can be viewed by selecting the Diagnostics / Off-Line Diags / Multiplexer (Mux) screen.

1.1.3 Equipment Models

This manual covers the current hardware and earlier equipment models to which the latest firmware may be installed (*Table 1.1*).

Table 1.1: Equipment Models

Model Number	Product Number	Description
E5910	M2/ESN/SNGA	The basic DSNG Codec not fitted with an Integral Receiver-Decoder (IRD) Card (early models of this equipment).
E5910	M2/ESN/SNGB	The basic DSNG Codec fitted with an Integral Receiver-Decoder (IRD) Card (S5902).

On the rear panel of the equipment is a label which identifies the Product Title, Product Number, Serial Number and Build Status.

1.2 Function of the DSNG Codec

The DSNG Codec is a low bit-rate, transportable, digital exciter designed specifically for digital satellite news gathering applications. It is compact and lightweight, fully MPEG-2 and DVB compliant, and has high performance for the transmission of studio-quality video material. The equipment is designed to be suitable for both flyaway use (within an appropriate flight case) and truck installation.

A single 5U chassis houses video, audio and data encoding, multiplexing and modulation functions. The unit is fully configurable and extremely flexible, while still being simple to operate and maintain. Various alignment, testing and diagnostic facilities have been incorporated to assist with operation and maintenance in the field.

The DSNG Codec provides a single video channel, accepting either digital, composite or component inputs which are to be encoded. Transponder bandwidth can be traded with video quality by operating the video compression bit-rate in the range 1.5 -15 Mbit/s. Over this operating range, encoded video resolution can be controlled in order to optimise subjective encoding performance.

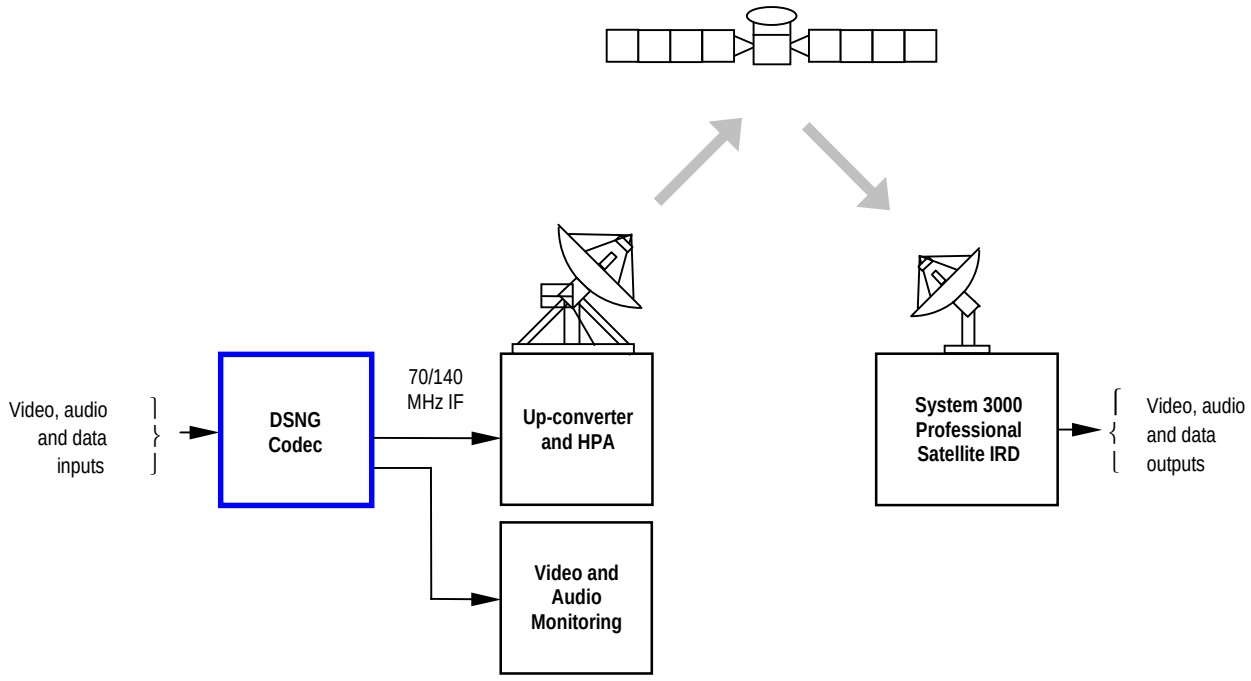


Figure 1.1 DSNG Codec Basic System Configuration

The unit encodes four channels of analogue audio which may be configured as four mono channels, or two stereo pairs, or two channels of AES/EBU digital audio.

Two channels of asynchronous and one channel of high speed synchronous data are also supported (data channels are not compressed).

The unit multiplexes these input signals and adds digital scrambling, under user control, to provide secure programme transmission. The digital stream is then processed for forward error correction (FEC) and modulates a single IF carrier (tuneable around 70 or 140 MHz) for output to an Up-converter and High Power Amplifier (HPA) equipment for transmission to the satellite. The error correction and modulation scheme used is DVB-compliant, using concatenated Reed-Solomon (188, 204) and Convolutional Encoding (selectable rate 1/2 to 7/8). A baseband output to the DVB parallel standard is also provided.

If fitted with an Integrated Receiver-Decoder (IRD) Card (M2/ESN/SNGB option only), monitoring of the local signal, or off-air reception of the uplinked, or even an unrelated compressed service off satellite, is possible. This provides a reliable means of ensuring the DSNG Codec is functioning correctly, eliminating the need to rely on an established link back to the studio, or on a separate receiver at the uplink site. In normal operation this monitors the baseband or dedicated IF output, but also has an L-band input capability which can be used to monitor the outgoing feed (where a two stage up-conversion is used), or a feed off satellite. The L-band IRD input can power a receive LNB.

1.3 Summary of Features

1.3.1 Video Encoding

Encoding Standards

The DSNG Codec processes a broadcast-standard video signal into a compressed encoded bit-stream in accordance with the MPEG-2 specification (ISO/IEC 13818-2).

Video Input Sources

The following video input types are supported:

- PAL-B/D/G/H/I/M and NTSC-M composite input
- Parallel digital (ITU-R BT. 656-1 part 2) input (“D1” parallel format)
- Serial digital (ITU-R BT. 656-1 part 3) input (“D1” serial format)
- EBU N10 YUV component input
- Betacam component input
- internal test pattern

Variable Bit-rate

The MPEG-2 compression algorithm uses adaptive field / frame coding, forward and backward predictive processing with motion estimation and compensation to reduce the bit-rate to within the range 1.5 - 15 Mbit/s.

> **NOTE...**
> SIF rate 1.5 - 5 Mbit/s (see *Coding Resolutions*). All other resolutions 2 - 15 Mbit/s.

Automatic Configuration of Parameters

In normal operation, the unit will automatically select the video coding parameters, such as bit-rate and resolution, which deliver optimum video quality given the output configuration, i.e. bandwidth and FEC rate, set by the user. Alternatively, the user can override this and select manual control.

Coding Resolutions

To provide optimum picture quality over the full range of supported bit-rates, the encoded picture resolution is normally controlled automatically according to the video bit-rate. Alternatively, the user can override this and select manual control.

The available coding resolutions are as follows:

Table 1.1: Video Coding Resolutions

625 Line Modes	525 Line Modes
704 pixels x 576 lines	704 pixels x 480 lines
544 pixels x 576 lines	544 pixels x 480 lines
480 pixels x 576 lines	480 pixels x 480 lines
352 pixels x 576 lines	352 pixels x 480 lines
352 pixels x 288 lines (SIF)	352 pixels x 240 lines (SIF)

SIF resolution mode allows video bit-rates down to 1.5 Mbit/s and provides a better coding quality than normal resolutions at very low rates. However, as it is only intended for low rates, the maximum rate in this mode is limited to 5 Mbit/s. As the bit-rate is increased from 2 Mbit/s, the other resolutions gradually provide better quality than SIF.

Low Delay Mode

Low delay coding modes are optimised to minimise the end-to-end encoding delay. In these modes the video quality is traded against the delay.

Internal Frame Synchroniser

An internal frame synchroniser is incorporated to maintain a valid encoded bit-stream in the event of input video sync loss or hot cuts of video input. The encoding process which operates on the output side of the video synchroniser is frequency-locked to a stable internal video clock reference, ensuring accuracy of video reconstruction at the receive site.

Output on Video Loss

The unit can be software-configured to provide a black frame or to freeze frame in the event of video input loss.

Frame Sequence Control

In normal operation, the DSNG Codec uses IBBP coding, for which it has been optimised. The user can override this default and select either IBP or IP coding, as required. Coding modes and frame sequences are explained in *Chapter 4, Equipment Description.*

1.3.2 Audio Encoding

Encoding Standards

Audio is encoded to the MPEG-2 Audio Encoding standard (Layer 1 or 2) at a sampling rate of 48 kHz.

Channel Modes

The DSNG Codec supports four channels of audio, which may be configured as follows:

- Four, analogue single mono channels (600 Ω or 20 kΩ)
- Two, analogue stereo pairs (600 Ω or 20 kΩ)
- Two, digital channels (AES/EBU)

The two stereo pairs, may be configured in various encoding modes:

- **Single mono:** the left channel is encoded - the signal is output to both XLR connectors at the receiving end
- **Dual mono:** two mono signals are carried in the transport stream as a single PES data stream - only one of the two channels is decoded and output to both XLR connectors at the receiving end. This is intended for multi-lingual services
- **Stereo:** a stereo pair is coded as two mono signals - the two signals are output as stereo at the receiving end
- **Joint/intensity stereo:** a stereo pair is coded taking advantage of the stereo nature of the channels - the two signals are output as stereo at the receiving end

Variable Bit-rate

Output bit-rate is selectable in the range 32-384 kbit/s (dependent on configuration).

Table 1.2: Audio Encoding Bit-rates

Bit-rate (kbit/s)	Single Mono	Dual Mono	Dual Stereo	Dual Joint / Intensity Stereo
32	✓	-	-	-
48	✓	-	-	-
56	✓	-	-	-
64	✓	✓	✓	✓
80	✓	-	-	-
96	✓	✓	✓	✓
112	✓	✓	✓	✓
128	✓	✓	✓	✓
160	✓	✓	✓	✓
192	✓	✓	✓	✓
224	-	✓	✓	✓
256	-	✓	✓	✓
320	-	✓	✓	✓
384	-	✓	✓	✓

Test Tone and Level Display

The equipment can be configured to generate a test tone for alignment purposes, and can also indicate audio input levels via the front panel display.

1.3.3 Data Channels

The equipment provides data channels that operate as bit-pipes between the Codec and Decoders. Two types of data channel are supported:

- **Synchronous RS-422:** One channel is supported at baud rates of: n x 64 kbit/s where n = 1 to 16, i.e. maximum rate is 1024 kbit/s. Data and clock are sourced externally to the Codec.
- **Asynchronous RS-232:** Two channels are supported at baud rates of: 1200, 2400, 4800, 9600 baud. The transfer control mechanism is XON/XOFF.

1.3.4 Multiplexing

MPEG-2 and DVB Compliance

The main function of the Multiplexer is to construct an output stream made up of a multiplex of all data sources in the system in such a way as to conform to the MPEG-2 transport layer specification (ISO/IEC 13818-1 MPEG-2 Systems). Programme Specific Information is provided in its basic form and is DVB-compliant. Service name and language descriptor can be defined by the user.

DVB Transport Stream Output

A baseband output comprising the compressed and multiplexed data is available for telecommunications link application. The output conforms to DVB Professional Parallel recommendation and operates at data rates in the range 2 Mbit/s to 32 Mbit/s.

Security of Transmission

A form of elementary security, designed simply to prevent open access to the transmitted service is provided on the DSNG Codec. The DMV Remote Authorisation System (RAS1) uses a fixed key code to scramble the encoded data. The key code can be changed under software control and then stored for future recall. The key code being used must be entered manually at the receiving end to permit descrambling. Scrambling can be disabled to permit open access to the transmitted service.

1.3.5 IF Modulation

The IF Modulator provides the satellite transmission functions specified for MPEG-2 packet signals to the transmission specification defined by ‘Digital Broadcasting Systems for Television, Sound and Data services’, ETS 300 421, December 1994.

The DSNG Codec utilises QPSK modulation at 70 MHz (±20 MHz) or 140 MHz (± 40 MHz) which outputs data at a rate of 1.5-16 MSymbol/s. The output incorporates a pulse shaping filter and spectrum inversion (selectable) and operates in the range -27 dBm to +5 dBm.

Two IF monitor outputs are also available, one of which provides a dedicated feed to the integral IRD.

1.3.6 Integrated Receiver-Decoder (IRD)

The IRD (MS/ESN/SNGB option only) comprises a digital Demodulator and single-channel Decoder.

Local Monitoring

In local monitoring mode, the IRD monitors the IF monitor output from the Encoder unit or, alternatively, an internal serial feed at baseband, and decodes the input video and audio services, presenting these for local monitoring and reporting status via the user controls.

Off-Satellite Monitoring / Independent Service Reception

Additionally, a tuner is incorporated which can accept an L-band input. This can either be an intermediate output from the up-linking Up-converter (again for local monitoring), or can be from a satellite receive installation Low Noise Block (LNB) via the signal down lead. In the latter case receive polarisation switching is user selectable by the d.c. voltage fed to the LNB. The LNB d.c. supply can also be switched off under user control.

Alternatively, the unit can accept a parallel baseband digital input on an interface designed to comply with the DVB Professional Parallel Interface Recommendation.

When operating from L-band input, microprocessor-controlled tuning, with a frequency synthesised local oscillator, is used. The baseband output signals from the L-band tuner are then passed to a Quadrature Phase Shift Keying (QPSK) Demodulator. The demodulated data stream is demultiplexed before being passed to the Decoder.

The Decoder further demultiplexes the data stream to select audio, video and data services received from the digital Demodulator. These services are then decoded, and presented at the IRD outputs.

The Decoder can decode both Single Channel Per Carrier (SCPC) and Multi-Channel Per Carrier (MCPC) transmissions and will operate with net input data rates in the range 2 Mbit/s to 45 Mbit/s.

1.3.7 Unit Control and Monitoring

Remote Control

The DSNG Codec may be controlled locally via the front panel, or remotely via an RS-485/RS-422 interface (see *DSNG Codec Remote Control Interface Specification ST.TS.E5910*).

When the unit is under local control, the remote control facility is disabled. When the unit is in remote control, only status information can be accessed from the front panel controls; all control commands then come from the remote link.

Local Control

Local control and operation of the unit is effected by a membrane keypad and a 20-character by 4-line display which uses a simple menu driven system (see *Chapter 3, Local Control and Operation* for details).

Reset/Alarm/Fail Relays

Relay contacts are available at the RESET/STATUS connector to permit remote monitoring of the DSNG Codec which provides changeover relay contacts for alarm and fail indications (video, audio, data and IRD alarms may be included or masked), and a two-wire input for remote reset of the equipment. These relays are active when operating in either local or remote mode (see *Chapter 5, Pr4eventive Maintenance and Fault-finding* for more information).

Configuration and Storage

Up to 16 editable current configurations can be named and stored in memory by the user; the active current configuration is automatically restored at power on, provided that it has been stored - this happens automatically when the user exits Setup mode. In addition, a set of 16 backup configurations may be stored / retrieved under password protection. Alternatively, the original 16 factory default configurations (see *Annex C, Default Configurations*) may be restored at any time (see *Chapter 3, Local Control and Operation* for more information).

Diagnostics

Power-up and self-test diagnostic facilities are available to assist with operation and maintenance down to card level. During operation, error messages are provided to notify the user of operating problems or faults (see *Chapter 3, Local Control and Operation*).

User Selectable Control Functions

The following control functions are provided through either local or remote control interface (see *Chapter 3, Local Control and Operation* for details).

Video

- Video on / off control
- Selection of line standard
- Selection of video source
- Bit-rate selection - normally derived from channel parameters automatically
- Pixel resolution selection - normally automatic
- Selection of coding mode
- Selection of video test pattern
- Selection of video in the event of video input fail (choice of test pattern or last frame)
- Selection of low delay modes

Audio

- Selection of number of audio channels
- Audio on / off control
- Selection of audio test tone
- Selection of coding mode
- Selection of coded bit-rate
- Selection of analogue or digital input(s)
- Selection of analogue input impedance

- Selection of language descriptor for Service Information

Asynchronous (RS-232) Data

- Baud rate(s)
- Port enable / disable

Synchronous (RS-422) Data

- Serial data rate
- Port enable / disable

Multiplexed Data Stream

- Selection of output format - baseband (for telecommunications link) or IF (for satellite uplink)
- Entry of service name
- Scrambling on/off control
- Entry of a key code for scrambling
- In baseband only
    - Selection of output bit-rate
    - Selection of packet length (188 / 204 bytes)
    - Reed Solomon error correction on / off

Modulator

- Transmission bandwidth or symbol rate
- Convolutional FEC rate
- IF spectrum inversion
- Modulation on / off
- IF output on / off
- Carrier frequency
- Output power
- Preset output power

Integrated Receiver-Decoder (MS/ESN/SNGB option only)

- Selection of tracking or independent mode
- In tracking mode
    - Selection of input interface (internal, baseband, IF, or L-band)
    - Selection of audio channel for monitoring
    - Selection of data channel for monitoring
    - L-band mode only
        - Configuration of LNB related parameters
        - Tuning control / signal level indication
- In independent mode
    - Selection of the input interface (L-band or baseband)
    - L-band mode only
        - Configuration of LNB related parameters
        - Tuning control / signal level indication
        - Configuration of symbols rate and Viterbi FEC code rate
    - Selection of service
    - Selection of the desired audio and data services associated with the video

- Entry of the key code for descrambling

Systems

- Local / remote control
- Remote control interface protocol
- Store up to 16 current (editable) configurations
- Restore factory 16 default (unchangeable) configurations
- Store up to 16 customer specific (password protected) configurations
- Set local time and date
- Set Universal Time Code offset
- Set display brightness
- Display of the internal temperature
- Selection of Alarm/Fail relay masking for video, audio, data and IRD channels

Diagnostics

- Upon request (with interruption of service)
- Self-test diagnostics, normally down to card level
- During the encoding, diagnostic / status information on the following
  - input video
  - video encoding
  - audio encoding
  - data encoding
  - multiplexing
  - IF modulation
  - reception
  - decoding
  - fans on / off
  - power rails

1.4 Guided Tour

1.4.1 Construction

The DSNG Codec is robustly constructed and is housed in a shielded, self-ventilated 5U high enclosure. All external connections are via rear-panel connectors. The unit is designed primarily for free-standing but may be mounted in a 19 inch rack, if required. It is lightweight and compact, and suitable for both flyaway use (within an appropriate flight case) and truck installation.

The equipment operates from a mains power supply, having autosensing selection covering 100-120 V or 220-240 V a.c., 45-440 Hz and is designed for use in ambient air temperature conditions in the range -20°C to +50°C after 10-15 minutes warming up period at low temperatures.

1.4.2 Controls, Indicators and Connectors

Controls and indicators are provided on the front panel (*Figure 1.2*) for local configuration and operation of the DSNG Codec. For further details, see *Chapter 3, Local Control and Operation*.

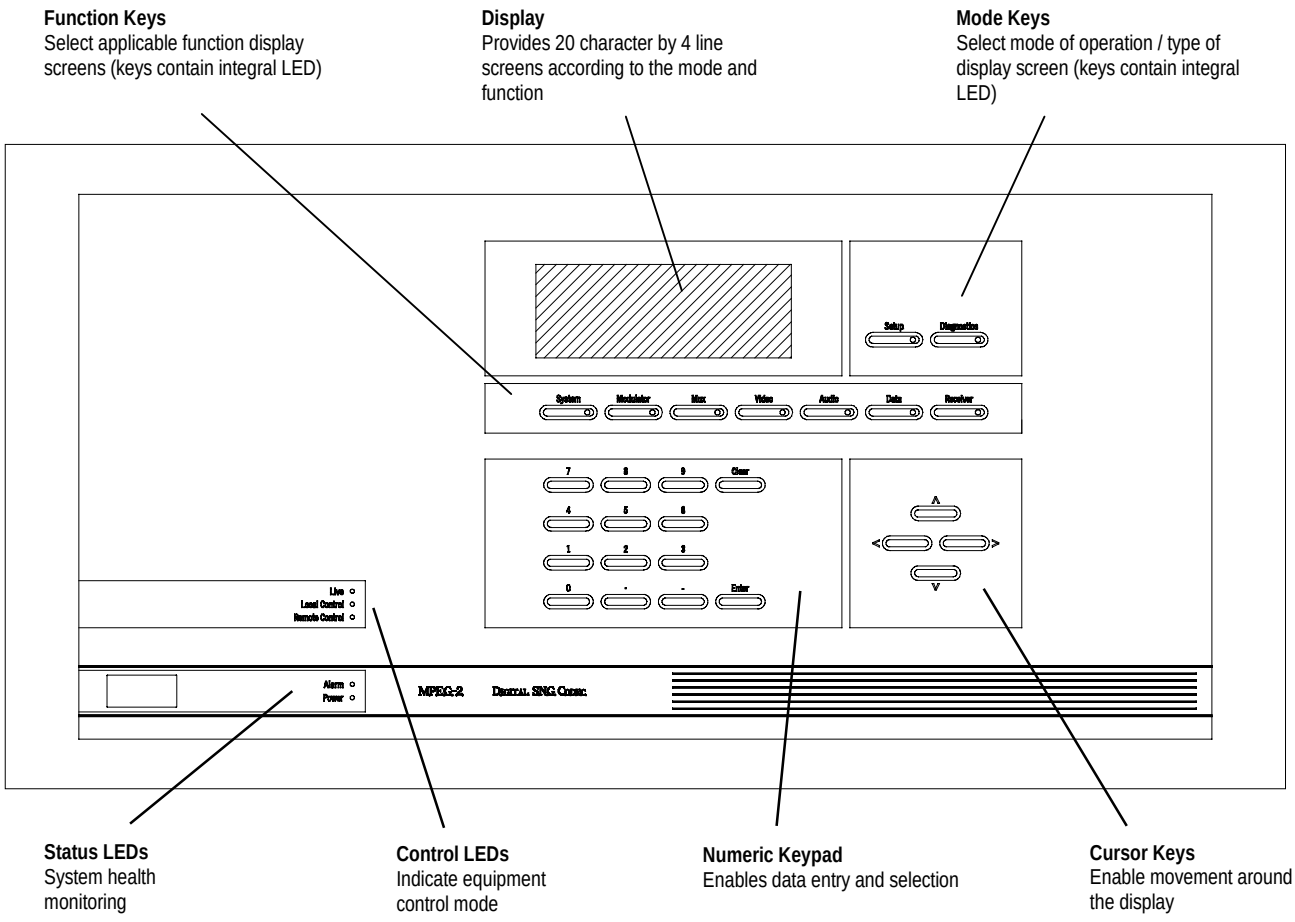


Figure 1.2: Front Panel Controls and Indicators

All input and output connectors for the DSNG Codec are located at the rear panel along with on-card LEDs which show through the rear panel (*Figure 1.3*). For connector pin-out details, see *Chapter 2, Installation*. For a full specification of the interface, see *Annex B, Technical Specification*.

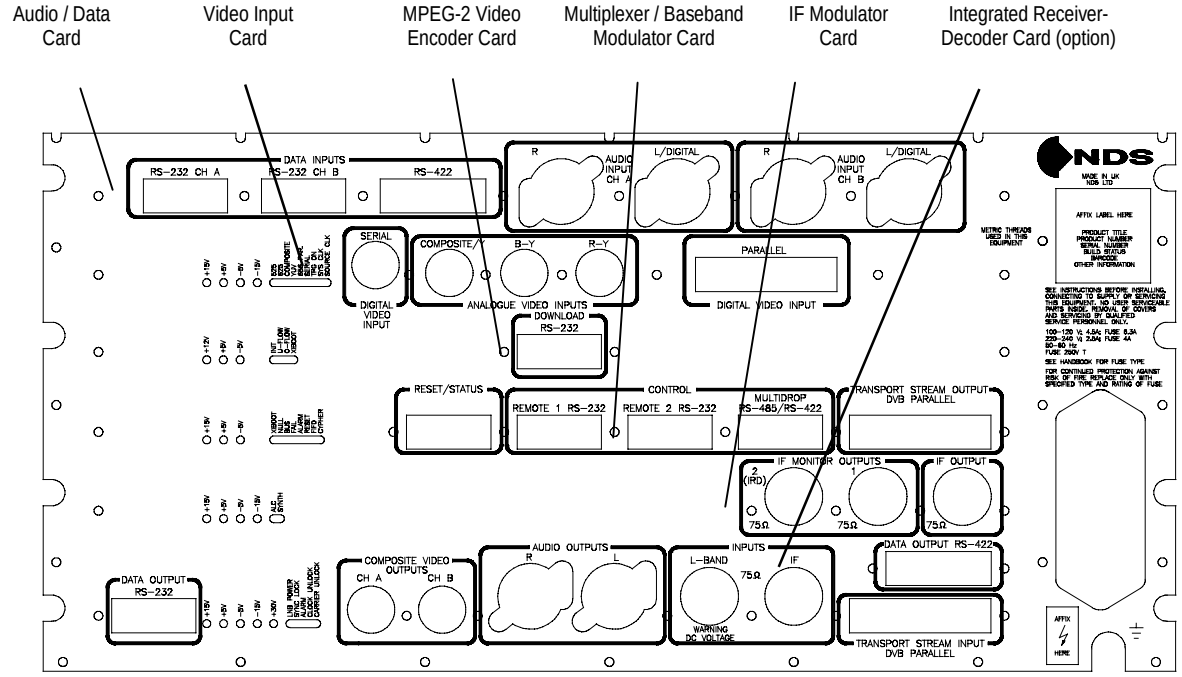


Figure 1.3: Rear Panel Connectors and Indicators

1.5 Options and Accessories

DSNG Codec (M2/ESN/SNGA)

An early basic model of the DSNG Codec comprises five cards, which are factory fitted into the slots provided by the enclosure *(Table 1.3)*

Table 1.3: DSNG Codec Cards

Slot	Name	Number
1	Audio, Data and Teletext Card	S5427
2	Video Input Card	S5424
3	MPEG-2 Video Encoder Card	S5430
4	Multiplexer / Baseband Modulator Card	S5898
5	IF Modulator Card	S5900
6	Not used	

All LEDs and connectors associated with the cards are available at the rear panel of the unit (*see Figure 1.3*). Access to the individual cards is not required for normal operation.

DSNG Codec (M2/ESN/SNGB)

The current enhanced model of the DSNG Codec (M2/ESN/SNGB) is factory fitted with the same cards as the basic model (M2/ESN/SNGA), plus an Integrated Receiver-Decoder (IRD) Card (S5902) to enable local or off-satellite monitoring, or independent service reception. The card is fitted in slot position 6 (bottom slot), *See Figure 1.3*.

Flight Case

A recommended specification can be supplied to enable a suitable fight case to be purchased separately. Contact Customer Support for details.

BLANK

Chapter 2

Installation

Contents

List of Illustrations

List of Tables

2.1 Introduction

2.1.1 General

This chapter provides configuration and connection information in order that you can plan the installation and check the final set-up when moving the equipment to an alternate location. In the event of problems, contact Customer Support.

2.1.2 Site Requirements

Power Supplies

The DSNG Codec operates from an auto-ranging power supply covering the ranges 100-120 V or 220-240 V a.c., 45-440 Hz. See *Annex B, Technical Specification* for a full power supply specification.

Environment

The Encoder is designed for use in ambient air temperature conditions in the range -20°C to +50°C, and humidity 0% to 90% (non-condensing) after a warming up period of 10-15 minutes. See *Annex B, Technical Specification* for a full specification.

> **NOTE...**
> The operation of this unit to specification can not be guaranteed below 0°C due to the commercial specification of the semiconductors used. However, extensive tests show that in practice the unit will operate reliably under these conditions.

This equipment is fitted with a splash-proof front panel, however, do not install this product in areas of high humidity or where there is danger of water ingress.

Lightning Protection

Where appropriate, ensure this product has an adequate level of lightning protection. Alternatively, during a lightning storm or when it is left unattended and unused for long periods of time, unplug it from the supply outlet and disconnect the antenna or cable system. This will prevent damage to the product due to lightning and power-line surges.

2.2 EMC Compliance Statements[1]

2.2.1 EN 55022: 1994 / AS/NZS 3548

This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

[1] The EMC information was correct at the time of print. The EMC tests were performed with the Technical earth attached.

2.2.2 FCC

The [equipment] has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

2.3 Preliminary Checks

2.3.1 Mechanical Inspection

When taking delivery of a DSNG Codec, check the equipment items delivered against the enclosed delivery note. Inspect the equipment for damage-in-transit. If in doubt, please contact Customer Support (see *Preliminary Pages*).

> **IMPORTANT NOTE...**
>
> Removing the covers of this equipment may invalidate any warranties, cause a safety hazard or/and affect the EMC performance. Please check with Customer Support beforehand.

2.3.2 Moving the Equipment Safely

This equipment weighs approximately 23 kg and we therefore recommend that two people are used when lifting it.

Do not place it on an unstable cart, stand, bracket, or table. The product may fall, causing serious injury and serious damage to the product. Do not move or carry the equipment whilst it is still connected to the supply or other leads, is live or is in operation.

2.4 Installing the Equipment

2.4.1 Read This First!

The DSNG Codec must be handled carefully and thoughtfully to prevent safety hazards and damage. Ensure the personnel designated to install the unit has the appropriate skills and knowledge.

Installation should follow instructions and should only use installation accessories recommended by the manufacturers.

2.4.2 Free-Standing Installation

The DSNG Codec can be installed free-standing. It is shipped with side plates which should be attached, using the M3 x 10 mm countersunk-head Pozidriv™ stainless steel screws provided, prior to positioning the unit. A free-standing unit should be installed on a secure horizontal surface where it is unlikely to be knocked or its connectors and leads disturbed.

Do not use this product as a support for any other equipment.

2.4.3 Rack Mounting

The DSNG Codec can be mounted in a 19 inch rack. It is shipped with fixing brackets which should be attached, using the M3 x 10 mm countersunk-head Pozidriv stainless steel screws provided, prior to positioning the unit. Equipment installed in racks must also be mounted on support shelves to reduce the weight on the brackets.

Do not use this product as a support for any other equipment.

2.4.4 Flight Case Mounting

The DSNG Codec can be mounted in a flight case for either temporary transportation, or it may be used as a permanent housing where access to rear panel connectors is achieved by means of a case-mounted connector panel which is permanently wired to the DSNG Codec.

In either arrangement, the equipment must be securely fixed to the flight case internal 19 inch rack using fixing brackets which should be attached, using the M3 x 10 mm countersunk-head Pozidriv stainless steel screws provided.

The DSNG Codec must be stationary during operation.

2.4.5 Cable Routing

Power supply cables should be routed so that they are not likely to be walked on or pinched by items placed upon or against them. Pay particular attention to cables at plugs, convenience receptacles, and the point where they exit from the appliance.

2.4.6 Equipment Access

In free-standing or rack-mounted applications, ensure that the DSNG Codec is installed in such a way to allow access to the rear of the unit in order to be able to view the card LEDs, gain access to cable connectors and reach the power on/off switch.

2.4.7 Ventilation

WARNING...

NEVER PUSH OBJECTS OF ANY KIND INTO THIS PRODUCT THROUGH OPENINGS AS THEY MAY TOUCH DANGEROUS VOLTAGE POINTS OR SHORT-OUT PARTS THAT COULD RESULT IN A FIRE OR ELECTRIC SHOCK. NEVER SPILL LIQUID OF ANY KIND ON THE PRODUCT.

CAUTION...

1. Openings in the cabinet are provided for ventilation and to ensure reliable operation of the product and to protect it from overheating, and these openings must not be blocked or covered. This product should never be placed near or over a radiator or heat register. This product should not be placed in a built-in installation such as a rack unless proper ventilation is provided or the instructions have been adhered to.
2. The fans contained within this unit are not fitted with a dust/insect filter. Pay particular attention to the environment in which it is to be used.

This equipment is designed for fixed use only when in operation. Ensure it is firmly and safely located and has an adequate flow of free-air. Allow at least 50 mm free air-space at each side of the equipment. Units in racks can be stacked without ventilation panels between. However, it may be useful to fit baffles between adjacent racks to prevent the warm air from one equipment from being drawn into the inlet of another. Racks containing stacked equipment may need to be forced-air cooled to reduce the operating ambient temperature.

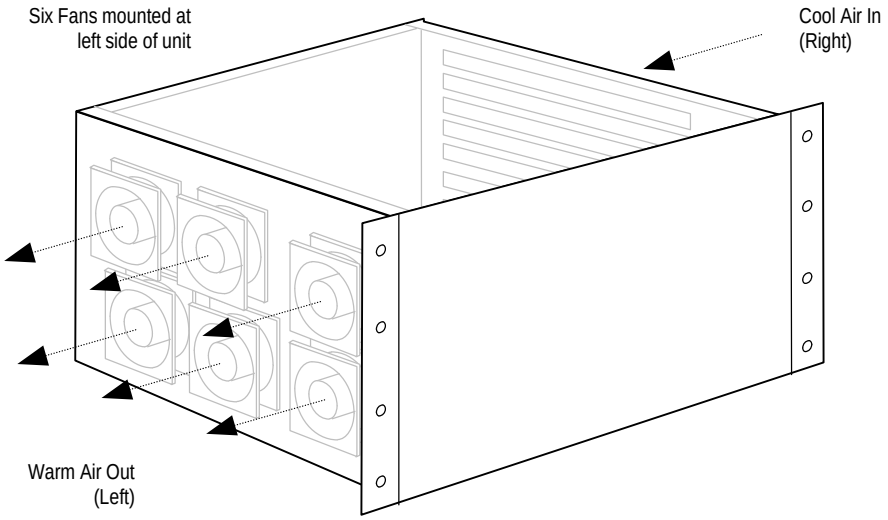


Figure 2.1: Air Path through the DSNG Codec

2.4.8 Connecting Up the DSNG Codec

General

Once the DSNG Codec has been installed in its intended operating position, it is ready to be connected up to the rest of the system equipment (Figure 2.2), providing it too has been installed (see *Signal Connections* for pinout details of the DSNG Codec connectors).

Unused inputs and outputs on this equipment need not be connected.

Video Input

Connect the appropriate video input connector (PARALLEL or SERIAL DIGITAL INPUT, or COMPOSITE or COMPONENT ANALOGUE INPUT) to the video source as required (see *Chapter 1, Introduction* for details of supporteD-types).

Audio Inputs

Connect the AUDIO INPUT A and AUDIO INPUT B, LEFT and RIGHT connectors to the audio source as required (see *Chapter 1, Introduction* for details of supported modes).

Data Inputs

Connect the DATA INPUTS connectors to the data source as required for the chosen mode of data/message transfer. One RS-422 synchronous data channel and two RS-232 asynchronous data channels are provided.

Local / Remote Control

For local control from the front panel, see *Chapter 3, Local Control and Operation* for details.

If control from a Remote Control Terminal is required, connect the terminal to the MULTIDROP RS-485/RS-422 connector on the Multiplexer / Baseband Modulator Card to configure the unit (see *DSNG Codec Remote Control Interface Specification ST.TS.E5910* for details).

A RESET/STATUS I/O connector provides a telemetry port.

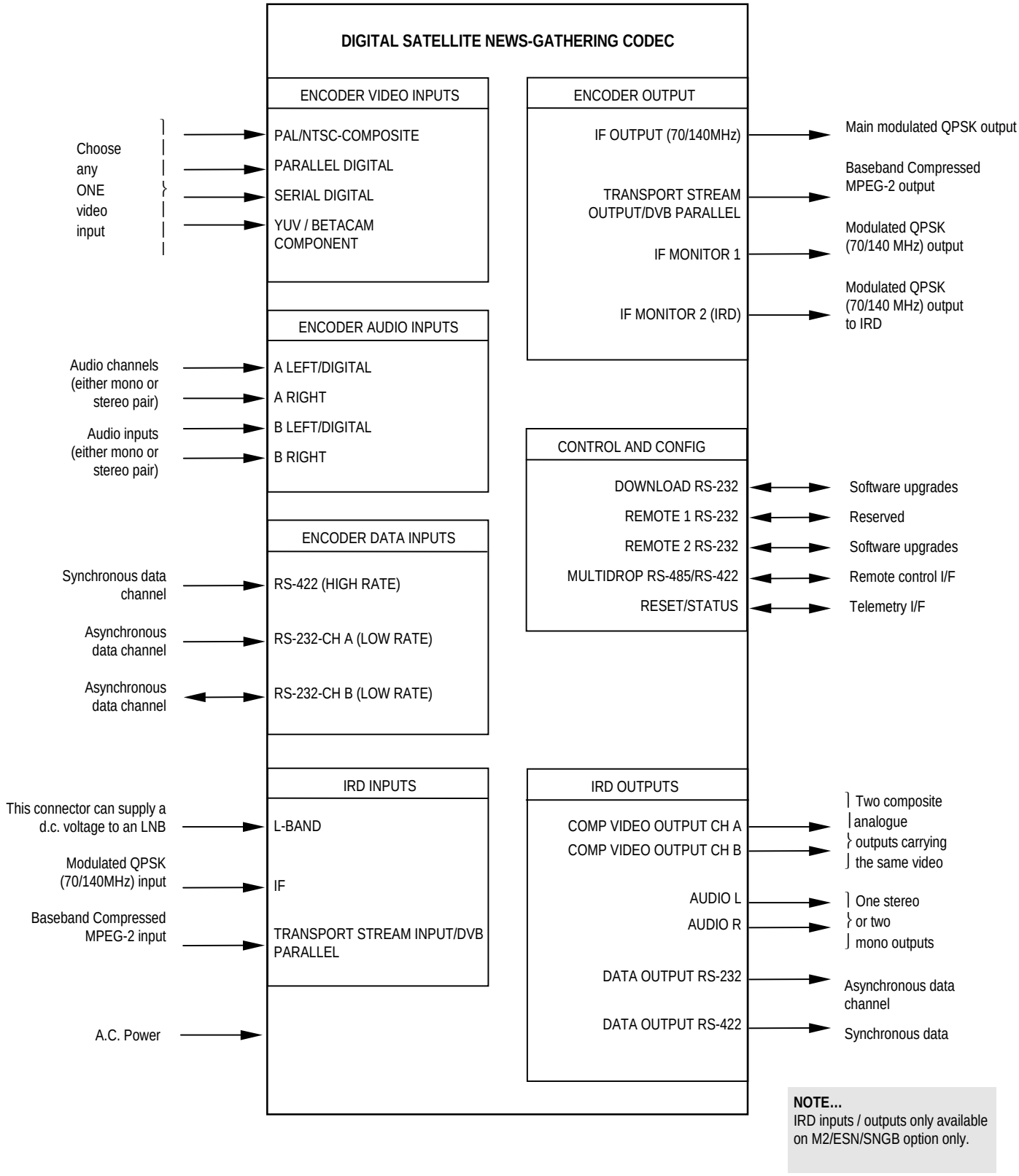


Figure 2.2: Equipment Connectors

Transport Stream / IF Output

Connect either the baseband TRANSPORT STREAM OUTPUT or the IF OUTPUT, as required, to the output equipment.

Baseband / IF/ L-Band IRD

Connect signals as required to the IRD Card, either baseband or IF (from the IF Modulator Card) or L-band.

Power Supply

The following section (*Mains Operating Voltage and Fusing*) provides details regarding power supply fusing, earthing, connection and safety. Please read all instructions carefully and take note of all warnings and cautions.

2.5 Mains Operating Voltage and Fusing

2.5.1 AC Power Supply

2.5.2 AC Power Supply

CAUTION...

This product should be operated only from the type of ac power source indicated on the marking label. If you are not sure of the type of power supply to your installation, consult a qualified electrical engineer or your local power company.

The power supply used in this equipment is a universal autosensing, a.c. power supply unit designed for use at either 100-120 V a.c. or 220-240 V a.c., 45-440 Hz (see *Annex B, Technical Specification* for a details). There are, therefore, no links or switches to be altered for operation from different a.c. supplies.

2.5.3 Fuse Replacement

The fuse is held in an integral fuse carrier at the a.c. power inlet at the rear of the unit.

Table 2.1: Fuse Information

Item	Specification
Fuse	Fuse in live conductor in power input filter at rear of unit
Fuse type	5 x 20 mm time delay (T) IEC 127 (EN60217-2 sheet 5) 1500 A
Fuse rated current	6.3 A 300 W (100-120 V a.c. range) 4 A, 300 W (220-240 V a.c. range)
Fuse rated voltage	250 Vac.

To replace the a.c. power fuse:

WARNING...

BEFORE REPLACING THE REAR PANEL FUSE, DISCONNECT THE EQUIPMENT FROM THE SUPPLY. FAILURE TO DO THIS MAY EXPOSE HAZARDOUS VOLTAGES. UNPLUG THE EQUIPMENT FROM THE LOCAL SUPPLY SOCKET.

1. Ensure that power is turned off and the power cable is disconnected from the a.c. power inlet.
2. Ease out the fuse carrier by placing a thumbnail (a small, flat-bladed screwdriver may be used) in the notch at the top of the carrier.

CAUTION...

When replacing the power input fuse, always ensure that you fit a fuse of the correct type and rating, according to the intended operating voltage. Failure to do so will result in inadequate protection.

3. Replace the fuse in the carrier at the side corresponding to the operating voltage to be used.
4. Insert the fuse carrier back in the a.c. power inlet. Ensure that the orientation of the fuse carrier is correct, according to the operating voltage to be used. The active fuse is on the right-hand side, when viewed from the rear.

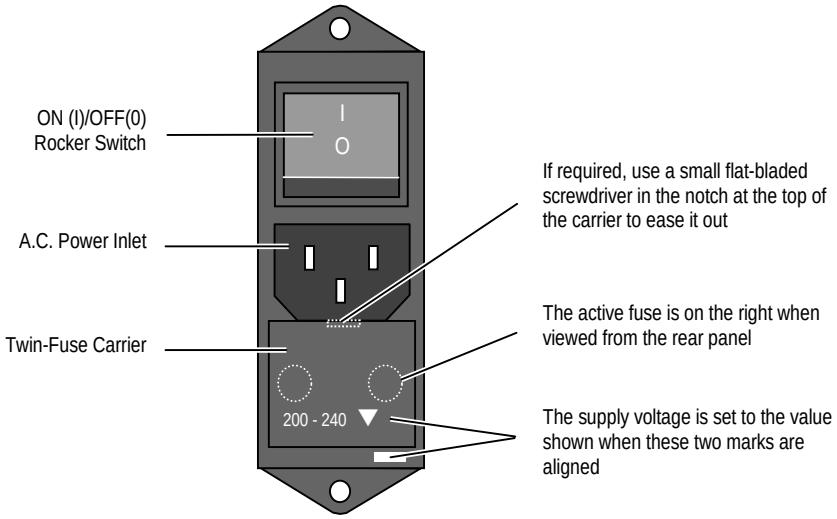


Figure 2.3: Orientation of Twin Fuse Carrier

If the replacement fuse also blows, do not continue. Disconnect the equipment and contact Customer support for advice.

2.5.4 Power Cable and Earthing

Check you have been given an a.c. power cable suitable for the country in which the equipment is to be used.

WARNINGS...

1. **IF THE MOULDED PLUG FITTED TO THE MAINS CABLE SUPPLIED WITH THIS EQUIPMENT IS NOT REQUIRED, PLEASE DISPOSE OF IT SAFELY. FAILURE TO DO THIS MAY ENDANGER LIFE AS LIVE ENDS MAY BE EXPOSED IF THE REMOVED PLUG IS INSERTED INTO A MAINS OUTLET.**
2. **POWER-SUPPLY CORDS SHOULD BE ROUTED SO THAT THEY ARE NOT LIKELY TO BE WALKED ON OR PINCHED BY ITEMS PLACED UPON OR AGAINST THEM, PAYING PARTICULAR ATTENTION TO CORDS AT PLUGS, CONVENIENCE RECEPTACLES, AND THE POINT WHERE THEY EXIT FROM THE APPLIANCE.**

This equipment is supplied with a two metre detachable mains supply cable fitted with a moulded plug suitable for either the USA, UK or Europe.

The wires in the mains cable are coloured in accordance with the wire colour code shown in *Table 2.2* .

Table 2.2: Supply Cable Wiring Colours

	UK (BS 1363)	EUROPE (CEE 7/7)	USA (NEMA 5-15P)
Earth:	Green-and-yellow	Green-and-yellow	Green
Neutral:	Blue	Blue	White
Live:	Brown	Brown	Black

Functional / Protective Earth

WARNING...

1. **THE EQUIPMENT MUST BE CORRECTLY EARTHED THROUGH MOULDED PLUG SUPPLIED WITH THE EQUIPMENT. IF THE LOCAL MAINS SUPPLY DOES NOT HAVE AN EARTH CONDUCTOR DO NOT CONNECT THE EQUIPMENT. CONTACT CUSTOMER SUPPORT FOR ADVICE.**
2. **THE PROTECTIVE EARTH IS CONNECTED TO THE FUNCTIONAL EARTH TERMINAL WITHIN THE UNIT. IF THE REAR PANEL TERMINAL IS LOOSE, DO NOT POWER THE UNIT. CONTACT CUSTOMER SUPPORT FOR ADVICE.**
3. **BEFORE CONNECTING THE EQUIPMENT TO THE SUPPLY, CHECK THE SUPPLY REQUIREMENTS IN ANNEX B.**

This equipment has a Functional Earth terminal located at the rear panel. This is not a Protective Earth for electric shock protection. Ensure that the terminal is clean and corrosion-free before connecting. The terminal is provided to:

1. Ensure all equipment chassis fixed within a rack are at the same technical earth potential. To do this, connect a wire between the functional earth terminal and a suitable point on the rack.
2. Eliminate the migration of stray charges when connecting between equipments.

Connecting the DSNG Codec

WARNING...

DO NOT OVERLOAD WALL OUTLETS AND EXTENSION CORDS AS THIS CAN RESULT IN A RISK OF FIRE OR ELECTRIC SHOCK.

To connect the unit to the local a.c. power supply:

1. Ensure the local a.c. supply is switched OFF.
2. Ensure the a.c. power switch at the rear of the DSNG Codec is switched OFF (0).
3. Ensure the correct fuse type and rating has been fitted to both the equipment (see *Fuse Replacement*) and the a.c. power cable.
4. Connect the a.c. power cable to the DSNG Codec power inlet connector and then to the local power supply.

2.6 Signal Connections

2.6.1 General

All signal input/output connectors are located at the rear panel of the DSNG Codec. For a detailed interface specification see *Annex B, Technical Specification*.

Always use the specified cables supplied for signal integrity and compliance with EMC requirements.

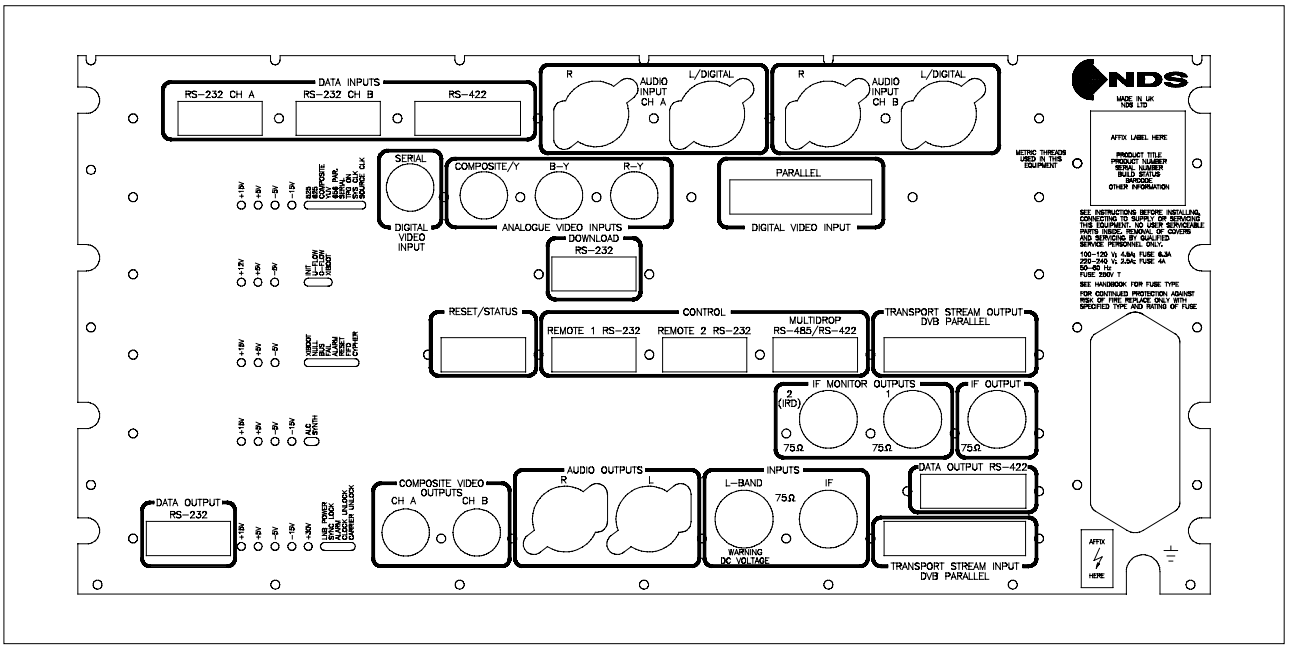


Figure 2.4: Rear Panel Connectors

2.6.2 Audio / Data Connectors

RS-232 CH A

A 9-way, D-type female connector provides a low rate asynchronous, serial communications interface for transmission of data.

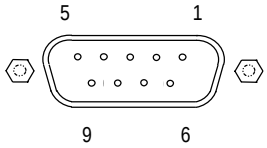


Table 2.3: RS-232 Data Connector

Pin	Signal
1	PROTECTIVE GROUND
2	TXD TRANSMIT DATA (O/P)
3	RXD RECEIVE DATA (I/P)

Pin	Signal
4	NOT CONNECTED
5	SYSTEM GROUND
6-9	NOT CONNECTED

RS-232 CH B

A second asynchronous, serial communications interface connector, identical to that above (see RS-232 CH A).

RS-422

A 15-way, D-type female connector provides a high-rate synchronous, serial communications interface for transmission of data.

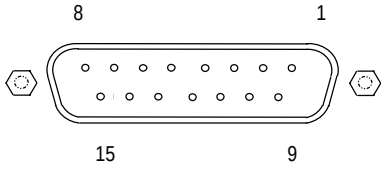


Table 2.4: RS-422 Data Connector

Pin	Signal
1	PROTECTIVE GROUND
2	DATA+
3-6	NOT CONNECTED
7	CLKIN+
8	GROUND (0V)

Pin	Signal
9	DATA-
10-13	NOT CONNECTED
14	CLKIN-
15	NOT CONNECTED

Audio Input A (Left/Digital)

An XLR female socket provides an interface for an audio channel which may be used as a single analogue or digital (AES/EBU) input, or may be configured as the left channel of a stereo pair.

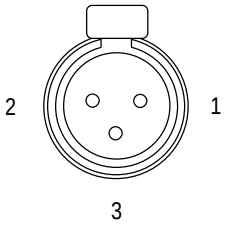


Table 2.5: Audio Input Connector

Pin	Signal (Analogue)	Signal (Digital)
1	X - CHASSIS GROUND	X CHASSIS GROUND
2	L (LINE) - ANALOGUE AUDIO (+)	L - DIGITAL AUDIO (+)
3	R (RETURN) - ANALOGUE AUDIO (-)	R - DIGITAL AUDIO (-)

Audio Input A (Right)

An XLR female socket provides an interface for an audio channel which may be used as a single analogue input, or may be configured as the right channel of a stereo pair.

Audio Input B (Left/Digital)

A second pair of audio input connectors, identical to that above (see AUDIO INPUT A (LEFT/DIGITAL)).

Audio Input B (Right)

A second pair of audio input connectors, identical to that above (see AUDIO INPUT A (RIGHT)).

2.6.3 Video Input Connectors

Digital Parallel Input

A 25-way, D-type female connector provides a parallel digital video input to the Encoder. The associated LED is lit when this connector is in use.

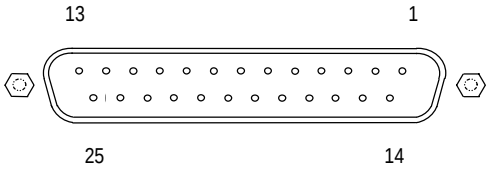


Table 2.6: Digital Parallel Video Input Connector

Pin	Signal	Pin	Signal
1	CLOCK A	14	CLOCK B
2	PROTECTIVE GROUND	15	PROTECTIVE GROUND
3	DATA 7A (MSB)	16	DATA 7A (MSB)
4	DATA 6A	17	DATA 6B
5	DATA 5A	18	DATA 5B
6	DATA 4A	19	DATA 4B
7	DATA 3A	20	DATA 3B
8	DATA 2A	21	DATA 2B
9	DATA 1A	22	DATA 1B
10	DATA 0A	23	DATA 0B
11	NOT CONNECTED	24	NOT CONNECTED
12	NOT CONNECTED	25	NOT CONNECTED
13	CABLE SHIELD		

Digital Serial Input

A 75 Ω BNC connector provides a serial digital video input to the unit. The associated LED is lit when this connector is in use.

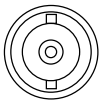


Table 2.7: Digital Serial Video Input Connector

Pin	Signal
CENTRE	VIDEO INPUT
SCREEN	GROUND

Composite Analogue Input

A 75 Ω BNC socket provides a differential analogue video input for either a 625 line composite PAL-I/B/G/H or 525 line composite NTSC-M signal. The associated LED is lit when this connector is in use. The Composite connector doubles as the Y component connector.

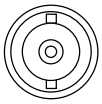


Table 2.8: Composite Video Input Connector

Pin	Signal
CENTRE	VIDEO INPUT
SCREEN	GROUND

Component (Y, B-Y, R-Y) Inputs

Three 75 Ω BNC sockets provide a YUV component or Betacam component analogue video input. The associated LEDs are lit when this connector is in use. The Y connector doubles as the composite connector.

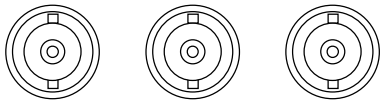


Table 2.9: Component Video Input Connectors

Pin	Signal
CENTRE	VIDEO INPUT
SCREEN	GROUND

2.6.4 MPEG-2 Video Encoder Connectors

Download RS-232

A 9-way, D-type male connector is provided for debug purposes. Software upgrades are made via this connector.

2.6.5 Multiplexer / Baseband Modulator Connectors

Reset /Status

A 9-way, D-type female connector provides external indication of status by relay contacts. Permits reset of the DSNG Codec by shorting two contacts together.

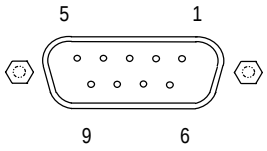


Table 2.10: Reset / Status Connector

Pin	Signal
1	PROTECTIVE GROUND
2	FAIL (COMMON)
3	MAKE TO ALARM COMMON WHEN OK
4	MAKE TO ALARM COMMON WHEN NOT OK
5	RESET (LINE 2) SHORTING PIN 5 TO PIN 9, CAUSES A SYSTEM RESET

Pin	Signal
6	MAKE TO FAIL COMMON WHEN OK
7	MAKE TO FAIL COMMON WHEN NOT OK
8	ALARM COMMON
9	RESET (LINE 1)

Remote 1 RS-232

A 9-way, D-type male connector is provided for future expansion.

Remote 2 RS-232

A 9-way, D-type male connector is provided for debug purposes. Software upgrades are made via this connector.

Multidrop RS-485 / RS-422

A 9-way, D-type female connector is wired to be compatible with RS-449 (mechanical specification of RS-422). Provides remote control using RS-422 or RS-485 type signalling.

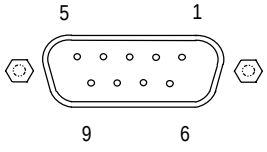


Table 2.11: Multidrop RS-485 / RS-422 Data Connector

Pin	Signal
1	PROTECTIVE GROUND
2	RX READY
3	TX DATA A
4	RX DATA A
5	GROUND (0V)

Pin	Signal
6	RX DATA B
7	RTS
8	CTS
9	TX DATA B

Transport Stream Output / DVB Parallel

A DVB-LVDS, 25-way, D-type female connector is provided for the transport data stream output.

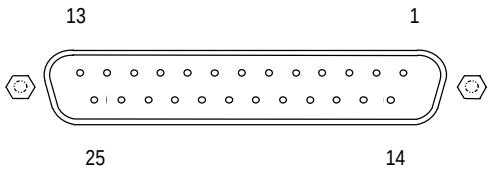


Table 2.12: Transport Stream Output / DVB Parallel Connector (DVB-LVDS)

Pin	Signal
1	CLOCK A
2	SYSTEM_GROUND
3	DATA 7 A
4	DATA 6 A
5	DATA 5 A
6	DATA 4 A
7	DATA 3 A
8	DATA 2 A
9	DATA 1 A
10	DATA 0 A
11	DATA_VALID A
12	PSYNC A
13	CABLE_SHIELD

Pin	Signal
14	CLOCK B
15	SYSTEM_GROUND
16	DATA 7 B
17	DATA 6 B
18	DATA 5 B
19	DATA 4 B
20	DATA 3 B
21	DATA 2 B
22	DATA 1 B
23	DATA 0 B
24	DATA_VALID B
25	PSYNC B

2.6.6 IF Modulator Connectors

IF Output

A 75 Ω BNC female socket provides the main QPSK (70/140 MHz) modulated output.

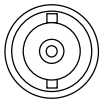


Table 2.13: IF Output Connector

Pin	Signal
CENTRE	IF OUTPUT
SCREEN	GROUND

IF Monitor Output

Two 75 Ω BNC female sockets provide QPSK (70/140 MHz) modulated monitoring outputs. Socket number 2 is intended for connection to the IRD Card IF Input.

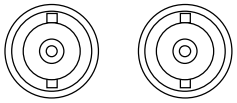


Table 2.14: IF Monitor Output Connectors

Pin	Signal
CENTRE	IF OUTPUT
SCREEN	GROUND

NOTE...
The power level on these outputs is fixed at -10 dBm and the output is always enabled.

2.6.7 IRD Connectors (M2/ESN/SNGB option only)

Data Output RS-232

A 9-way, D-type female connector provides an asynchronous, serial communications output for the data channel.

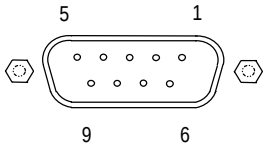


Table 2.15: Data Output RS-232 Connector

Pin	Signal
1	PROTECTIVE GROUND
3	TXD TRANSMIT DATA (NOT USED)
5	GND SYSTEM GROUND
7	RTS REQUEST TO SEND (NOT USED)
9	NOT CONNECTED

Pin	Signal
2	RXD RECEIVE DATA (O/P)
4	NOT CONNECTED
6	NOT CONNECTED
8	CTS CLEAR TO SEND (NOT USED)

Composite Video Outputs

Two 75 Ω BNC female sockets provide outputs for video. The single video channel is split into two identical channels, A and B.

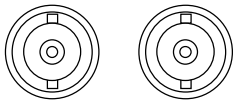


Table 2.16: Composite Video Output Connectors

Pin	Signal
CENTRE	VIDEO OUTPUT
SCREEN	GROUND

Audio Outputs (L/R)

Two 600 Ω XLR male sockets are used to output a single stereo channel of audio, or two mono channels. Left and right signals are available on separate output connectors.

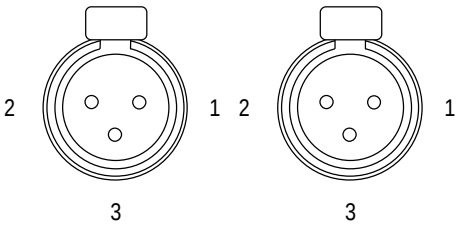


Table 2.17: Audio Output Connector

Pin	Signal
1	X - CHASSIS GROUND
2	L (LINE) - ANALOGUE AUDIO (+)
3	R (RETURN) - ANALOGUE AUDIO (-)

L-band Input

A 75 Ω BNC female socket provides an input for an L-band (950-2050 MHz) QPSK modulated signal. **This connector is also capable of providing a dc voltage supply for an LNB.**

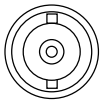


Table 2.18: L-band Input Connector

Pin	Signal
CENTRE	L-BAND INPUT
SCREEN	GROUND

IF Input

A 75 Ω BNC female sockets accept a QPSK (70/140 MHz) modulated input. Socket number 2 on the IF Monitor Card directly above is dedicated for connection to this connector.

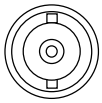


Table 2.19: IF Input Connector

Pin	Signal
CENTRE	IF INPUT
SCREEN	GROUND

Data Output RS-422

A 15-way, D-type male connector provides a high-rate synchronous output for the data channel.

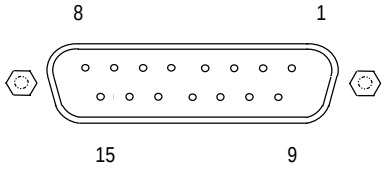


Table 2.20: Data Output RS-422 Connector

Pin	Signal
1	PROTECTIVE GROUND
2	DATA+
3	DTR+
4	NOT CONNECTED
5	DSR+
6	NOT CONNECTED
7	CLOCK+
8	PROTECTIVE GROUND

Pin	Signal
9	DATA-
10	DTR-
11	NOT CONNECTED
12	DSR-
13	NOT CONNECTED
14	CLOCK-
15	NOT CONNECTED

Transport Stream Input / DVB Parallel

A DVB-LVDS, 25-way, D-type female connector is provided for the transport data stream input.

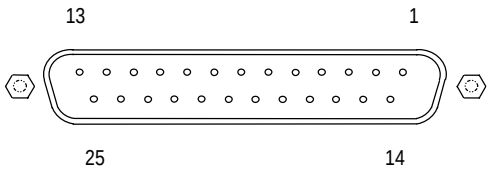


Table 2.21: Transport Stream Input / DVB Parallel Connector (DVB-LVDS)

Pin	Signal	Pin	Signal
1	CLOCK A	14	CLOCK B
2	PROTECTIVE GROUND	15	PROTECTIVE GROUND
3	DATA 7 A	16	DATA 7 B
4	DATA 6 A	17	DATA 6 B
5	DATA 5 A	18	DATA 5 B
6	DATA 4 A	19	DATA 4 B
7	DATA 3 A	20	DATA 3 B
8	DATA 2 A	21	DATA 2 B
9	DATA 1 A	22	DATA 1 B
10	DATA 0 A	23	DATA 0 B
11	DATA_VALID A	24	DATA_VALID B
12	PSYNC A	25	PSYNC B
13	PROTECTIVE GROUND		

Chapter 3

Local Control and Operation

Contents

List of Tables

List of Illustrations

3.1 Introduction

3.1.1 Using Local Control

This chapter describes in detail, the Digital Satellite News Gathering Coder/Decoder controls, indicators and display screens, and the operations which may be performed using them. The display is ergonomically designed, requiring only a few key presses to access the shallow hierarchy of menus, with only meaningful and relevant options displayed.

If you are unfamiliar with this equipment a *Getting Started* guide is provided in this chapter to take you step-by-step through the setting up procedure.

Once the equipment is set-up and running, there are normally no further Operator actions required, unless there is a requirement to change the set-up to accommodate a different configuration of input or output.

3.1.2 Using Remote Control

Everything which can be controlled and monitored at the front panel display can be accessed remotely by using a suitable protocol and set of NDS - proprietary remote commands via the rear panel remote control port (see *DSNG Codec Remote Control Interface Specification ST.TS.E5910*).

3.2 Controls and Indicators

3.2.1 LED Colour Coding Philosophy

There are three LED colours used in this equipment:

- **Red** is used to indicate fault conditions, e.g. a missing or faulty input signal. For correct operation, all red LEDs must be off, although some may be on briefly during power-up;
- **Yellow** is used to indicate various system status conditions, e.g. Multiplexer occupancy. Thus, for normal operation, yellow LEDs may be either on or off, or flashing;
- **Green** is used to indicate correct conditions and correct system functioning. For normal operation, all green LEDs must be on continuously.

This colour coding principle was devised to facilitate instant perception by the Operator of the equipment operational status, i.e. any red LEDs on or green LEDs permanently off indicates a fault condition.

> **NOTE...**
>
> If operating in Baseband mode, the red LEDs relating to the IF stage will be lit on the MuxMod Card S5898 and IRD Card S5902 (see *Chapter 4, Equipment Description* for a description of the rear panel LEDs).

3.2.2 Front Panel Controls and Indicators

The front panel (*Figure 3.1*) provides various keys and LEDs (*Table 3.1*).

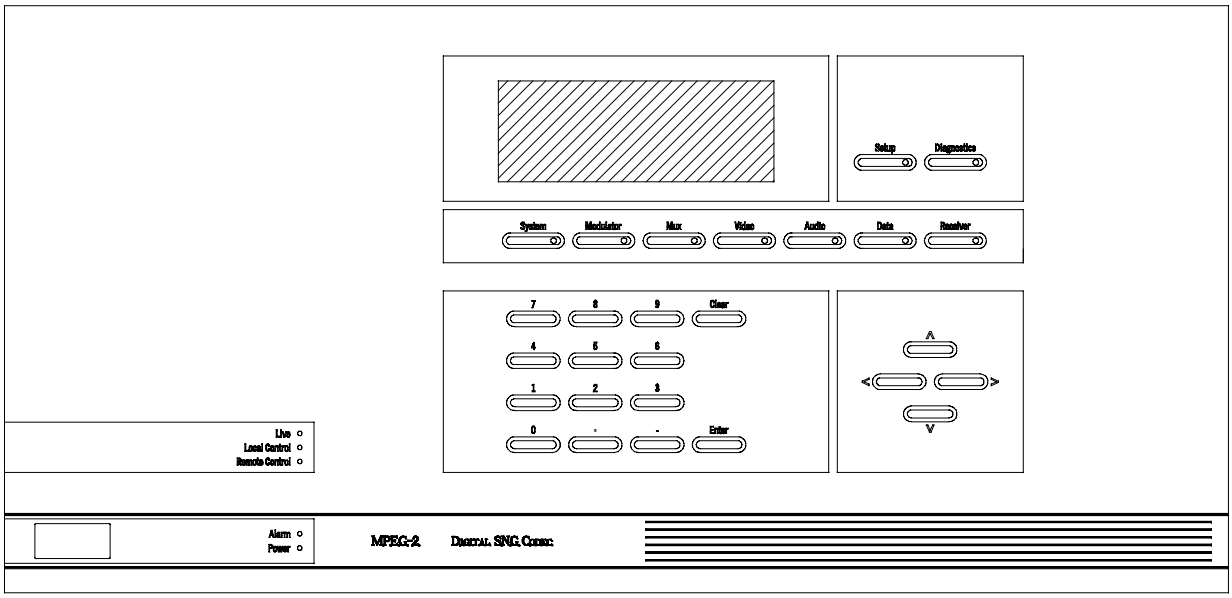


Figure 3.1: Front Panel Controls and Indicators

Table 3.1: Front Panel Controls and Indicators

Key / Indicator	Description
Control LEDs:	
Live	This green LED is lit when the equipment is “on-air”.
Local Control	This yellow LED is lit when the unit is under local (front panel) control.
Remote Control	This yellow LED is lit when the unit is under remote control.
Status LEDs:	
Alarm	This red LED is lit when a failure of the equipment has been detected (accompanies triggering of the ALARM relay, the contacts of which are available on the rear panel RESET / STATUS connector).
Power	This green LED is lit when ac power is being received.
Mode Keys:	**NOTE…** If Setup or Diagnostics are not selected, the unit is in Status mode.
Setup	This key selects Setup mode and provides relevant options on the display for changing system setup parameters. The keys contain an integral green LED which is lit when the key is pressed.
Diagnostics	This key selects Diagnostics mode and provides relevant options on the display for running system diagnostics. The keys contain an integral green LED which is lit when the key is pressed.
Keypad:	
0, 1, 2, 3, 4, 5, 6, 7, 8, 9, ., -	These keys permit numerical input to be entered on some display pages to select options or enter parameter values.
Clear	This key takes you back to the previous display, or cancels any changes to parameter values which have been keyed in but not yet entered.
Enter	This key is used to select options and to confirm that changes made to parameter values are accepted.
Cursor Keys: < > ∧ ∨	These keys are used to move around the display pages and select menu options. The > key may duplicate the function of the Enter key, and the < key duplicate the Clear key on certain pages where these keys would serve no other useful purpose.
Function Keys: System, Modulator, Mux, Video, Audio, Data, Receiver	These keys select the functional areas of the unit and provide relevant options on the display, depending on whether Status, Setup or Diagnostics mode is selected. The keys contain an integral green LED which is lit when the key is pressed.

3.2.3 Rear Panel Controls and Indicators

LEDs on each of the cards which comprise the DSNG Codec are visible at the rear panel of the unit. For normal operation, these LEDs are not needed. See *Chapter 4, Equipment Description* for a description of the on-card LEDs.

3.3 Getting Started

3.3.1 Choosing Parameters

The following check list provides a guide to getting the equipment up and running. It assumes that the equipment is to be operated locally using the front panel display. However, the same sequence of events is also valid for remote operation.

Familiarise yourself with the operating controls and indicators on the front panel of the unit (see *Controls and Indicators*). This will enable you to find your way around the various display pages (see *Navigating the Display Screens* later in this chapter).

1. **Switch On the DSNG Codec.**
   With the DSNG Codec correctly installed, switch on the equipment in accordance with the instructions given in *Powering Up/Down*. Confirm that it powers up correctly. If it does not, refer to *Chapter 6, Fault Finding*.
2. **Check Configuration.**
   Check the Status screens to confirm whether the currently set parameters for each functional area (System, Modulator, Mux, Video, Audio, Data and Receiver) meet with your requirements. If they do, then the unit is ready for operation; switch on the audio and data services and turn on the video by selecting the input source.

   If parameters need to be changed, proceed to next step. If not, proceed to step 4.
3. **Change Configuration.**
   If the required parameters are saved as a configuration file then load the relevant file (see *Setup / Load Stored Config*) and proceed to step 4. If not:
   a) **Set All Audio Parameters.**
      Enable audio channels, set the coding mode, input type, bit-rate, and all other parameters, as required. See *Chapter 1, Introduction* for a table of the supported bit-rates which are dependent on chosen mode.
   b) **Set All Data Parameters.**
      Enable data channels, set baud-rates, as required.
   c) **Select IF or Baseband Operation.**
      Using the Setup / Mux / Output Format option, select the required output format (IF or Baseband). This enables access to the relevant Modulator and/or Multiplexer parameters.

d) **Set Multiplexer Parameters.**
Select and modify the multiplexing parameters as required (bit-rate, packet length, RS encoding, scrambling). Video bit-rate and pixel resolution will be determined automatically to optimise the system and fully utilise the baseband output bit-rate. By default the baseband output will be **on** unless stored as off.

e) **Set Modulator and Multiplexer Parameters.**
Select and modify the modulation parameters as required (IF output power, IF frequency, bandwidth, FEC rate, spectrum inversion). Symbol rate, video bit-rate and pixel resolution will be determined automatically to optimise the system and fully utilise the available bandwidth. Set scrambling as required using the Setup / Mux screen. By default the IF output will be **off**. Turn IF output and modulation **on** when ready to transmit.

f) **Check Video Bit-Rate and Resolution.**
These parameters will have been set automatically according to the selections made above. Check that the values set meet your needs. If not, you may make manual adjustments to reduce the audio and data requirements to free up more bandwidth to allow higher resolution video to be processed.

g) **Set Receiver Parameters.**
Check that the IRD is connected and set up to receive the transmission.

> **NOTE...**
> If manual changes are made to the configuration, and too low a bandwidth / symbol rate is entered for the required services, the display will offer the option to switch off the services in the following order: Video, Audio B, Audio A, RS422, RS232 Ch A, RS232 Ch B. Similarly when increasing bandwidth / symbol rate, the display offers the choice of whether to restore services or not.

4. **Turn on the Output**
Turn the output of the unit on to begin transmitting; Baseband output is on by default, IF Output is off by default. If using the IF output, turn on both the modulation and the IF output.

3.3.2 Automatic Data Rate Selection

IF Operation

The starting point is usually to enter the bandwidth that has been allocated for use on the Satellite Transponder. Normally, the output symbol rate and the video bit-rate are calculated automatically corresponding to the entry of bandwidth and FEC rate parameters. In this way the DSNG Codec is optimised and system capacity is not exceeded. This automated process takes into account the data rates which have been allocated (manually) to audio and data services. From the permissible bit-rate, the pixel resolution is selected automatically to maximise the quality of the video channel.

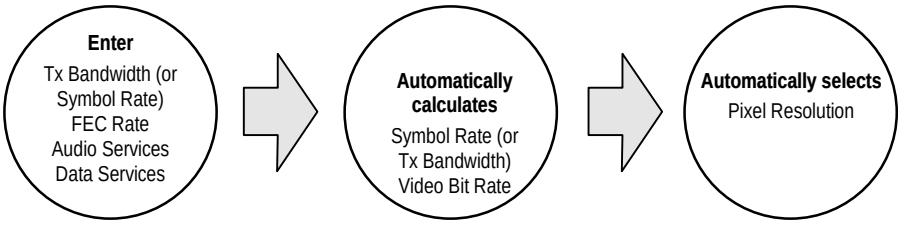


Figure 3.2: Data Rate Automatic Selection (IF Operation)

Baseband Operation

The starting point is usually to enter the bit-rate and packet length requirements of the telecommunications equipment. Normally, the video bit-rate is calculated automatically corresponding to the entry of these parameters. In this way the DSNG Codec is optimised and system capacity is not exceeded. This automated process takes into account the data rates which have been allocated (manually) to audio and data services. From the permissible bit-rate, the pixel resolution is selected automatically to maximise the quality of the video channel.

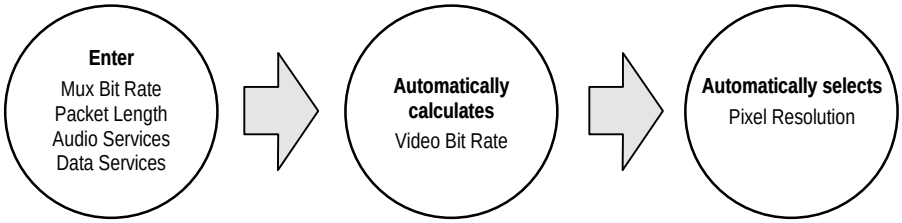


Figure 3.3: Data Rate Automatic Selection (Baseband Operation)

3.3.3 Manual Data Rate Selection

Automatic selections may, if required, be overridden to suit particular requirements. The block diagram below (*Figure 3.4*) illustrates the general principles and functions which are used in order to calculate the useful data rate which may then be allocated to the video, audio and data services.

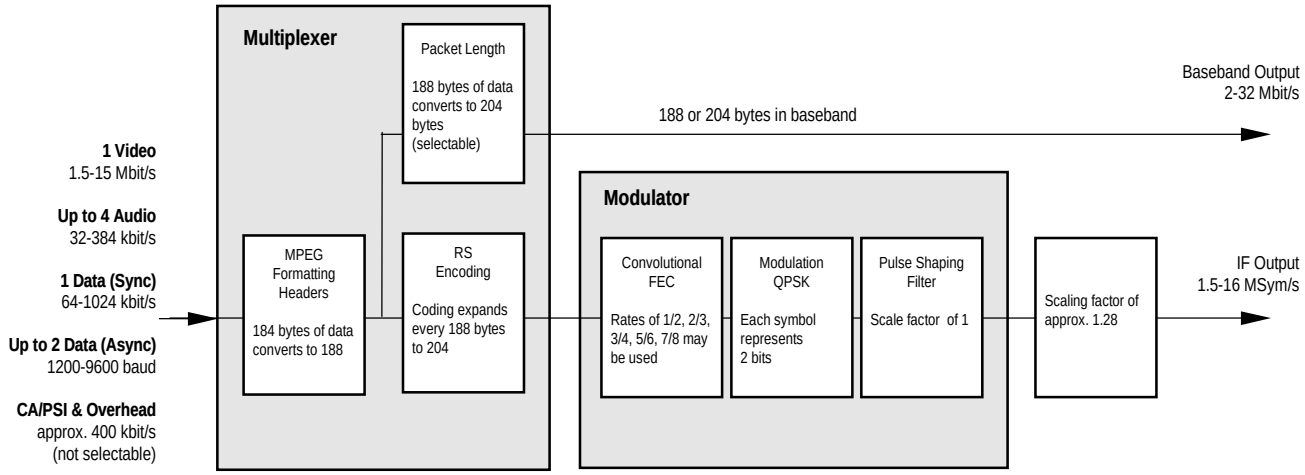


Figure 3.4: Data Rate Manual Selection

The ratio used for transponder bandwidth over symbol rate is approximately 1.28. Therefore, the maximum useful data rate in **IF** output mode is:

$$BW \times \frac{1}{1.28} \times 2 \times FEC \times \frac{188}{204} \times \frac{184}{188} \text{ Mbit/s}$$

The maximum useful data rate in **Baseband** output mode, **with** RS encoding is:

$$\text{mux rate} \times \frac{188}{204} \times \frac{184}{188} \text{ Mbit/s}$$

The maximum useful data rate in **Baseband** output mode, **without** RS encoding is:

$$\text{mux rate} \times \frac{184}{188} \text{ Mbit/s}$$

3.3.4 Configuration File Loading and Storage

The parameters currently in use may be stored and retrieved as desired to prevent having to re-enter all the corresponding values and settings every time the unit is borrowed or temporarily changed to suit other requirements.

> **NOTE...**
>
> The parameters currently in use are restored when the equipment is turned off and back on again, providing that the configuration has been stored - this happens automatically when the user exits Setup mode.

Using the **Setup / Store Current Conf** option, the current configuration being used may be stored as a file for future use. Up to 16 such configurations may be named and stored as files. Any of these configurations may be loaded as the current configuration by using the **Setup / Load Stored Config** option. The configurations may be altered by using the **Setup / Edit Confg Title** option.

In addition, another set of 16 configurations may be stored and retrieved under password protection using the **Setup / Backup Configs** option. This prevents unauthorised personnel from changing parameters which have been optimised for existing situations.

The current set of user configurations may also be restored to the original factory defaults using the **Setup / Restore Orig Confgs** option (see *Annex C* for a complete listing of parameter values and settings for the default configurations).

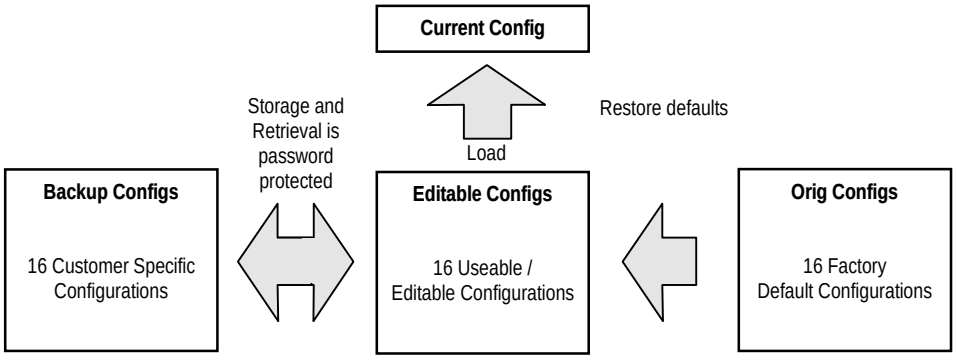


Figure 3.5: Configuration Loading and Storage

3.4 Powering Up/Down

3.4.1 Before Powering Up...

Before powering up the DSNG Codec, check the following:

1. The DSNG Codec enclosure has been properly installed in a suitable location (see *Chapter 2, Installation*).
2. The DSNG Codec has been connected to external equipment and power supply, as required.

> **NOTE...**
> All other connecting equipment, such as an up-converter, video source, etc., may be switched on either before or after the DSNG Codec and will not result in damage, lock-up, or otherwise interfere with the operation of the DSNG Codec.

3. Power supply has been checked and a good earth provided.
4. Ensure the correct fuse type and rating has been fitted to both the equipment and the ac power cable.

3.4.2 Powering Up

To power up the DSNG Codec:

1. Power up the DSNG Codec by setting the integral power switch at the rear panel power inlet connector to on (I).

   The equipment will execute a series of power-up initialisation and self-test routines which may take up to one minute.
2. Confirm that power is available throughout the DSNG Codec, if not refer to *Chapter 5, Preventive Maintenance and Fault-finding*:
   a) **Front Panel Indicators** - Confirm that the green **Power** LED is lit and that the red **Alarm** LED is unlit.
   b) **Rear Panel LEDs** - At the rear panel, confirm that there are no unexpected red LEDs lit, and that all green LEDs are lit (see *Chapter 4, Equipment Description*).

3. The unit may require a warm-up period of up to 10-15 minutes if operating at temperatures below 0°C. Stable operation within specification is normally available immediately.

3.4.3 Powering Down

To power down the DSNG Codec simply turn the power switch at the rear of the unit to off (0). The unit will shut down in a controlled manner.

3.4.4 Quick Restart

The DSNG Codec may be restarted from the Diagnostics / Re-initialise DSNG screen. This provides a quick method of returning it to operation without powering down.

3.5 Navigating the Display Screens

3.5.1 Booting-up

On power-up, the DSNG Codec runs through a boot-up sequence. During this stage a Boot-up screen (*Figure 3.6*) is displayed until the equipment is re-initialised and firmware is loaded (accompanied by a bargraph to show the percentage completed). On completion, the relevant "top-level" status screen (see *Status Screens*) is displayed according to the currently set output format (Baseband or IF), see Setup / Mux / Output Format.

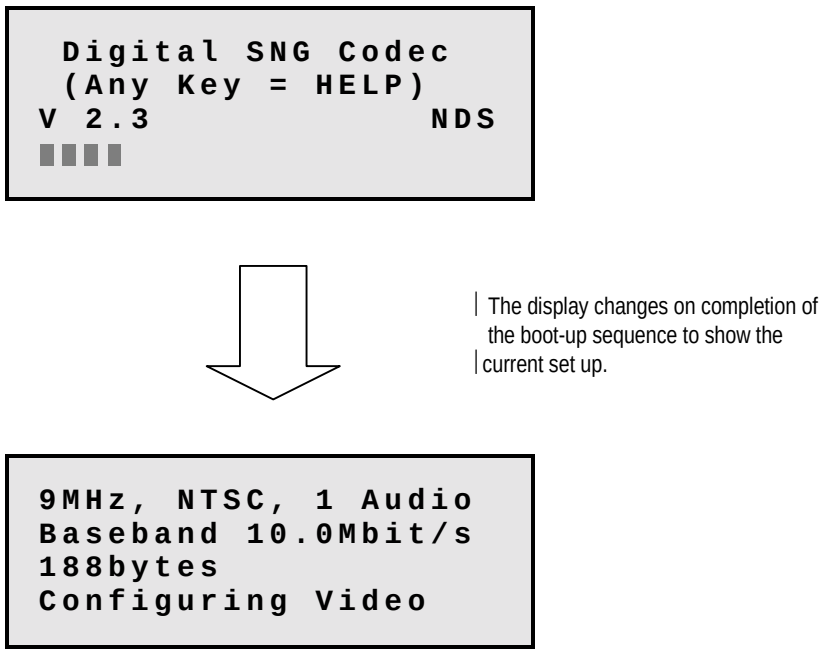


Figure 3.6: Typical Boot-up Screens

3.5.2 Moving through the Screens

Screens are available by pressing the required mode or function keys (see *Figure 3.9* overleaf). Most of the screens contain a menu of options or a list of parameters which may extend “below” the four-line display. These can be viewed by scrolling the page downward one line at a time using the cursor keys (press and hold the cursor keys to move more quickly), or press the function key repeatedly to scroll down one screen at a time. Some menu options lead to a further menu screen in areas requiring many parameters to be set to achieve complete control.

Use the **Clear** key to step back through the screen levels, one at a time. No more than three presses are required to get back to the top-level Status screen from anywhere within the screen hierarchy. A message (**Storing Current Configuration - Please Wait**) may be displayed during the two or three seconds that it takes to store the new configuration and re-display the status information.

3.5.3 Help Screens

Help information is available on the front panel display by pressing the **Enter** key from the top-level Status page.

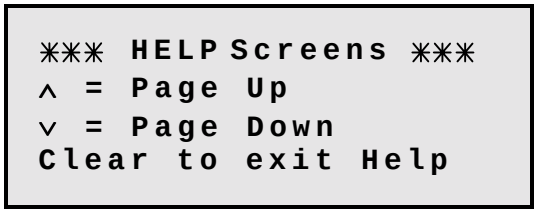


Figure 3.7: Help Screen

18 pages of help text provide an overview of how to use the keys to navigate the screens and make selections. Press **Clear** to restore the top-level Status screen. The Status screen is automatically restored if the Help screens are inactive, i.e. no keys are pressed, for a few seconds.

3.5.4 Idle Screen

In the event that the equipment is inactive for a few minutes while in Status or Setup mode, i.e. no keys are pressed, the equipment will assume that no further changes are required, and display a screen saver (*Figure 3.4*). If the equipment is in Diagnostics mode, the screen saver will not be activated until much longer (approximately 20 hours), since the user may be running and monitoring tests. Press **Clear** to restore the top-level Status screen.

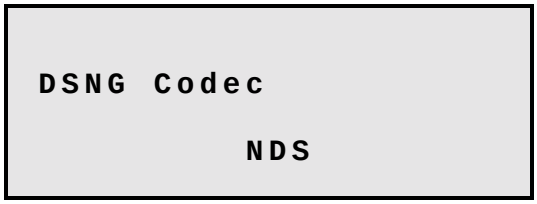
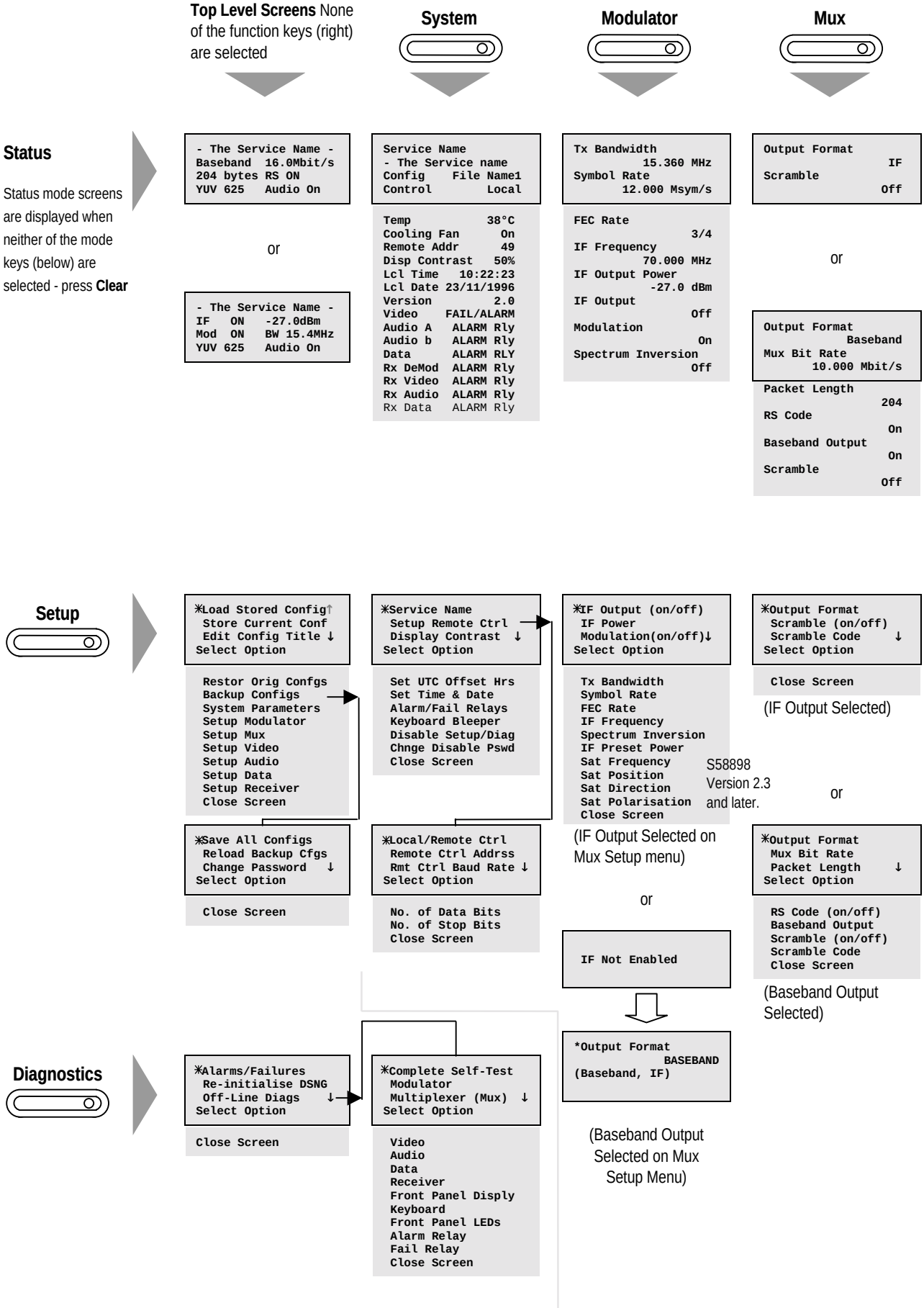


Figure 3.8: Idle Screen


Top Level Screens None of the function keys (right) are selected
System
Modulator
Mux
Status
Status mode screens are displayed when neither of the mode keys (below) are selected - press Clear
- The Service Name -
Baseband 16.0Mbit/s
204 bytes RS ON
YUV 625 Audio On
or
- The Service Name -
IF ON -27.0dBm
Mod ON BW 15.4MHz
YUV 625 Audio On
Service Name
- The Service name
Config File Name1
Control Local
Temp 38°C
Cooling Fan On
Remote Addr 49
Disp Contrast 50%
Lcl Time 10:22:23
Lcl Date 23/11/1996
Version 2.0
Video FAIL/ALARM
Audio A ALARM Rly
Audio b ALARM Rly
Data ALARM RLY
Rx DeMod ALARM Rly
Rx Video ALARM Rly
Rx Audio ALARM Rly
Rx Data ALARM Rly
Tx Bandwidth
15.360 MHz
Symbol Rate
12.000 Msym/s
FEC Rate
3/4
IF Frequency
70.000 MHz
IF Output Power
-27.0 dBm
IF Output
Off
Modulation
On
Spectrum Inversion
Off
Output Format
IF
Scramble
Off
or
Output Format
Baseband
Mux Bit Rate
10.000 Mbit/s
Packet Length
204
RS Code
On
Baseband Output
On
Scramble
Off
Setup
✳Load Stored Config↑
Store Current Conf
Edit Config Title ↓
Select Option
Restor Orig Confgs
Backup Configs
System Parameters
Setup Modulator
Setup Mux
Setup Video
Setup Audio
Setup Data
Setup Receiver
Close Screen
✳Save All Configs
Reload Backup Cfgs
Change Password ↓
Select Option
Close Screen
✳Service Name
Setup Remote Ctrl
Display Contrast ↓
Select Option
Set UTC Offset Hrs
Set Time & Date
Alarm/Fail Relays
Keyboard Bleeper
Disable Setup/Diag
Chnge Disable Pswd
Close Screen
✳Local/Remote Ctrl
Remote Ctrl Addrss
Rmt Ctrl Baud Rate ↓
Select Option
No. of Data Bits
No. of Stop Bits
Close Screen
✳IF Output (on/off)
IF Power
Modulation(on/off)↓
Select Option
Tx Bandwidth
Symbol Rate
FEC Rate
IF Frequency
Spectrum Inversion
IF Preset Power
Sat Frequency
Sat Position
Sat Direction
Sat Polarisation
Close Screen
S58898
Version 2.3
and later.
(IF Output Selected on Mux Setup menu)
or
IF Not Enabled
*Output Format
BASEBAND
(Baseband, IF)
(Baseband Output Selected on Mux Setup Menu)
✳Output Format
Scramble (on/off)
Scramble Code ↓
Select Option
Close Screen
(IF Output Selected)
or
✳Output Format
Mux Bit Rate
Packet Length ↓
Select Option
RS Code (on/off)
Baseband Output
Scramble (on/off)
Scramble Code
Close Screen
(Baseband Output Selected)
Diagnostics
✳Alarms/Failures
Re-initialise DSNG
Off-Line Diags ↓
Select Option
Close Screen
✳Complete Self-Test
Modulator
Multiplexer (Mux) ↓
Select Option
Video
Audio
Data
Receiver
Front Panel Disply
Keyboard
Front Panel LEDs
Alarm Relay
Fail Relay
Close Screen

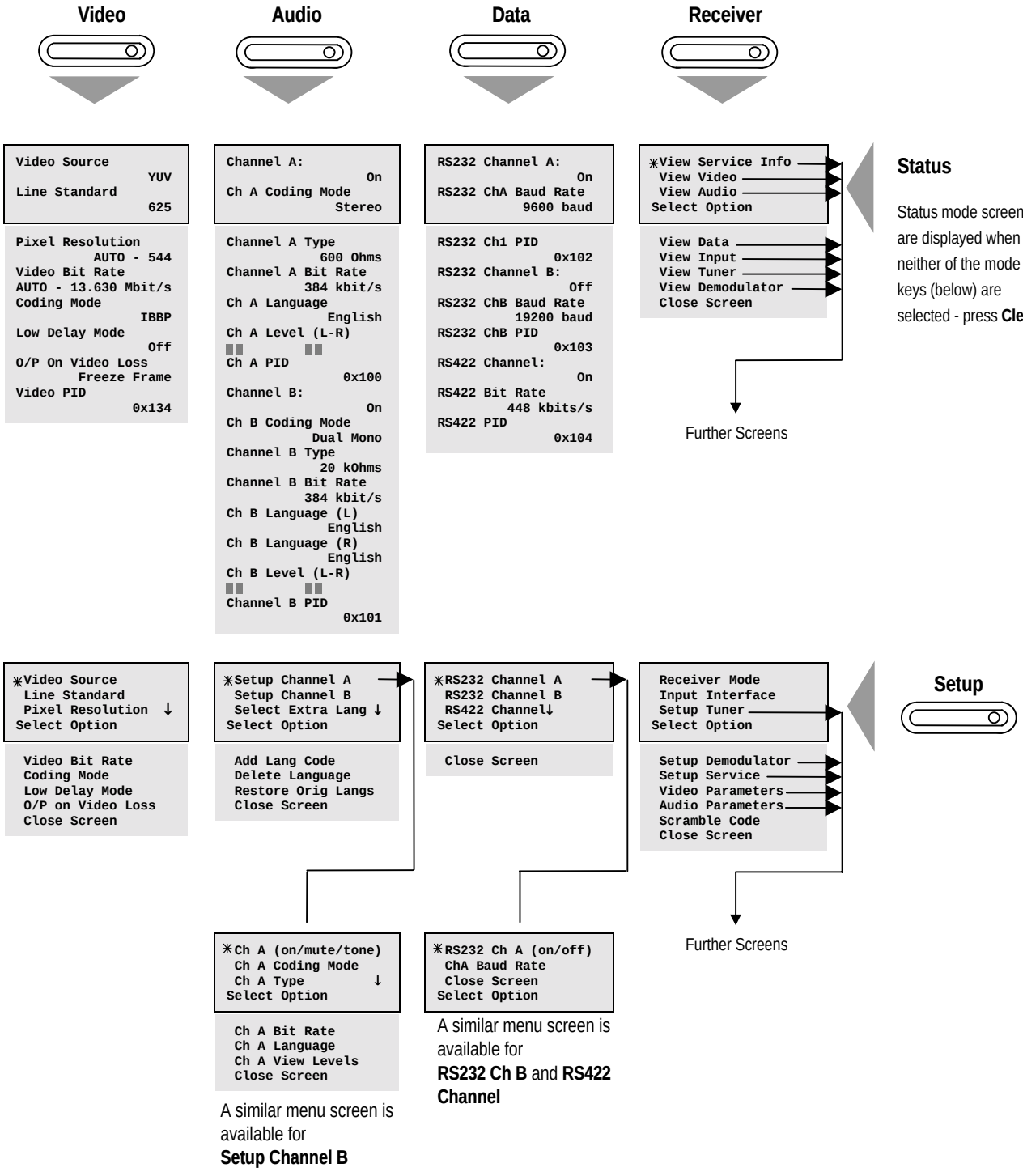


Figure 3.9: Display Screens Overview

3.6 Status Screens

3.6.1 What is Status Mode?

When the mode select keys (**Setup** and **Diagnostics**) are inactive, i.e. the green LED associated with each key is unlit, the unit is in Status mode.

In this mode, status information is displayed on the front panel display, according to the function selected by pressing the **System**, **Modulator**, **Mux**, **Video**, **Audio**, **Data** or **Receiver** keys. If no keys are pressed, a status summary screen is displayed showing the current mode of operation: either Baseband or IF output. Typical displays are shown below

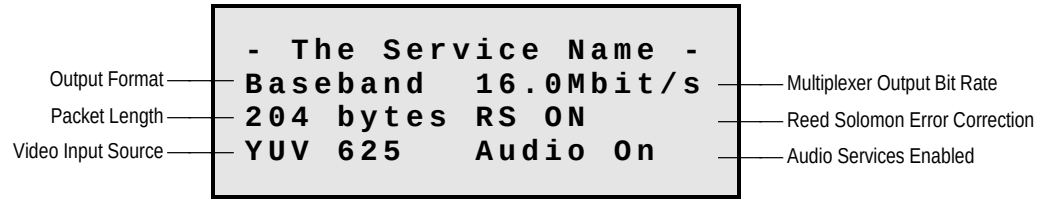


Figure 3.10: Baseband Output Status Summary Screen

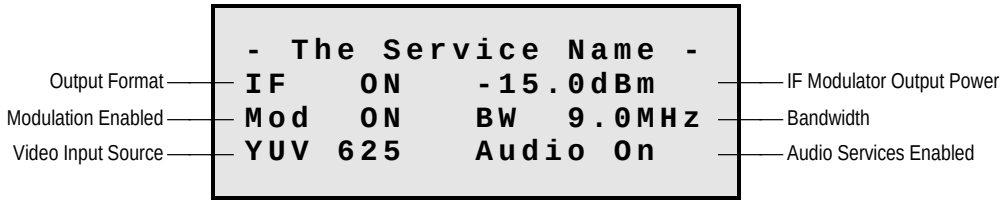
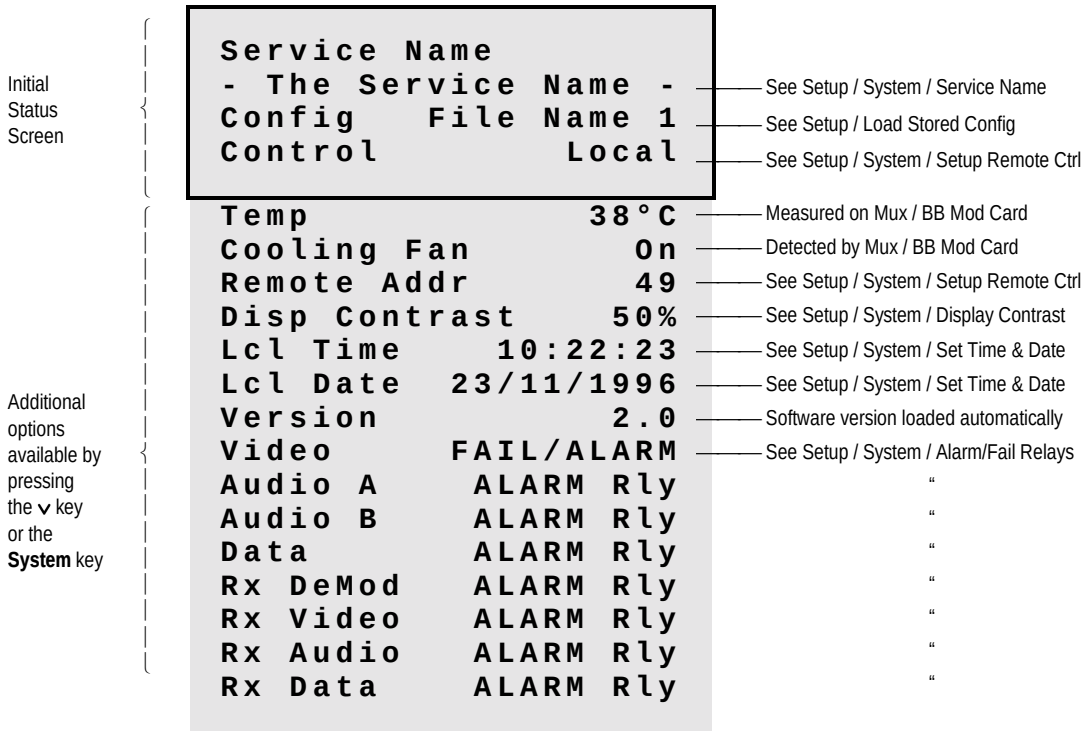


Figure 3.11: IF Output Status Summary Screen

Status screens may not be changed directly as they provide a read-only display of the parameters which have been set using the Setup screens.

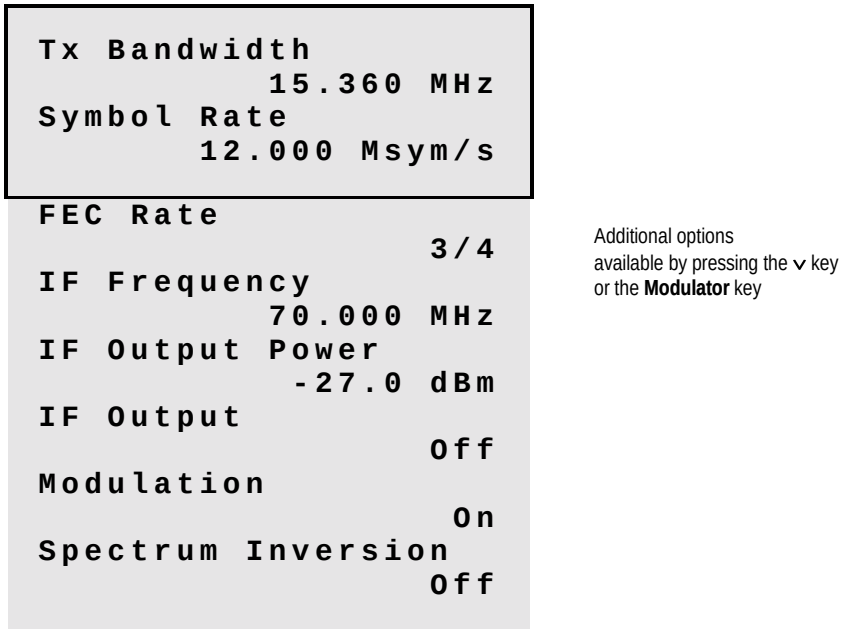
3.6.2 Status / System

The following status screen displays the current parameter settings for the complete DSNG Codec system. Changes to some of these parameters can be made via the Setup / System screens. A typical display is shown below.



3.6.3 Status / Modulator

The following status screen displays the current parameter settings for the DSNG Codec Modulator functions. Changes to these parameters can be made via the Setup / Modulator screens. A typical display is shown below (values and settings may differ).



NOTE...

In order to display the Status / Modulator screen (shown above), the output format of the Multiplexer must be set to **IF** (as opposed to **Baseband**) on the Setup / Mux / Output Format screen. If the IF output is not enabled, an advisory message is displayed: **Baseband output currently enabled**.

3.6.4 Status / Mux

The following status screen displays the current parameter settings for the DSNG Codec Multiplexer functions. Changes to these parameters can be made via the Setup / Mux screens.

With the output mode set to **IF**, a typical display is shown below (values and settings may differ).

```
Output Format
                        IF
Scramble (on/off)
                       Off
```

With the output mode set to **Baseband**, a typical display is shown below (values and settings may differ).

```
Output Format
                  Baseband
Mux Bit Rate
        10.000 Mbit/s
Packet Length
                       204
RS Code
                        On
Baseband Output
                        On
Scramble
                       Off
```

Only displayed if 204 byte packets are set

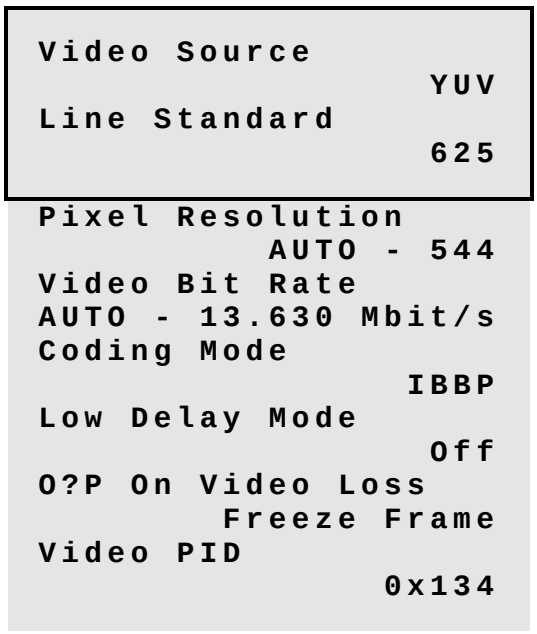
Additional options available by pressing the ⌄ key or the **Mux** key

NOTE...

If 188 byte packet length is selected then **RS code (on/off)** option is not displayed and can only be off.

3.6.5 Status / Video

The following status screen displays the current parameter settings for the DSNG Codec Video functions. Changes to these parameters can be made via the Setup / Video screens. A typical display is shown below (values and settings may differ).

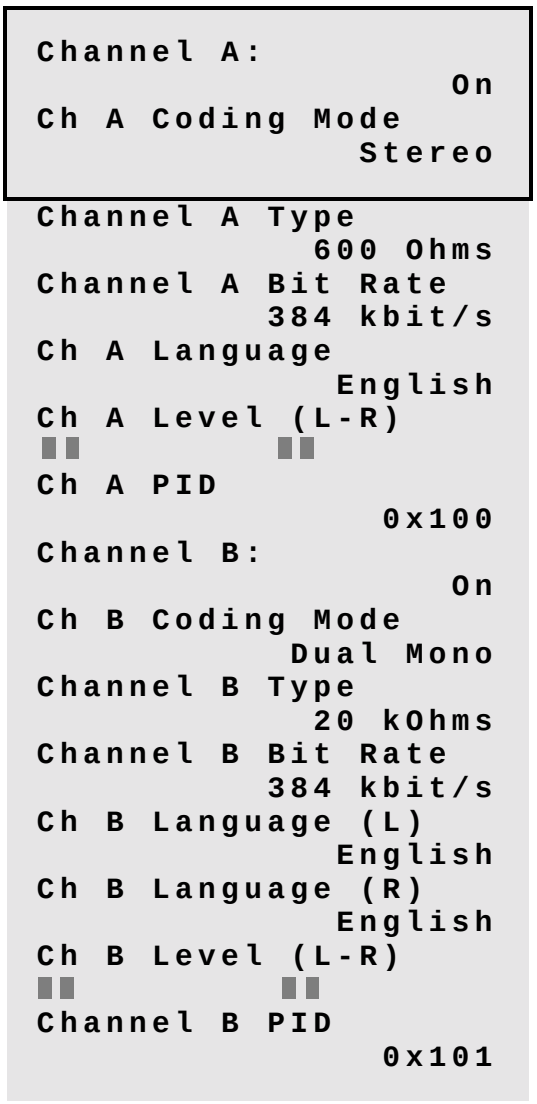


Additional options available by pressing the ⌄ key or the **Video** key

> **NOTE...**
> If **Video Source** is set to **Off** then **Video Bit Rate** is not displayed.

3.6.6 Status / Audio

The following status screen displays the current parameter settings for the DSNG Codec Audio functions. Changes to these parameters can be made via the Setup / Audio screens. A typical display is shown below (values and settings may differ).

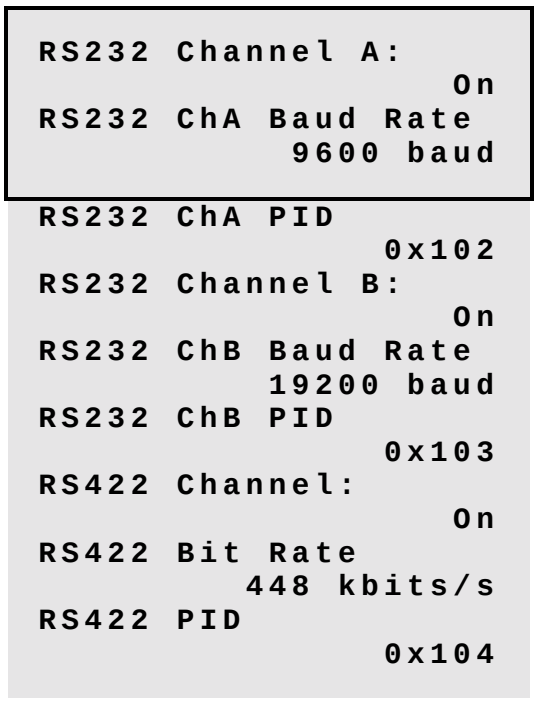


Additional options available by pressing the ⌄ key or the **Audio** key

> **NOTE...**
> If **Channel A: (or B:)** is set to **Mute** or **Test Tone** then **Bit Rate** information is not displayed. Bit rate is set to 64 kbit/s and is not user configurable.

3.6.7 Status / Data

The following status screen displays the current parameter settings for the DSNG Codec Data functions. Changes to these parameters can be made via the Setup / Data screens. A typical display is shown below (values and settings may differ).

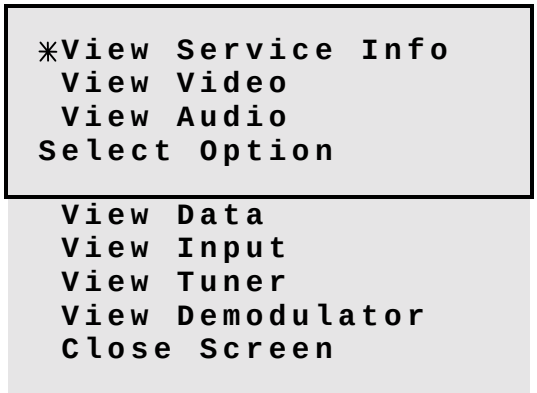


Additional options available by pressing the ⌄ key or the **Data** key

> **NOTE...**
> If a data channel set to **Off** then **Baud Rate, Bit Rate** and **PID** information is not displayed.

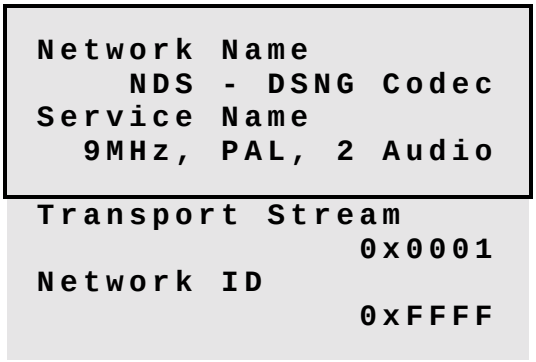
3.6.8 Status / Receiver

The following screen permits the status parameters associated with the DSNG Codec Receiver (IRD) functions to be viewed. Changes to these parameters can be made via the Setup / Receiver screens (M2/ESN/SNGB option only).



Status / Receiver / View Service Info

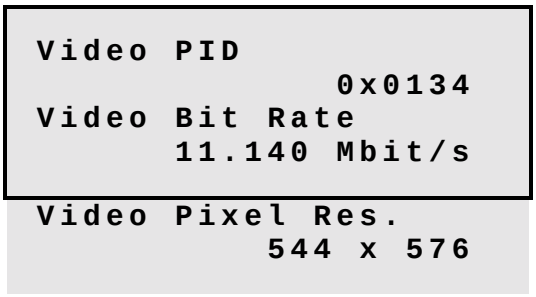
The following status screen displays Receiver service information. A typical display is shown below (values and settings may differ).



Additional options available by pressing the ⌄ key or the **Receiver** key

Status / Receiver / View Video

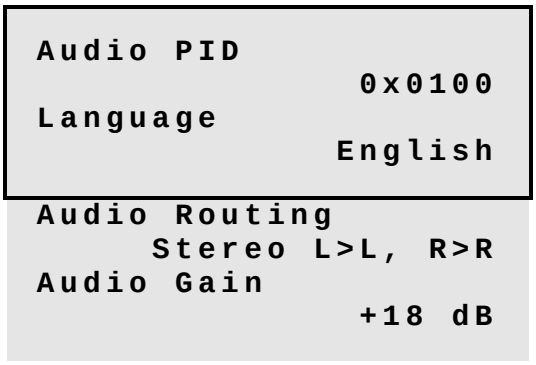
The following status screen displays Receiver video settings. A typical display is shown below (values and settings may differ).



Additional options available by pressing the ⌄ key or the **Receiver** key

Status / Receiver / View Audio

The following status screen displays Receiver audio settings. A typical display is shown below (values and settings may differ).



Additional options available by pressing the ⌄ key or the **Receiver** key

Status / Receiver / View Data

The following status screen displays Receiver data settings. A typical display is shown below (values and settings may differ).

```
RS232 Data Stream
                0x0102
RS422 Data Stream
                0x0104
```

Status / Receiver / View Input

The following status screen displays Receiver input mode. A typical display is shown below (values and settings may differ).

```
Operating Mode
              Tracking
Input Interface
              Internal
```

Status / Receiver / View Tuner

The following status screen displays Receiver tuner settings. A typical display is shown below (values and settings may differ).

```
Carrier Frequency
        11.070000 GHz
LNB LO Frequency
        10.000000 GHz
Polarisation
             Horizonal
LNB Power
                   Off
Spectrum Inversion
                   Off
```

Additional options available by pressing the ⌄ key or the **Receiver** key

Status / Receiver / View Demodulator

The following status screen displays Receiver Demodulator settings. A typical display is shown below (values and settings may differ).

```
Demod Status
                Locked
Symbol Rate
         9.000 Msym/s
FEC Rate
                   3/4
Signal Level
                 130
BER
               1 e -5
```

Additional options available by pressing the ⌄ key or the **Receiver** key

3.7 Setup Screens

3.7.1 What is Setup Mode?

Press the **Setup** key to enter Setup mode; the green LED associated with the key will be lit.

> **NOTE...**
> You must exit Diagnostics mode before you can enter Setup mode. Press **Clear**.

In this mode, setup information is displayed on the front panel display, according to the function selected by pressing the **System**, **Modulator**, **Mux**, **Video**, **Audio**, **Data** or **Receiver** keys. If no keys are pressed, a top level setup screen invites the user to choose one of these functional areas, or enables a configuration file to be loaded, stored, edited, etc.

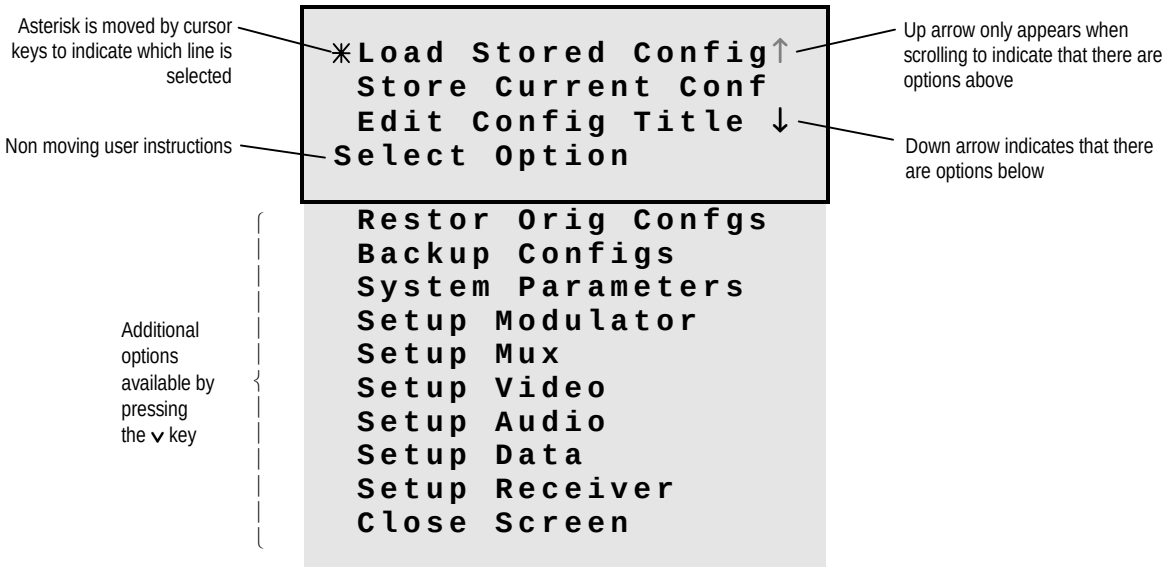


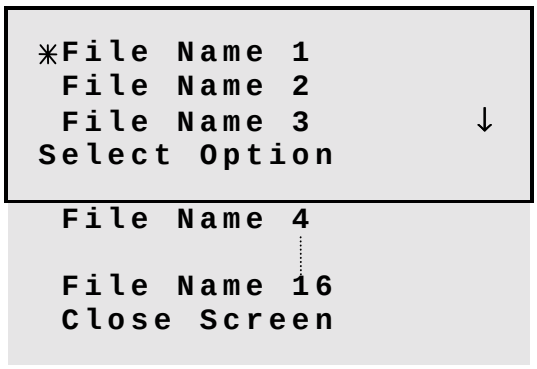
Figure 3.12: Setup Screen

Choose a menu option by using the cursor keys to position the asterisk alongside the required option. Then press the **Enter** key to confirm selection. Depending on the option selected, either a parameter setup screen or a further list of options will be displayed (see the following headings).

Choose the **Close Screen** option (or press the **Clear** key) to go back to the top level Status screen.

3.7.2 Setup / Load Stored Config

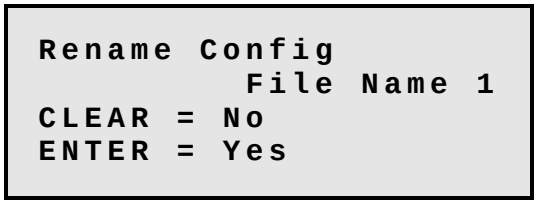
The following setup screen permits a previously stored system configuration (containing all the parameter values and settings which may be entered at the front panel display, except for parameters connected with the physical unit, such as display contrast, keyboard bleeper, etc.) to be loaded, ready to be used.



Up to 16 different configuration files may be stored. The names of these files may be set by the user when they are stored (see *Store Current Conf*) or edited afterward (see *Edit Confg Title*). When a new configuration is loaded, it may take a few seconds to reconfigure the machine. During this time messages may be displayed such as, **Re-initialising DSNG**, **Please wait**, and **Re-initialising Video Encoder**.

3.7.3 Setup / Store Current Conf

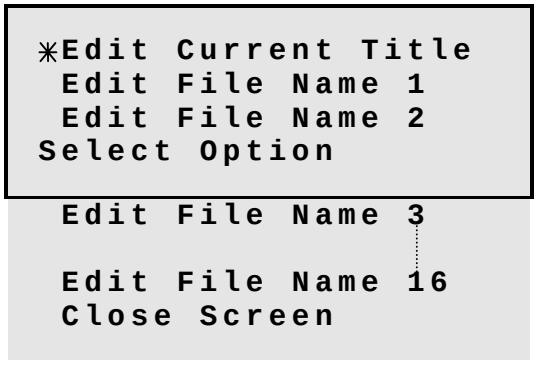
The following setup screen allows you to save the current system configuration (containing all the parameter values and settings which may be entered at the front panel display, except for parameters connected with the physical unit, such as display contrast, keyboard bleeper, etc.) as a configuration file, and to give the file a 12 character name, to recall the configuration at a later date.



Press the **Enter** key to confirm storage.

3.7.4 Setup / Edit Config Title

The following setup screen allows you to change the name of the 16 configuration files.



Use the ∧ and ∨ cursor keys to increment or decrement through an alphanumeric list. The numeric keypad may be used to enter numbers directly and the function keys may be used to enter the alphabetical characters: S, M, M, V, A, D, R. Use the < and > cursor keys to move back and forth along the file name in order to enter the correct letter or number in the appropriate place. Press the **Enter** key to confirm selection.

When entered, a message is displayed, **Storing new title**, **please wait** (accompanied by a bargraph to show the percentage completed).

3.7.5 Setup / Restor Orig Confgs

The following setup screen allows you to restore the factory-set default configurations and erase all 16 currently editable configuration files (see *Annex C* for a complete listing of parameter values and settings for the default configurations).

```
This will erase ALL
Configs.  CONTINUE?
CLEAR = exit
ENTER = confirm
```

Press the **Enter** key to confirm deletion.

3.7.6 Setup / Backup Configs

The following setup screen allows you to save or reload a backup set of 16 configuration files under password protection, in order that customer defined configurations can be safely stored while the equipment is temporarily borrowed.

```
✳Save All Configs
 Reload Backup Cfgs
 Change Password
Select Option

 Close Screen
```

Choose a menu option by using the cursor keys to position the asterisk alongside the required option. Then press the **Enter** key to confirm selection. A setup screen will be displayed (see the following headings).

Choose the **Close Screen** option (or press the **Clear** key) to go back to the Setup screen.

Setup / Backup Configs / Save All Configs

The following setup screen allows you to save the currently editable set of 16 configuration files by overwriting the backup files. This process will therefore erase the present set of backup configuration files.

```
This will erase ALL
Backup RAM configs
CLEAR = Exit
ENTER = Continue?
```

Press the **Enter** key to continue.

This action is protected by a password.

> **IMPORTANT NOTE...**
>
> The equipment is supplied with password set to **PASSWORD_ _ _ _.** It is recommended that you change this immediately WHETHER YOU INTEND TO USE THIS FEATURE OR NOT. This will ensure that you are not locked out of the equipment either by accident, or deliberately by someone else entering their own password.

```
Enter Password:
          ____________

Use <^v>,Clear,Enter
```

A password of up to 12 characters must be entered before the 16 configurations can be stored. Use the ∧ and ∨ cursor keys to increment or decrement through an alphanumeric list. The numeric keypad may be used to enter numbers directly and the function keys may be used to enter the alphabetical characters: S, M, M, V, A, D, R. Use the < and > cursor keys to move back and forth along the password in order to enter the correct letter or number in the appropriate place.

> **NOTE...**
>
> Passwords are case sensitive. Make sure you enter UPPER and lower case characters correctly.

> **TIP...**
>
> The quickest way to enter "**PASSWORD_ _ _ _**" is to type in MASSVMRD by pressing the appropriate function keys, and then to use the cursor keys to go back and change the M to a P, the V to a W, and the other M to an O, to produce PASSWORD.

Press **Clear** to return to the Setup / Backup Configs screen.

Setup / Backup Configs / Reload Backup Cfgs

The following setup screen allows you to reload the backed-up set of 16 customer defined configuration files which were previously stored under password protection.

Setup / Backup Configs / Change Password

The following setup screen allows you to change the password associated with Backup configurations.

```
Current Password
          ____________

Use <^v>,Clear,Enter
```

Use the ∧ and ∨ cursor keys to increment or decrement through an alphanumeric list. The numeric keypad may be used to enter numbers directly and the function keys may be used to enter the alphabetical characters: S, M, M, V, A, D, R. Use the < and > cursor keys to move back and forth along the password in order to enter the correct letter or number in the appropriate place.

> **NOTE...**
> Passwords are case sensitive. Make sure you enter UPPER and lower case characters correctly.

> **TIP...**
> The quickest way to enter "**PASSWORD**_ _ _ _" is to type in MASSVMRD by pressing the appropriate function keys, and then to use the cursor keys to go back and change the M to a P, the V to a W, and the other M to an O, to produce PASSWORD.

3.7.7 Setup / System

The following setup screen permits changes to be made to the current parameter settings for the overall DSNG Codec system.

```
✳Service Name
 Setup Remote Ctrl
 Display Contrast  ↓
Select Option

 Set UTC Offset Hrs
 Set Time & Date
 Alarm/Fail Relays
 Keyboard Bleeper
 Disable Setup/Diag
 Chnge Disable Pswd
 Close Screen
```

Choose a menu option by using the cursor keys to position the asterisk alongside the required option. Then press the **Enter** key to confirm selection. Depending on the option selected, either a parameter setup screen or a further list of options will be displayed (see the following headings).

Choose the **Close Screen** option (or press the **Clear** key) to go back to the top level Setup screen.

Setup / System / Service Name

The following setup screen permits a 20-character alphanumeric service name to be entered.

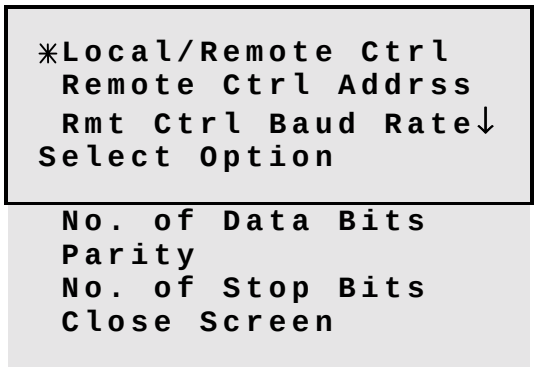
```
Service Name
- The Service Name -

Use <^v>,Clear,Enter
```

← New Service Name entered here

Use the ∧ and ∨ cursor keys to increment or decrement through an alphanumeric list. The numeric keypad may be used to enter numbers directly and the function keys may be used to enter the alphabetical characters: S, M, M, V, A, D, R. Use the < and > cursor keys to move back and forth along the name in order to enter the correct letter or number in the appropriate place.

Setup / System / Setup Remote Ctrl

The following setup screen permits the interface parameters of the remote control port to be set.

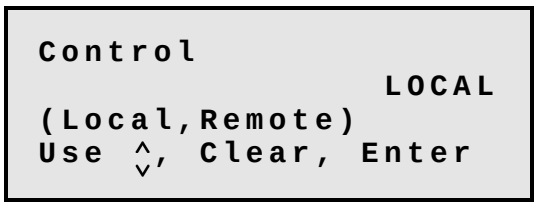


Choose a menu option by using the cursor keys to position the asterisk alongside the required option. Then press the **Enter** key to confirm selection. A parameter setup screen will be displayed (see the following headings).

Choose the **Close Screen** option (or press the **Clear** key) to go back to the Setup / System screen.

Setup / System / Setup Remote Ctrl / Local/Remote Ctrl

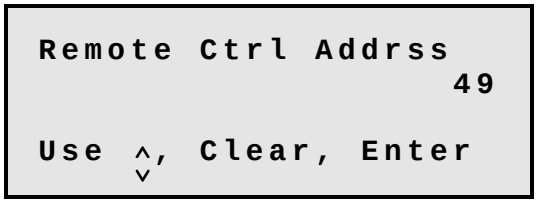
The following setup screen permits the control mode to be selected.



Use the ∧ and ∨ cursor keys to select the required control mode option (Local or Remote). Press the **Enter** key to confirm selection.

Setup / System / Setup Remote Ctrl / Remote Ctrl Addrss

The following setup screen permits the address of the DSNG Codec to be specified. This enables a single remote controller to control and monitor several units in a multidrop system.



Use the ∧ and ∨ cursor keys, or use the numeric keypad, to select an address in the available range (49 to 111). Press the **Enter** key to confirm selection.

Setup / System / Setup Remote Ctrl / Rmt Ctrl Baud Rate

The following setup screen permits the baud rate of the remote control interface to be specified.

```
Rmt Ctrl Baud Rate
          19200 baud
(5 options)
Use ^v, Clear, Enter
```

Use the ∧ and ∨ cursor keys, or use the numeric keypad, to select one of the baud rate options (1200, 2400, 4800, 9600 or 19200). Press the **Enter** key to confirm selection.

Setup / System / Setup Remote Ctrl / No. of Data Bits

The following setup screen permits the number of data bits in each frame of data to be specified for transmission over the remote control interface.

```
No. of Data Bits
                      8
(7,8)
Use ^v, Clear, Enter
```

Use the ∧ and ∨ cursor keys, or use the numeric keypad, to select one of the available options (7 or 8). Press the **Enter** key to confirm selection.

Setup / System / Setup Remote Ctrl / No. of Stop Bits

The following setup screen permits the number of stop bits, which signify the end of each frame of data, to be specified.

```
No. of Stop Bits
                      1
(1,2)
Use ^v, Clear, Enter
```

Use the ∧ and ∨ cursor keys, or use the numeric keypad, to select one of the available options (1 or 2). Press the **Enter** key to confirm selection.

Setup / System / Display Contrast

The following setup screen permits the contrast of the display screen to be adjusted to suit the ambient light conditions.

```
Display Contrast
                     50%
(25 % to 100 %)
Use ^v, Clear, Enter
```

Use the ∧ and ∨ cursor keys to select the required level from the list of supported options (25, 50, 75 or 100%). The numeric keypad may also be used (press 2, 5, 7 or 1). Press the **Enter** key to confirm selection.

Setup / System / Set UTC Offset Hrs

The following setup screen permits the offset to be set between the local time, displayed on the System / Status display, and the Greenwich Mean Time (GMT) Universal Time Code (UTC) which is transmitted with the service.

```
Set UTC Offset
                0 Hours
(+ve=East, -ve=West)
Use  ^,Clear, Enter
     v
```

Use the ∧ and ∨ cursor keys to increment or decrement through the range of numbers (+12 to -12). The numeric keypad may be used to enter numbers directly. Press the **Enter** key to confirm time selection.

Setup / System / Set Time & Date

The following setup screen permits the time and date to be set.

```
Set Local Time
      15:05:20

Use <^>,Clear,Enter
    v
```

Use the ∧ and ∨ cursor keys to increment or decrement through the range of numbers. The numeric keypad may be used to enter numbers directly. Use the < and > cursor keys to move back and forth along the time segments in order to enter the correct number in the appropriate place. Press the **Enter** key to confirm time selection.

Upon entering the time, the display changes to show the currently set date. Changes to the date are made in a similar way. Press the **Enter** key to confirm date selection.

Setup / System / Alarm/Fail Relays

The following setup screen permits video channel alarms and failures to be reported to the Front Panel display and to trigger the Alarm and Fail Relays. These error conditions can be either masked or enabled. When enabled, the nature of the fault determines whether an alarm or a fail is indicated.

```
Video Alarm/Fail
ON (FAIL/ALARM RLYS)
(2 options)
Use  ^, Clear, Enter
     v
```

Use the ∧ and ∨ cursor keys to select one of the options (on or off). Press the **Enter** key to confirm selection.

Another setup screen permits audio channel alarms and failures to be reported to the Front Panel display and to trigger the Alarm relay only, or both the Alarm and Fail Relays.

```
Audio ChA Alarm/Fail
          ALARM RELAY
(3 options)
Use ^v, Clear, Enter
```

Use the ∧ and ∨ cursor keys to select one of the options (Alarm Relay, Ignore Error, Fail and Alarm Relays). Press the **Enter** key to confirm selection.

A similar screen is displayed to allow changes to be made to audio channel B, followed by a screen for the data channels and the IRD (M2/ESN/SNGB option only). When these three screens have been viewed, the DSNG Codec stores any changed parameter settings and displays the message **Storing Data** on screen.

Setup / System / Keyboard Bleeper

The following setup screen permits an internal bleeper to be enabled which sounds a tone whenever a key on the front panel is pressed.

```
Keyboard Bleeper
                    Off
(On,Off)
Use ^v, Clear, Enter
```

Use the ∧ and ∨ cursor keys to select either **on** or **off**. Press the **Enter** key to confirm selection.

Setup / System / Disable Setup/Diag

The following setup screen permits password entry to disable access to both the Setup and Diagnostics screens. This protects the equipment against changes being made to the equipment setup, and access to self-test and diagnostics.

> **IMPORTANT NOTE...**
>
> The equipment is supplied with password set to **PASSWORD_ _ _ _.** It is recommended that you change this immediately WHETHER YOU INTEND TO USE THIS FEATURE OR NOT. This will ensure that you are not locked out of the equipment either by accident, or deliberately by someone else entering their own password.

```
Enter Password:
          ____________

Use <^v>,Clear,Enter
```

Use the ∧ and ∨ cursor keys to increment or decrement through an alphanumeric list. The numeric keypad may be used to enter numbers directly and the function keys may be used to enter the alphabetical characters: S, M, M, V, A, D, R. Use the < and > cursor keys to move back and forth along the password in order to enter the correct letter or number in the appropriate place.

> **NOTE...**
> Passwords are case sensitive. Make sure you enter UPPER and lower case characters correctly.

> **TIP...**
> The quickest way to enter "**PASSWORD**_ _ _ _" is to type in MASSVMRD by pressing the appropriate function keys, and then to use the cursor keys to go back and change the M to a P, the V to a W, and the other M to an O, to produce PASSWORD.

Press the **Enter** key to confirm selection.

When the password is correctly entered a series of screens are displayed:

```
Change Password

CLEAR = No
ENTER = Yes?
```

Press **Clear** to continue or **Enter** key to change the password.

Assuming that **Clear** is pressed, the following screen is displayed to permit setup of the IF output on power up.

```
IF O/P on Power Up
                  OFF
(2 options)
Use <^v>,Clear,Enter
```

When this parameter has been set, press **Enter** to confirm. A message is then displayed, **Storing current configuration**, **please wait** (accompanied by a bargraph to show the percentage complete). You are automatically returned to the top-level Status screen.

Now, when the **Setup** key is pressed, that mode of operation is not restored until the correct password is entered.

```
Setup mode has been
disabled.
Enter password to
access Setup mode.
```

When the **Diagnostics** key is pressed, Diagnostics mode is entered but the list of options is reduced:

```
✳Display Errors
 Close Screen

Select Option
```

To restore full access to both the Setup and Diagnostics screens, simply enter the correct password when the Setup key is pressed.

Setup / System / Chnge Disable Pswd

The following setup screen permits the 12-digit password allowing access to Setup and/or Diagnostics Screens to be changed.

> **IMPORTANT NOTE...**
>
> The equipment is supplied with password set to **PASSWORD_ _ _ _.** It is recommended that you change this immediately WHETHER YOU INTEND TO USE THIS FEATURE OR NOT. This will ensure that you are not locked out of the equipment either by accident, or deliberately by someone else entering their own password.

```
Current Password:
          ____________

Use <^>,Clear,Enter
     v
```

Use the ∧ and ∨ cursor keys to increment or decrement through an alphanumeric list. The numeric keypad may be used to enter numbers directly and the function keys may be used to enter the alphabetical characters: S, M, M, V, A, D, R. Use the < and > cursor keys to move back and forth along the password in order to enter the correct letter or number in the appropriate place.

> **NOTE...**
>
> Passwords are case sensitive. Make sure you enter UPPER and lower case characters correctly.

> **TIP...**
>
> The quickest way to enter "**PASSWORD**_ _ _ _" is to type in MASSVMRD by pressing the appropriate function keys, and then to use the cursor keys to go back and change the M to a P, the V to a W, and the other M to an O, to produce PASSWORD.

Press the **Enter** key to confirm selection.

3.7.8 Setup / Modulator

The following setup screen permits changes to be made to the current parameter settings for the DSNG Codec Modulator functions.

```
*IF Output (on/off)
 IF Power
 Modulation(on/off)↓
Select Option

 Tx Bandwidth
 Symbol Rate
 FEC Rate
 IF Frequency
 Spectrum Inversion
 IF Preset Power
 Sat Frequency     }
 Sat Position      }
 Sat Direction     } S5898 Version 2.3 and later.
 Sat Polarisation  }
 Close Screen
```

> **NOTE...**
>
> In order to access the Setup / Modulator options (shown above), the output format of the Multiplexer must be set to **IF** (as opposed to **Baseband**) on the Setup / Mux / Output Format screen. If the IF output is not enabled, an advisory message is displayed followed by a screen which allows you to make this selection. Use the cursor keys to change **Baseband** to **IF**, then press **Enter** to confirm selection and display the Setup / Modulator options.

Choose a menu option by using the cursor keys to position the asterisk alongside the required option. Then press the **Enter** key to confirm selection. A parameter setup screen will be displayed (see the following headings).

Choose the **Close Screen** option (or press the **Clear** key) to go back to the top level Setup screen.

Setup / Modulator / IF Output

The following setup screen permits the main IF output to be enabled. By default, on power-up or after a configuration load, the IF output is normally set to **off**.

> **NOTES...**
>
> 1. This option may be overridden by the **Setup / System / Disable Setup/Diag** option.
> 2. IF Monitor Outputs 1 and 2 are always switched on.

When the IF output is enabled, the **Live** LED on the front panel lights to signify the equipment is “on-air”.

```
IF Output
                        ON
(On,Off)
Use ^v, Clear, Enter
```

Use the ∧ and ∨ cursor keys to select either **on** or **off**. Press the **Enter** key to confirm selection.

Setup / Modulator / IF Power

The following setup screen permits the main IF output power level to be set. A (preset) power level may be set as a default for when a new configuration is loaded or when the equipment is switched on, see Setup / Modulator / IF Preset Power.

```
IF Output Power
             -27.0 dBm

Use ^v, Clear, Enter
```

Use the ∧ and ∨ cursor keys to increment or decrement the number in the range (+5.0 to -27.0 dBm). The numeric keypad may be used to enter numbers directly. Press the **Enter** key to confirm selection.

> **NOTE...**
> Monitor IF outputs are fixed at -10 dBm and always turned on.

Setup / Modulator / Modulation

The following setup screen permits the IF carrier to be modulated.

```
Modulation
                        ON
(On,Off)
Use ^v, Clear, Enter
```

Use the ∧ and ∨ cursor keys to select either **on** or **off**. Press the **Enter** key to confirm selection.

Setup / Modulator / Tx Bandwidth

The following setup screen permits the IF output bandwidth to be set.

```
Tx Bandwidth
           10.000 MHz
       (7.182 Msym/s)
Use ^v, Clear, Enter
```

Symbol Rate calculated automatically from entered bandwidth

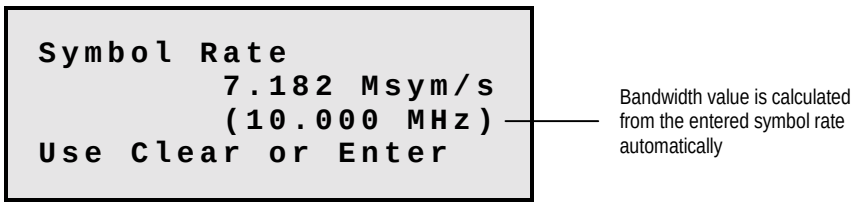
> **NOTE...**
>
> If the IF output is currently set to on, the operator is prompted by a screen to **Switch OFF IF Output**, before any changes can be made. When the required changes to the Tx Bandwidth have been entered, a screen is displayed to enable the operator to **Switch ON IF Output**.

Use the ∧ and ∨ cursor keys to increment or decrement the number in the range (1.92-20.48 MHz). The numeric keypad may be used to enter numbers directly. Press the **Enter** key to confirm selection.

Upon entering a bandwidth value the DSNG Codec automatically calculates the maximum permissible symbol rate, the optimum video bit-rate (depending upon the audio and data services selected) and selects an appropriate pixel resolution (see *Getting Started*). These changes may take a few seconds to process and during this time advisory messages will be displayed.

Setup / Modulator / Symbol Rate

The following setup screen permits the IF output symbol rate to be set.

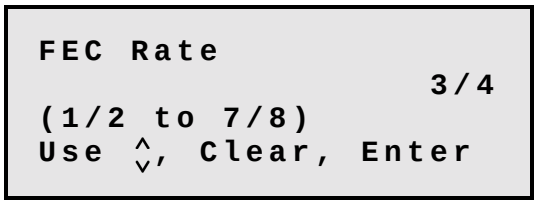


> **NOTE...**
>
> Before changes can be made to this screen the operator is prompted with a message to allow the IF output to be turned off.

Use the ∧ and ∨ cursor keys to increment or decrement the number in the range (1.5-16 MSymbol/s). The numeric keypad may be used to enter numbers directly. Press the **Enter** key to confirm selection.

Setup / Modulator / FEC Rate

The following setup screen permits the IF output Forward Error Correction (FEC) rate to be set.



Use the ∧ and ∨ cursor keys to select the required rate from the list of supported options (1/2, 2/3, 3/4, 5/6, and 7/8). The numeric keypad may also be used (press 1, 2, 3, 5 or 7). Press the **Enter** key to confirm selection.

Upon entering a new FEC rate, the video bit-rate is automatically re-adjusted (and pixel resolution if necessary) to maintain the same bandwidth/symbol rate. A mid-value of 3/4 is normally used. If the signal needs more powerful error correction, a value of 1/2 represents the maximum which may be applied, providing one error correction bit for every one data bit.

Setup / Modulator / IF Frequency

The following setup screen permits the IF output frequency to be set.

```
IF Frequency
          70.000 MHz

Use Clear or Enter
```

> **NOTE...**
>
> If the IF output is currently set to on, the operator is prompted by a screen to **Switch OFF IF Output**, before any changes can be made. When the required changes to the IF Frequency have been entered, a screen is displayed to enable the operator to **Switch ON IF Output**.

Use the ∧ and ∨ cursor keys to increment or decrement the number in the supported ranges (50-90 MHz and 100-180 MHz, in steps of 125 kHz). The numeric keypad may be used to enter numbers directly. Press the **Enter** key to confirm selection.

Setup / Modulator / Spectrum Inversion

The following setup screen permits the inversion of the IF spectrum.

```
Spectrum Inversion
                   OFF
(On/Off)
Use ^, Clear, Enter
    v
```

Use the ∧ and ∨ cursor keys to select either **on** or **off**. Press the **Enter** key to confirm selection.

Setup / Modulator / IF Preset Power

The following setup screen permits the IF preset power to be set. This value is that to which the IF output will default whenever a configuration is loaded or when the equipment is switched on. To make operational adjustments to this value use Setup / Modulator, IF Preset Power.

```
IF Preset Power
           -27.0 dBm

Use ^, Clear, Enter
    v
```

Use the ∧ and ∨ cursor keys to increment or decrement through the available range (+5.0 to -27.0 dBm). The numeric keypad may be used to enter numbers directly. Press the **Enter** key to confirm selection.

> **NOTE...**
> Monitor IF Outputs are fixed at -10 dBm and are always turned on.

Setup / Modulator / Sat Frequency (S5898 Ver 2.3 and later)

The following setup screen permits the Satellite Frequency to be set. This value is that to which the modulator will default whenever a configuration is loaded or when the equipment is switched on. To make operational adjustments to this value use Setup / Modulator, Sat Frequency.

```
Satellite Frequency
         11.400 GHz

Use ^v, Clear, Enter
```

Use the ∧ and ∨ cursor keys to increment or decrement through the available range. The numeric keypad may be used to enter numbers directly. Press the **Enter** key to confirm selection.

Setup / Modulator / Sat Position (S5898 Ver 2.3 and later)

The following setup screen permits the Satellite Position to be set. This value is that to which the modulator will default whenever a configuration is loaded or when the equipment is switched on. To make operational adjustments to this value use Setup / Modulator, Sat Position.

```
Satellite Position
          19.2 degs

Use ^v, Clear, Enter
```

Use the ∧ and ∨ cursor keys to increment or decrement through the available range. The numeric keypad may be used to enter numbers directly. Press the **Enter** key to confirm selection.

Setup / Modulator / Sat Direction (S5898 Ver 2.3 and later)

The following setup screen permits the Satellite Direction to be set. This value is that to which the modulator will default whenever a configuration is loaded or when the equipment is switched on. To make operational adjustments to this value use Setup / Modulator, Sat Direction.

```
Satellite Direction
                EAST
(East, West)
Use ^v, Clear, Enter
```

Use the ∧ and ∨ cursor keys to toggle the option (East, West). Press the **Enter** key to confirm selection.

Setup / Modulator / Sat Polarisation (S5898 Ver 2.3 and later)

The following setup screen permits the Satellite Polarisation to be set. This value is that to which the modulator will default whenever a configuration is loaded or when the equipment is switched on. To make operational adjustments to this value use Setup / Modulator, Sat Polarisation.

```
Satellite
Polarisation
          LINEAR HOR
(4 Options)
Use ^v, Clear, Enter
```

Use the ∧ and ∨ cursor keys to step through the available options (Circ Right, Circ Left, Liners Vert, Liner Hor). Press the **Enter** key to confirm selection.

3.7.9 Setup / Mux (IF Output Selected)

The following setup screen permits changes to be made to the current parameter settings for the DSNG Codec Multiplexer functions when **IF** is selected as the output format.

> **NOTE...**
>
> Additional options may be available on this screen, depending on whether **IF** or **Baseband** is selected as the output format, see also Setup / Mux (Baseband Output Selected).

```
✳Output Format
 Scramble (on/off)
 Scramble Code      ↓
Select Option

 Close Screen
```

Choose a menu option by using the cursor keys to position the asterisk alongside the required option. Then press the **Enter** key to confirm selection. A parameter setup screen will be displayed (see the following headings).

Choose the **Close Screen** option (or press the **Clear** key) to go back to the top level Setup screen.

Setup / Mux / Output Format

The following setup screen permits the format of the data output to be set for either telecommunications link (baseband) or satellite uplink (IF) operation.

```
Output Format
                    IF
(Baseband/IF)
Use ^v, Clear, Enter
```

> **NOTE...**
> The choice of output format is reflected in the status summary screen.

Use the ∧ and ∨ cursor keys to select the required format from the list of supported options (Baseband or IF). Press the **Enter** key to confirm selection.

Setup / Mux / Scramble

The following setup screen permits scrambling of the data output to be enabled. If used, a scrambling code must also be entered (see below) in order that only the data may be accessed by the intended receiver.

```
Scramble
                    OFF
(On/Off)
Use ^v, Clear, Enter
```

Use the ∧ and ∨ cursor keys to select either **on** or **off**. Press the **Enter** key to confirm selection.

Setup / Mux / Scramble Code

The following setup screen permits a 7-digit numerical scrambling code to be set. This code must be used at the receive end to unscramble the transmission.

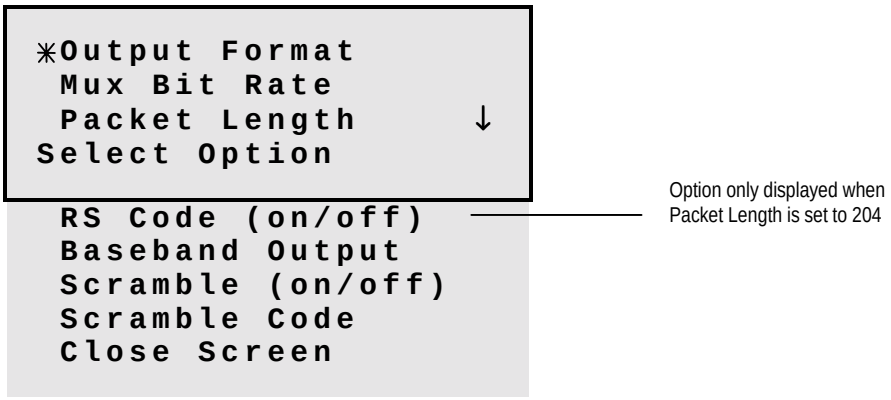
```
Scramble Code
              9171473

Use <^v>,Clear,Enter
```

Use the ∧ and ∨ cursor keys to increment or decrement numbers. The numeric keypad may be used to enter numbers directly. Use the < and > cursor keys to move back and forth along the code in order to enter the correct number in the appropriate place. Press the **Enter** key to confirm selection.

3.7.10 Setup / Mux (Baseband Output Selected)

The following setup screen permits changes to be made to the current parameter settings for the DSNG Codec Multiplexer functions when **Baseband** is selected as the output format.

> **NOTE...**
> Fewer options may be available on this screen, depending on whether **IF** or **Baseband** is selected as the output format, see also Setup / Mux (IF Output Selected).

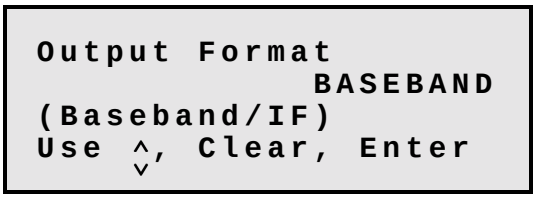


Choose a menu option by using the cursor keys to position the asterisk alongside the required option. Then press the **Enter** key to confirm selection. A parameter setup screen will be displayed (see the following headings).

Choose the **Close Screen** option (or press the **Clear** key) to go back to the top level Setup screen.

Setup / Mux / Output Format

The following setup screen permits the format of the data output to be set for either telecommunications link (baseband) or satellite uplink (IF).

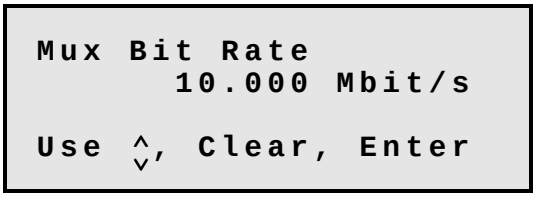


> **NOTE...**
> The choice of output format is reflected in the status summary screen which is displayed.

Use the ∧ and ∨ cursor keys to select the required format from the list of supported options (Baseband or IF). Press the **Enter** key to confirm selection.

Setup / Mux / Mux Bit Rate

The following setup screen permits the Multiplexer output bit-rate to be set.



Use the ∧ and ∨ cursor keys to increment or decrement the number in the range (2-32 Mbit/s). The numeric keypad may be used to enter numbers directly. Press the **Enter** key to confirm selection.

Setup / Mux / Packet Length

The following setup screen permits the Multiplexer packet length to be set. This is normally set according to the requirements of the receiving equipment.

```
Packet Length
                    204
(188,204)
Use ^v, Clear, Enter
```

Use the ∧ and ∨ cursor keys to select the required packet length from the list of options (188, 204). The numeric keypad may be used to enter numbers directly. Press the **Enter** key to confirm selection.

If 204 is selected, a further option for the selection of Reed-Solomon (RS) encoding is displayed (see below). Thus, the extra 16 bits in each packet can be filled with forward error correction (FEC) bits.

Setup / Mux / RS Code (on/off)

The following setup screen permits the Multiplexer Reed-Solomon error correction to be enabled. For use where there are long runs or RFI between this equipment and the receiving telecommunications equipment, or left empty (gapped) for use at the receiving end.

> **NOTE...**
> This option is only displayed when 204 has been previously selected as the packet length.

```
RS Code
                    ON
(On,Off)
Use ^v, Clear, Enter
```

Use the ∧ and ∨ cursor keys to select either **on** or **off**. Press the **Enter** key to confirm selection.

Setup / Mux / Baseband Output

The following setup screen permits the baseband output to be enabled. The **Live** LED on the front panel is lit to signify the equipment is “on-air”.

```
Baseband Output
                    ON
(On,Off)
Use ^v, Clear, Enter
```

Use the ∧ and ∨ cursor keys to select either **on** or **off**. Press the **Enter** key to confirm selection.

Setup / Mux / Scramble (on/off)

This option is identical to *Setup / Mux (IF Output Selected*).

Setup / Mux / Scramble Code

This option is identical to *Setup / Mux (IF Output Selected*).

3.7.11 Setup / Video

The following setup screen permits changes to be made to the current parameter settings for the DSNG Codec Video Channel functions.

```
✳Video Source
 Line Standard
 Pixel Resolution  ↓
Select Option
```

```
 Video Bit Rate
 Coding Mode
 Low Delay Mode
 O/P on Video Loss
 Close Screen
```

> **NOTE...**
> Line Standard, Pixel Resolution, Video Bit Rate and Coding Mode may be missing from the display if these are inappropriate according to the current setting of the Video Source.

Choose a menu option by using the cursor keys to position the asterisk alongside the required option. Then press the **Enter** key to confirm selection. A parameter setup screen will be displayed (see the following headings).

Choose the **Close Screen** option (or press the **Clear** key) to go back to the top level Setup screen.

Setup / Video / Video Source

The following setup screen permits the video input type to be selected.

```
Video Source
                    YUV
(9 options)
Use ^, Clear, Enter
    v
```

Use the ∧ and ∨ cursor keys to select the required input type from the list of supported options (white and black halves, colour bars, YUV, serial digital, parallel digital, NTSC (No pedestal), NTSC (Pedestal), PAL or off). Press the **Enter** key to confirm selection. There is approximately a one second delay to change the parameter, restart the Codec and pick up the new picture unless the line standard has changed, i.e. PAL to NTSC or vice-versa; in this case there will be a 25 second delay to re-initialise the video encoding circuitry.

NOTE
It is recommended that serial video should not be applied when selecting yuv input (On both 525 and 625 line Standards)

Setup / Video / Line Standard

The following setup screen permits the video input line standard to be selected.

NOTE...
This option may be missing from the menu when selection of a line standard is inappropriate according to the current video source, i.e. NTSC or PAL.

```
Line Standard
                    625
(525/625)
Use ^, Clear, Enter
    v
```

Use the ∧ and ∨ cursor keys to select the required line standard from the list of supported options (525 or 625). The numeric keypad may also be used (press 5 or 6). Press the **Enter** key to confirm selection. There is approximately a 25 second delay to re-initialise the video encoding circuitry.

Setup / Video / Pixel Resolution

The following setup screen permits the video input pixel resolution to be selected. Normally, resolution is selected automatically to optimise system capacity. However, this value can be overridden and entered manually, if so desired.

```
Pixel Resolution
          AUTO (3/4)
(6 options)
Use ^, Clear, Enter
    v
```

Brackets indicate that value was selected automatically by the software

Use the ∧ and ∨ cursor keys to select the required resolution from the list of supported options (Full Res., 3/4 Res., 2/3 Res., 1/2 Res., SIF, Auto).

NOTE...
SIF mode bit rates are limited to 1.5 - 5 Mbit/s.

Press the **Enter** key to confirm selection.

Setup / Video / Video Bit Rate

The following setup screen permits the video bit-rate to be selected. Normally, bit-rate is selected automatically to optimise system capacity. However, this value can be overridden and entered manually, if so desired.

```
Video Bit Rate
        13.630 Mbit/s

Use ^v, Clear, Enter
```

Use the ∧ and ∨ cursor keys to increment or decrement through the available range (1.5 to 5 Mbit/s for SIF mode, 2 to 15 Mbit/s all other).The numeric keypad may be used to enter numbers directly. Press the **Enter** key to confirm selection.

Upon entering the desired bit-rate, the pixel resolution may be re-adjusted automatically. If bit-rate is entered manually, it will not be altered automatically by software unless the output configuration has been changed in such a way that the selected bit-rate is no longer valid, i.e. achievable. In this event, an advisory message is displayed. Entering an invalid video bit-rate value for the current configuration will have the same effect. When the **Video Source** is set to **Off**, the bit-rate may be configured for when it is next turned **On**.

Setup / Video / Coding Mode

The following setup screen permits the video coding mode to be selected. The different modes allow more or less (or none) bi-directionally predictive (B) frames to be used in the compressed video data stream. IBBP is the default mode.

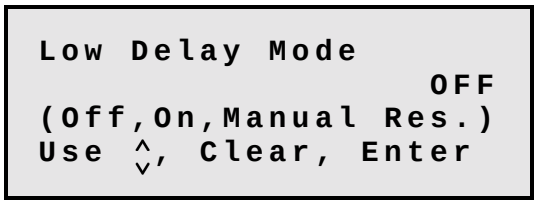
```
Coding Mode
                    IBBP
(IP,IBP,IBBP)
Use ^v, Clear, Enter
```

Use the ∧ and ∨ cursor keys to select the required mode from the list of supported options (IP, IBP, IBBP). Press the **Enter** key to confirm selection.

> **NOTE...**
> This option is not available if **Low Delay Mode** is selected.

Setup / Video / Low Delay Mode

The following setup screen permits the video low delay mode to be enabled. This option minimises the delay in encoding the video signal by trading-off video quality. When the low delay mode is enabled, the pixel resolution is set to 1/2 (352) and can not be altered. If a higher resolution is required, the manual resolution option should be selected; higher resolutions are then supported at the expense of a larger coding delay.



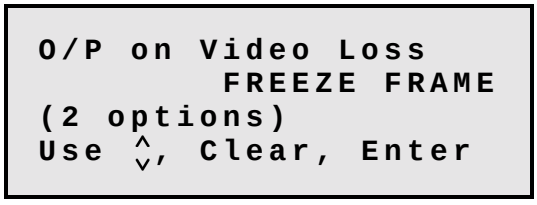
> **NOTE...**
> Coding mode is set to IP and cannot be altered in this mode.

Use the ∧ and ∨ cursor keys to select the required mode from a list of the supported options (Off, On, Manual Res.). Press the **Enter** key to confirm selection.

> **NOTE...**
> The manual resolution option is not available when SIF mode is selected.

Setup / Video / O/P on Video Loss

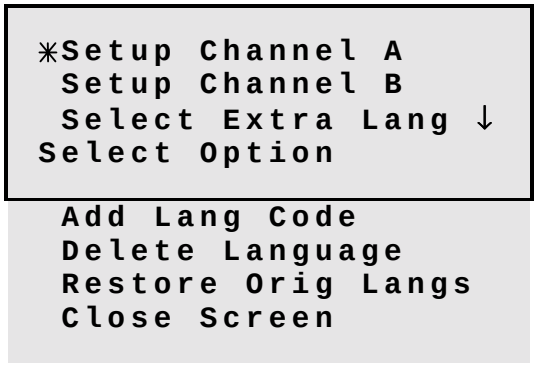
The following setup screen permits the required output to be specified in the event of loss of video.



Use the ∧ and ∨ cursor keys to select the required mode from the list of supported options (Black or Freeze Frame). Press the **Enter** key to confirm selection.

3.7.12 Setup / Audio

The following setup screen permits changes to be made to the current parameter settings for the DSNG Codec Audio Channel functions.



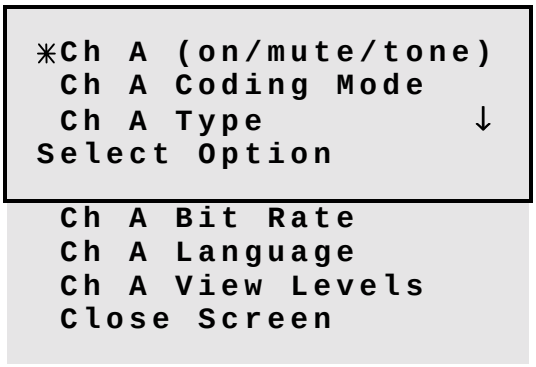
> **NOTE...**
> The Ch A View Levels option will be missing from the list of options if the channel is not enabled.

Choose a menu option by using the cursor keys to position the asterisk alongside the required option. Then press the **Enter** key to confirm selection. Depending on the option selected, either a parameter setup screen or a further list of options will be displayed (see the following headings).

Choose the **Close Screen** option (or press the **Clear** key) to go back to the top level Setup screen.

Setup / Audio / Setup Channel A

The following setup screen permits changes to be made to the current parameter settings for the Channel A audio functions.

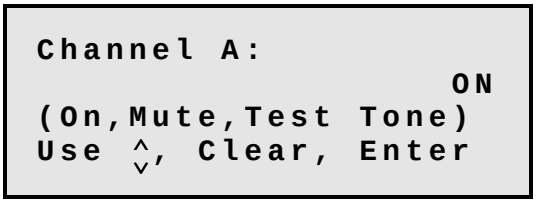


Choose a menu option by using the cursor keys to position the asterisk alongside the required option. Then press the **Enter** key to confirm selection. A parameter setup screen will be displayed (see the following headings).

Choose the **Close Screen** option (or press the **Clear** key) to go back to the Setup / Audio screen.

Setup / Audio / Setup Channel A / Ch A (on/mute/tone)

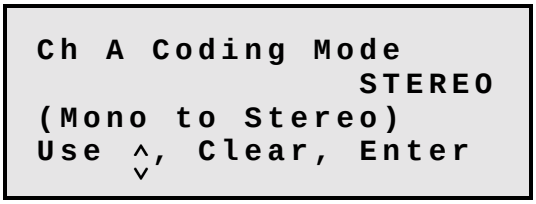
The following setup screen permits Channel A to be enabled, or a tone to be inserted for testing/alignment purposes.



Use the ∧ and ∨ cursor keys to select the required mode from the list of supported options (on, mute, test tone). Press the **Enter** key to confirm selection.

Setup / Audio / Setup Channel A / Ch A Coding Mode

The following setup screen permits Channel A coding mode to be selected.



Use the ∧ and ∨ cursor keys to select the required mode from the list of supported options (stereo, joint stereo, dual mono, mono). Press the **Enter** key to confirm selection.

Setup / Audio / Setup Channel A / Ch A Type

The following setup screen permits Channel A input type to be selected.

```
Channel A Type
 600 Ohms (Analogue)
(3 options)
Use ^v, Clear, Enter
```

Use the ∧ and ∨ cursor keys to select the required mode from the list of supported options (600 Ohms (Analogue), 20 kOhms (Analogue), digital). Press the **Enter** key to confirm selection.

Setup / Audio / Setup Channel A / Ch A Bit Rate

The following setup screen permits Channel A input bit rate to be selected.

```
Channel A Bit Rate
          384 kbit/s
(10 options)
Use ^v, Clear, Enter
```

Use the ∧ and ∨ cursor keys to select the required bit rate from the list of supported options (dependent on selected mode). Press the **Enter** key to confirm selection.

> **NOTE...**
>
> When **Mute** or **Test Tone** is selected, the actual bit rate is fixed at 64 kbit/s. Any adjustment made to the bit rate will be applied to the audio channel when it is next turned on.

Setup / Audio / Setup Channel A / Ch A Language

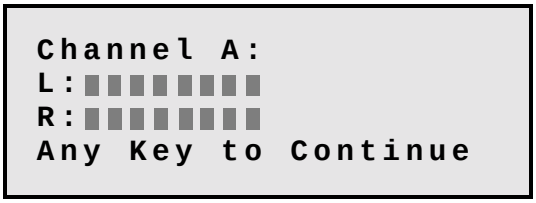
The following setup screen permits language identifier to be set as Service Information to the audio channel. Language may be set separately for left (L) and right (R) channels depending on the mode selected.

```
Ch A Language
              ENGLISH
(12 options)    (eng)
Use ^v, Clear, Enter
```

Use the ∧ and ∨ cursor keys to select the required language from a short-form list of default options (English, French, German, Dutch, Spanish, Portuguese, Italian, Danish, Norwegian, Swedish, Finnish or undefined). Press the **Enter** key to confirm selection. For more language options see Setup / Audio / Select Extra Lang. If the language you are looking for is not present, enter it by using the **Add Lang Code** option.

Setup / Audio / Setup Channel A / Ch A View Levels

The following setup screen permits Channel A input levels to be displayed.



> **NOTE...**
> This option may be missing from the menu when channels are not enabled.

The screen provides a bargraph-type display of the audio activity on the left (L) and right (R) channels. The bargraph is graded in eight levels, zero corresponding to silence and level eight corresponding to clipping. Press any key to return to the Setup / Audio / Setup Channel A screen.

Setup / Audio / Setup Channel B

These screens are the same as for Channel A described above.

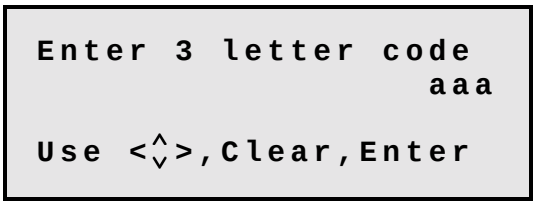
Setup / Audio / Select Extra Lang

The following setup screen permits additional languages to be added to the default 12 option short-form list available to Channels A and B.

Use the ∧ and ∨ cursor keys to select the required language from the full list (Afrikaans to Welsh). Press the **Enter** key to confirm selection.

Setup / Audio / Add Lang Code

The following setup screen permits a user defined language identifier to be added to the default list on Channel A.



Use the ∧ and ∨ cursor keys to increment or decrement through an alphanumeric list. Use the < and > cursor keys to move back and forth along the code in order to enter the correct letter in the appropriate place. Press the **Enter** key to confirm selection.

When entered, two further screens are displayed to make the description entry and confirm that the code is included in the list of languages.

Setup / Audio / Delete Language

The following setup screen permits languages to be deleted from the language list.

```
Delete Language:
                GERMAN
(12 options)
Use ^, v, Clear, Enter
```

Use the ^ and v cursor keys to select the required language from the list of supported options. Press the **Enter** key to confirm deletion.

Setup / Audio / Restore Orig Langs

The following option restores the default 12 languages.

```
     Storing Data
```

The above screen is displayed for a few seconds before returning automatically to the setup / audio screen.

3.7.13 Setup / Data

The following setup screen permits changes to be made to the current parameter settings for the DSNG Codec Data Channel functions.

```
*RS232 Channel A
 RS232 Channel B
 RS422 Channel↓
Select Option

  Close Screen
```

Choose a menu option by using the cursor keys to position the asterisk alongside the required option. Then press the **Enter** key to confirm selection. Depending on the option selected, either a parameter setup screen or a further list of options will be displayed (see the following headings).

Choose the **Close Screen** option (or press the **Clear** key) to go back to the top level Setup screen.

Setup / Data / RS232 Channel A

The following setup screen permits changes to be made to the current parameter settings for the DSNG Codec RS232 asynchronous Data Channel A.

```
*RS232 Ch A(on/off)
 ChA Baud Rate
 Close Screen
Select Option
```

Choose a menu option by using the cursor keys to position the asterisk alongside the required option. Then press the **Enter** key to confirm selection. A parameter setup screen will be displayed (see the following headings).

Choose the **Close Screen** option (or press the **Clear** key) to go back to the Setup / Data screen.

Setup / Data / RS232 Channel A/ RS232 Ch A (on/off)

The following setup screen permits RS232 Data Channel A to be enabled.

```
RS232 Channel A
                  OFF
(On,Off)
Use ^, Clear, Enter
      v
```

Use the ^ and v cursor keys to select either **on** or **off**. Press the **Enter** key to confirm selection.

Setup / Data / RS232 Channel A/ ChA Baud Rate

The following setup screen permits RS232 Data Channel A baud rate to be set.

```
RS232 Channel A
            9600 baud
(4 options)
Use ^, Clear, Enter
      v
```

Use the ^ and v cursor keys to select the required baud rate from the list of supported options (9600, 4800, 2400, or 1200). Press the **Enter** key to confirm selection.

> **NOTE...**
> When the data channel is turned off, any adjustment made to the baud rate will be actioned when it is next turned on.

Setup / Data / RS232 Channel B

These screens are the same as for RS232 Channel A, described above.

Setup / Data / RS422 Channel

The following setup screen permits changes to be made to the current parameter settings for the DSNG Codec RS422 synchronous Data Channel.

```
*RS422 (on/off)
 RS422 Bit Rate
 Close Screen
Select Option
```

Choose a menu option by using the cursor keys to position the asterisk alongside the required option. Then press the **Enter** key to confirm selection. A parameter setup screen will be displayed (see the following headings).

Choose the **Close Screen** option (or press the **Clear** key) to go back to the Setup / Data screen.

Setup / Data / RS422 Channel / RS422 (on/off)

The following setup screen permits RS422 Data Channel to be enabled.

```
RS422 Channel
                    OFF
(On,Off)
Use ^, Clear, Enter
```

Use the ∧ and ∨ cursor keys to select either **on** or **off**. Press the **Enter** key to confirm selection.

Setup / Data / RS422 Data Channel / RS422 Bit Rate

The following setup screen permits RS422 Data Channel bit-rate to be set.

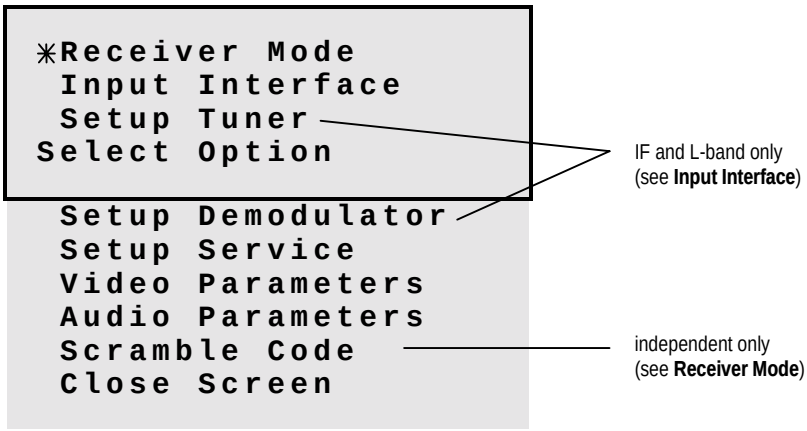
```
RS422 Bit Rate
          448 kbits/s
(16 options)
Use ^, Clear, Enter
```

Use the ∧ and ∨ cursor keys to select the required bit-rate from the list of supported options (1024, 960, 896, 832, 768, 704, 640, 576, 512, 448, 384, 320, 256, 192, 128, 64). Press the **Enter** key to confirm selection.

> **NOTE...**
>
> When the data channel is turned off, any adjustment made to the bit rate will be actioned when it is next turned on.

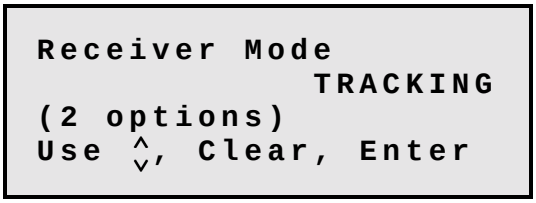
3.7.14 Setup / Receiver

The following screen permits changes to be made to the Receiver parameters.



Setup / Receiver / Receiver Mode

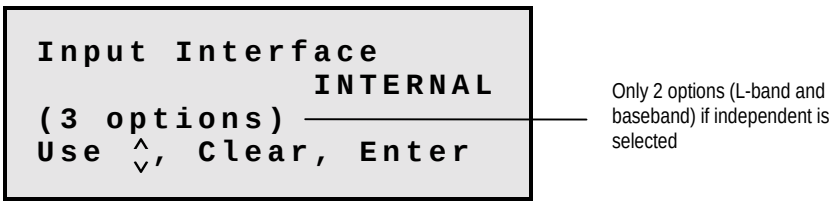
The following setup screen permits selection of the Receiver input mode. The IRD may be set up to track the transmission generated by the DSNG (internally at baseband, or externally at IF or L-band) or to receive and decode a totally independent transmission from some other source (at baseband or L-band).



Use the ∧ and ∨ cursor keys to select the required input mode from the list of supported options (independent, tracking). Press the **Enter** key to confirm selection.

Setup / Receiver / Input Interface

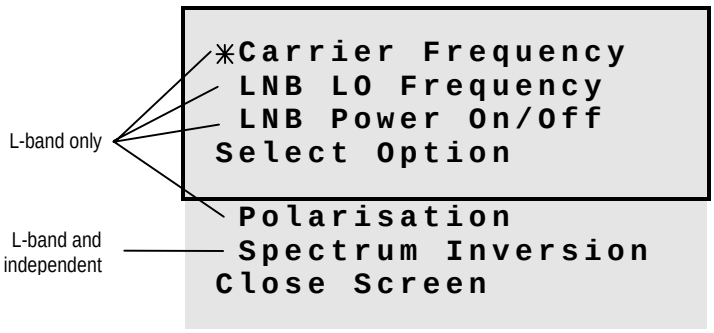
The following setup screen permits selection of the type of input to be received.



Use the ∧ and ∨ cursor keys to select the required input type from the list of supported options (L-band, IF, internal). If an independent broadcast is selected (see above) then only two options are displayed: L-band and baseband. Press the **Enter** key to confirm selection.

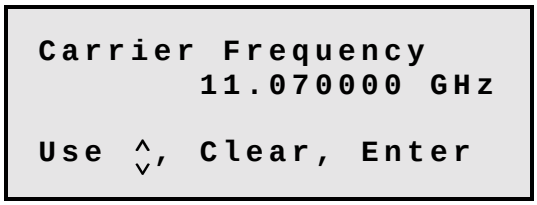
Setup / Receiver / Setup Tuner

The following setup screen permits set up of the Receiver Tuner, when the input interface (above) has been set to receive either IF or L-band inputs.



Setup / Receiver / Setup Tuner / Carrier Frequency

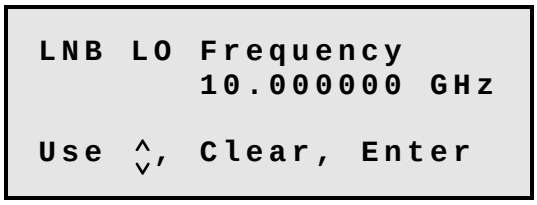
The following setup screen permits the tuner carrier frequency to be set, when receiving an L-band signal.



Use the ^ and v cursor keys to increment or decrement through the available range (1 to 20 GHz). The numeric keypad may be used to enter numbers directly. Press the **Enter** key to confirm selection.

Setup / Receiver / Setup Tuner / LNB LO Frequency

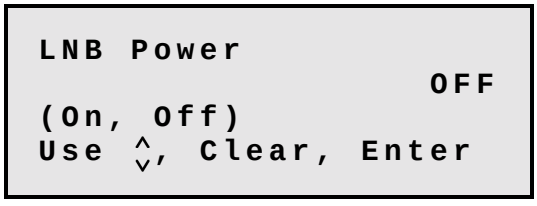
The following setup screen permits the tuner Low Noise Block local oscillator frequency to be set, when receiving an L-band signal.



Use the ^ and v cursor keys to increment or decrement through the available range (0 to 20 GHz). The numeric keypad may be used to enter numbers directly. Press the **Enter** key to confirm selection.

Setup / Receiver / Setup Tuner / LNB Power On/Off

The following setup screen permits the tuner Low Noise Block power dc power supply output to be enabled at the L-band connector.



Use the ∧ and ∨ cursor keys to select either **on** or **off**. Press the **Enter** key to confirm selection.

Setup / Receiver / Setup Tuner / Polarisation

The following setup screen permits the tuner polarisation to be set when receiving an L-band signal.

```
Polarisation
           HORIZONTAL
(2 options)
Use ^v, Clear, Enter
```

Use the ∧ and ∨ cursor keys to select either horizontal or vertical. Press the **Enter** key to confirm selection.

Setup / Receiver / Setup Tuner / Spectrum Inversion

The following setup screen permits inversion of the L-band spectrum.

```
Spectrum Inversion
                  OFF
(On, Off)
Use ^v, Clear, Enter
```

Use the ∧ and ∨ cursor keys to select either **on** or **off**. Press the **Enter** key to confirm selection.

Setup / Receiver / Setup Demodulator

The following setup screen permits selection of the Receiver Demodulator when the input interface (above) has been set to receive either IF or L-band inputs.

```
*Symbol Rate
 FEC Rate
 BER Alm Threshold
Select Option

 Sig Lvl Threshold
Close Screen
```

Independent Mode only

Setup / Receiver / Setup Demodulator / Symbol Rate

The following setup screen permits the Symbol rate to be selected when receiving an L-band or IF signal (independent mode only).

```
Symbol Rate
     9.000000 Msym/s

Use ^v, Clear, Enter
```

Use the ∧ and ∨ cursor keys to increment or decrement through the available range (1.5 to 30 Msym/s). The numeric keypad may be used to enter numbers directly. Press the **Enter** key to confirm selection.

Setup / Receiver / Setup Demodulator / FEC Rate

The following setup screen permits the Forward Error Correction rate to be selected when receiving an L-band or IF signal (independent mode only).

```
FEC Rate
                    3/4
(1/2 to 7/8)
Use ^v, Clear, Enter
```

Use the ∧ and ∨ cursor keys to increment or decrement through the available range (1/2, 2/3, 3/4 , 5/6, 7/8). The numeric keypad may be used to enter numbers directly. Press the **Enter** key to confirm selection.

Setup / Receiver / Setup Demodulator / BER Alarm Threshold

The following setup screen permits the Bit Error Rate alarm threshold to be set when receiving an L-band or IF signal.

```
BER Alrm Threshold
                1 e -5
(1 e -5 to 9 e -2)
Use ^v, Clear, Enter
```

Use the ∧ and ∨ cursor keys to increment or decrement through the available range (1 e -5 to 9 e -2). The numeric keypad may be used to enter numbers directly. Press the **Enter** key to confirm selection.

Setup / Receiver / Setup Demodulator / Signl Lvl Threshol

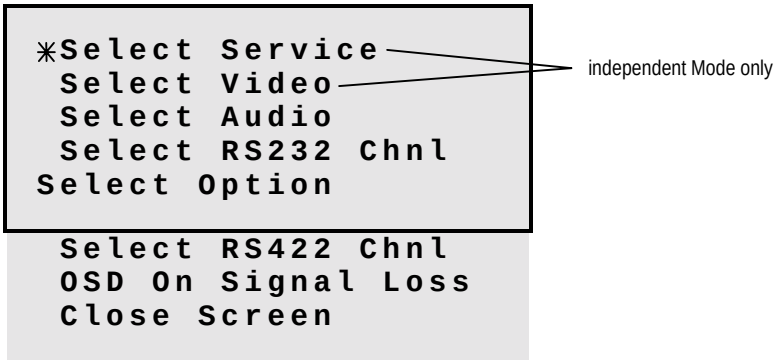
The following setup screen permits the signal level threshold to be set when receiving an L-band or IF signal.

```
Signl Lvl Threshold
                  130

Use ^v, Clear, Enter
```

Use the ∧ and ∨ cursor keys to increment or decrement through the available range (0 to 255). The numeric keypad may be used to enter numbers directly. Press the **Enter** key to confirm selection.

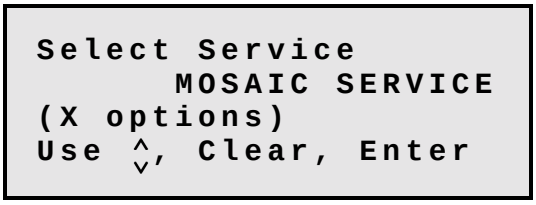
Setup / Receiver / Setup Service

The following setup screen permits selection of the Receiver service information.



Setup / Receiver / Setup Service / Select Service

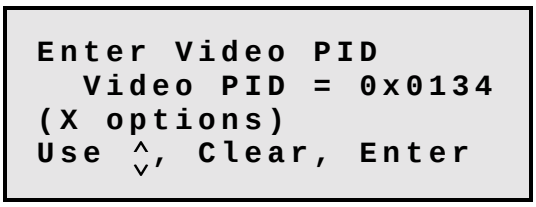
The following setup screen permits selection of the required service from the received external signal, when operating in independent mode.



Use the ∧ and ∨ cursor keys to scroll through the names of the services provided by the received signal. Press the **Enter** key to confirm selection.

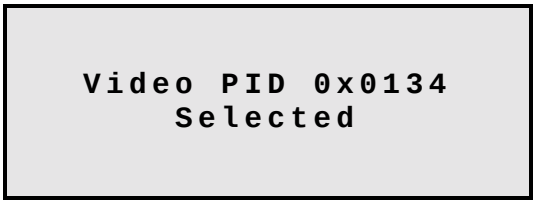
Setup / Receiver / Setup Service / Select Video

The following setup screen permits the selection, by hexadecimal packet identifier, of the video channel to be output at the COMPOSITE VIDEO connector.



Use the ∧ and ∨ cursor keys to scroll through the PIDs of the video channels provided by selected service. Press the **Enter** key to confirm selection.

If the service only carries one video channel then the selection is automatically made.



Setup / Receiver / Setup Service / Select Audio

The following setup screen permits the selection, by hexadecimal packet identifier, of the audio channel to be output at the L and R connectors (see *Setup / Receiver / Audio Parameters / Set Audio Routing* for details of the supported options)

```
Select Audio
                ENGLISH
(X options)      0x0100
Use ^, Clear, Enter
    v
```

Use the ∧ and ∨ cursor keys to scroll through the PIDs of the audio channels provided by selected service. Press the **Enter** key to confirm selection.

If the service only carries one audio channel then the selection is automatically made.

```
   Audio PID 0x0100
       Selected
```

Use the ∧ and ∨ cursor keys to display the PID from the two audio channels (L and R). Press the **Enter** key to confirm selection.

Setup / Receiver / Setup Service / Select RS232 Chnl

The following setup screen permits the selection, by hexadecimal packet identifier, of the asynchronous data channel to be output at the RS-232 connector.

```
Enter RS232 PID
  RS232 PID = 0x0102
(X options)
Use ^, Clear, Enter
    v
```

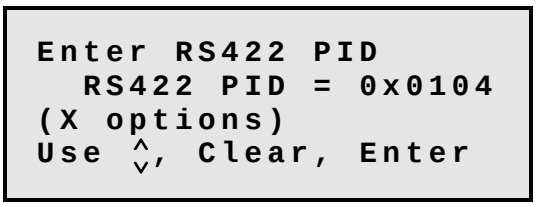
Use the ∧ and ∨ cursor keys to scroll through the PIDs of the asynchronous data channels provided by selected service. Press the **Enter** key to confirm selection.

If the service only carries one asynchronous data channel then the selection is automatically made.

```
   RS232 PID 0x0102
       Selected
```

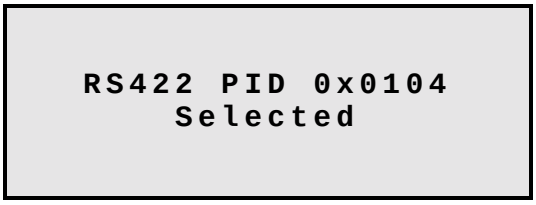
Setup / Receiver / Setup Service / Select RS422 Chnl

The following setup screen permits the selection, by hexadecimal packet identifier, of the asynchronous data channel to be output at the RS-422 connector.



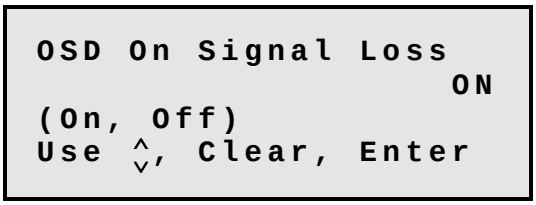
Use the ^ and v cursor keys to scroll through the PIDs of the synchronous data channels provided by selected service. Press the **Enter** key to confirm selection.

If the service only carries one synchronous data channel then the selection is automatically made.



Setup / Receiver / Setup Service / OSD on Signal Loss

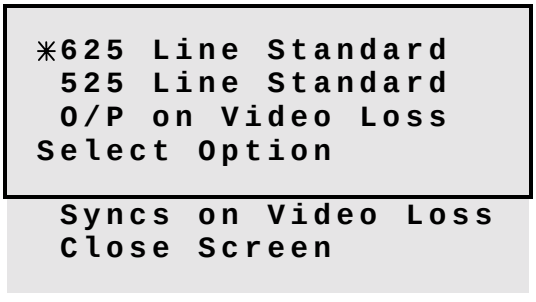
The following setup screen permits selection of the choice of output to be sent to the Receiver Monitor on-screen display (OSD) on signal loss.



Use the ^ and v cursor keys to select either **on** or **off**. Press the **Enter** key to confirm selection.

Setup / Receiver / Video Parameters

The following setup screen permits selection of the Receiver video parameters.



Setup / Receiver / Video Parameters / 625 Line Standard

The following setup screen permits selection of the Receiver video line standard.

```
625 Line Standard
                    PAL
(Alarm,PAL)
Use ^v, Clear, Enter
```

Use the ^ and v cursor keys to select the required line standard from the list of supported options (Alarm, PAL). Press the **Enter** key to confirm selection.

Setup / Receiver / Video Parameters / 525 Line Standard

The following setup screen permits selection of the Receiver video line standard.

```
525 Line Standard
     NTSC (PEDESTAL)
(4 options)
Use ^v, Clear, Enter
```

Use the ^ and v cursor keys to select the required line standard from the list of supported options (NSTC (no pedestal), NTSC (pedestal), PAL (525), Alarm). Press the **Enter** key to confirm selection.

Setup / Receiver / Video Parameters / O/P on Video Loss

The following setup screen permits selection of the choice of output to be transmitted from the main video output on signal loss.

```
O/P on Video Loss
        FREEZE FRAME
(2 options)
Use ^v, Clear, Enter
```

Use the ^ and v cursor keys to select the required output from the list of supported options (freeze frame, black output). Press the **Enter** key to confirm selection.

Setup / Receiver / Video Parameters / Syncs on Video Loss

The following setup screen permits selection of the picture synchronisation when the incoming video signal has been lost. The selected output (freeze, frame or black, see above) can be maintained indefinitely (by selecting 0 seconds) or maintained for up to 300 seconds.

```
Syncs on Video Loss
           0 seconds

Use ^v, Clear, Enter
```

Use the ∧ and ∨ cursor keys to increment or decrement the number in the range (0 - 300 seconds). The numeric keypad may be used to enter numbers directly. Press the **Enter** key to confirm selection.

Setup / Receiver / Audio Parameters

The following setup screen permits selection of the Receiver audio parameters.

```
✳Set Audio Routing
 Set Audio Gain
 Close Screen
Select Option
```

Setup / Receiver / Audio Parameters / Set Audio Routing

The following setup screen permits the routing of audio channel signals to the rear panel left and right audio connectors. This should be set according to the coding mode used by the audio channel.

```
Set Audio Routing
     STEREO L>L, R>R
(4 options)
Use ^v, Clear, Enter
```

Use the ∧ and ∨ cursor keys to select the required audio mode from the list of supported options (mono R > L & R, mono L > L & R, mono (L+R)/2 > L & R, stereo L>L R>R). Press the **Enter** key to confirm selection.

Setup / Receiver / Audio Parameters / Set Audio Gain

The following setup screen permits selection of the Receiver audio gain.

```
Set Audio Gain
              +12 dBm
(+9 dBm to +18 dBm)
Use ^v, Clear, Enter
```

Use the ∧ and ∨ cursor keys to select the required audio gain from the list of supported options (+9, +12, +15, +18 dBm). Press the **Enter** key to confirm selection.

Setup / Receiver / Scramble Code

The following setup screen permits selection of the 7-digit numerical scramble code (in independent mode only) which must be entered to match that of the transmitted signal.

```
Scramble Code
              9171473

Use ^v, Clear, Enter
```

Use the ∧ and ∨ cursor keys to increment or decrement numbers. The numeric keypad may be used to enter numbers directly. Use the < and > cursor keys to move back and forth along the code in order to enter the correct number in the appropriate place. Press the **Enter** key to confirm selection.

3.8 Diagnostics Screens

3.8.1 What is Diagnostics Mode?

Press the **Diagnostics** key to enter Diagnostics selectable mode; the green LED associated with the key will be lit.

> **NOTE...**
> You must exit Setup mode before you can enter Diagnostics mode. Press **Clear**.

In this mode, diagnostic information about all, or any, of the functions of the DSNG Codec is displayed on the front panel display.

> **NOTE...**
> System, Modulator, Mux, Video, Audio, Data or Receiver keys are inoperative in this mode.

The display shows a top level setup screen which invites the user to choose a diagnostic function.

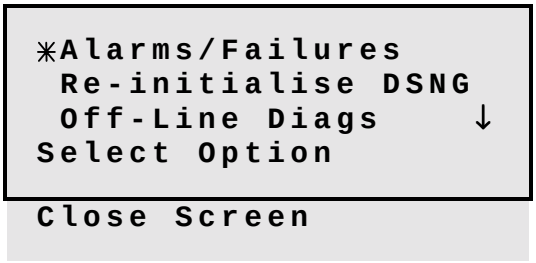


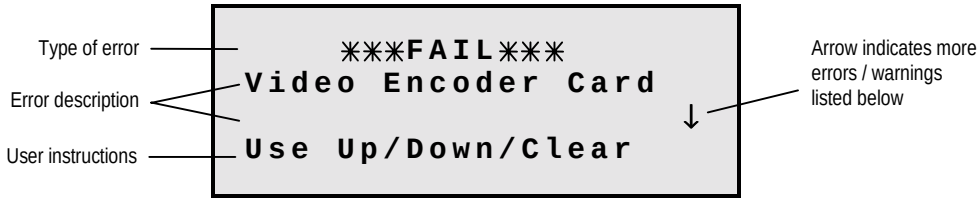
Figure 3.13: Diagnostics Screen

Choose a menu option by using the cursor keys to position the asterisk alongside the required option. Then press the **Enter** key to confirm selection. Depending on the option selected, either a diagnostics screen or a further list of options will be displayed (see the following headings).

Choose the **Close Screen** option (or press the **Clear** key) to go back to the Status summary screen.

3.8.2 Diagnostics / Alarms/Failures

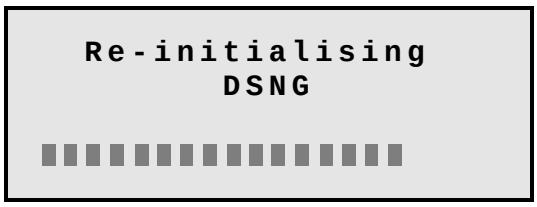
The following diagnostics screen displays the current errors detected on the equipment.



Use the ∧ and ∨ cursor keys to scroll through the list of error messages in the event that several errors are detected (see *Chapter 6, Fault Finding* for a list of error and warning messages and the action necessary to restore operation). If the equipment is functioning correctly, the display reads **No errors**. Press the **Clear** key to return to the top level Diagnostics screen.

3.8.3 Diagnostics / Re-initialise DSNG

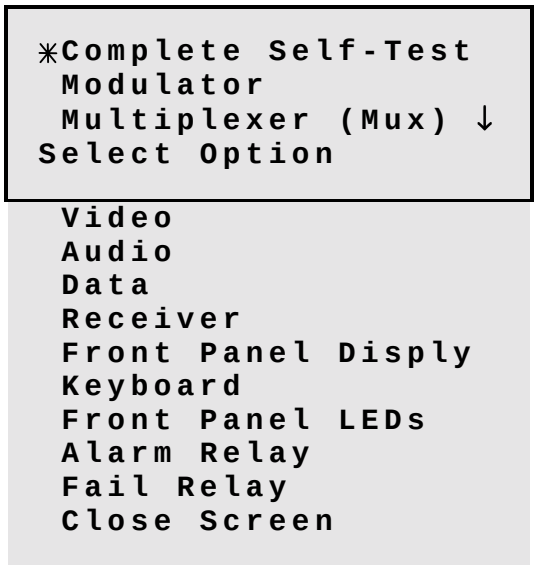
The following option performs a restart of the encoding circuitry and re-enabling the output.



3.8.4 Diagnostics / Off-Line Diags

The following diagnostics screen displays options for testing the functional areas of the DSNG Codec.

> **IMPORTANT NOTE...**
> Upon entry into this menu, the output is switched off.



Choose a menu option by using the cursor keys to position the asterisk alongside the required option. Then press the **Enter** key to confirm selection. A diagnostics screen will be displayed (see following headings).

Choose the **Close Screen** option (or press the **Clear** key) to go back to the Diagnostics screen.

Diagnostics / Off-Line Diags / Complete Self-Test

The following diagnostics screen enables a complete test of the following functional areas:

- Modulator
- Multiplexer
- Video
- Audio
- Data

The complete self-test takes approximately 3.5 minutes and can not be cancelled once selected. These tests may be performed separately if required (see headings below).

Press the **Enter** key to run through the functional tests in sequence.

Diagnostics / Off-Line Diags / Modulator

The following diagnostics screen enables a test of the modulator functions to be performed. Initially, a screen is displayed which shows the hardware (card number) and software (version number) to be tested.

```
IF Modulator
Hardware id: S5900
Version No : B
Any Key to Continue
```

Press any key to start the test and display the results.

```
IF Modulator
                    PASS

Any Key to Continue
```

Test Results
(PASS or error message
and FAIL screens)

Press any key to return to the Diagnostics / Off-Line Diags screen.

Diagnostics / Off-Line Diags / Multiplexer (Mux)

The following diagnostics screen enables a test of the multiplexing functions to be performed. Initially, a screen is displayed which shows the hardware (card number) and software (version number) to be tested.

```
MuxMod Card
Hardware id: S5898
Software   : 2.0
Any Key to Continue
```

Press any key to start the test and display the results.

```
MuxMod Card
                    PASS

Any Key to Continue
```

Test Results
(PASS or error message
and FAIL screens)

Press any key to return to the Diagnostics / Off-Line Diags screen.

Diagnostics / Off-Line Diags / Video

The display shows a top level setup screen which invites the user to choose a diagnostic function.

```
*Video Encoder
 Video Input
 Close Screen
Select Option
```

Choose a menu option by using the cursor keys to position the asterisk alongside the required option. Then press the **Enter** key to confirm selection. A diagnostics screen will be displayed (see following headings).

Choose the **Close Screen** option (or press the **Clear** key) to go back to the Status summary screen.

Diagnostics / Off-Line Diags / Video / Video Encoder

The following diagnostics screen enables a test of the video encoding functions to be performed. The Video Encoder diagnostics take approximately 3 minutes and can not be cancelled once selected. The card to be tested is initially interrogated.

```
Testing Video
Encoder ...

Please Wait
```

```
Video Encoder Card
Hardware id: S5430
Software   : 1.5
Any Key to Continue
```

Press any key to initiate a simple functional test of the card.

```
Video Encoder Card
        Status: PASS

Any Key to Continue
```

Test Results (PASS or error message and FAIL screens)

Press any key to start a rigorous test of the Encoder ICs test.

```
Testing Video
Encoder ICs
A: PASS    IC A
Please Wait      -
```

Rotating segment indicates that the test is progressing

```
Video Encoder Card
                PASS

Any Key to Continue
```

Test Results (PASS or error message and FAIL screens)

Press any key to return to the Diagnostics / Off-Line Diags / Video screen.

Diagnostics / Off-Line Diags / Video / Video Input

The following diagnostics screen enables a test of the video input functions to be performed. The card to be tested is initially interrogated.

```
Testing Video
Input ...

Please Wait
```

```
Video Input Card
Hardware id: S5424
Software   : 1.7
Any Key to Continue
```

Press any key to initiate a simple functional test of the card.

```
Video Input Card
        Status: PASS

Any Key to Continue
```

Test Results
(PASS or error message
and FAIL screens)

Press any key to return to the Diagnostics / Off-Line Diags / Video screen.

Diagnostics / Off-Line Diags / Audio

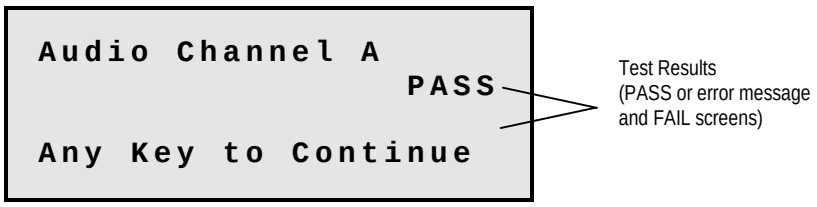
The following diagnostics screen enables a test of the audio functions to be performed. The card to be tested is initially interrogated.

```
Testing ADT Card
(Audio) ...

Please Wait
```

```
Audio (ADT) Card
Hardware id: S5427
Software   : 1.6
Any Key to Continue
```

Press any key to start the test and display the results.

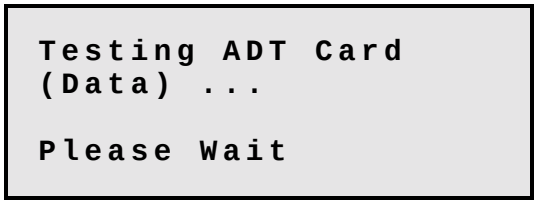
```
Testing Audio
Channel A ...

Please Wait
```

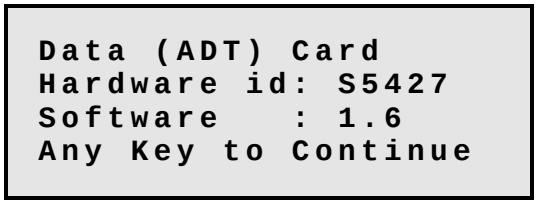


Press any key to continue to perform tests on channel B. Then, press any key again to return to the Diagnostics / Off-Line Diags screen.

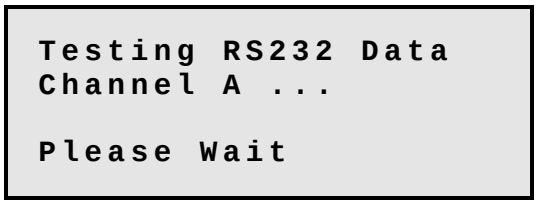
Diagnostics / Off-Line Diags / Data

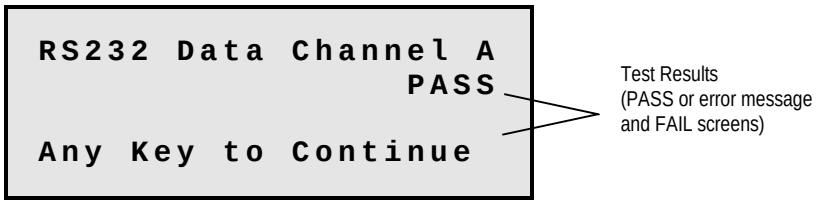
The following diagnostics screen enables a test of the data functions to be performed. The card to be tested is initially interrogated.





Press any key to start the test and display the results.

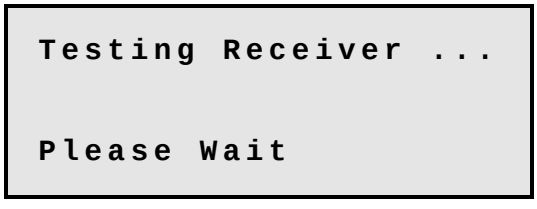




Press any key to continue to perform tests on RS232 channel B and the RS422 channel. Then, press any key again to return to the Diagnostics / Off-Line Diags screen.

Diagnostics / Off-Line Diags / Receiver

The following diagnostics screen enables a test of the IRD functions to be performed. The card to be tested is initially interrogated.



```
Receiver (IRD) Card
Hardware id: S5902
Software   : 1.9.N S
Any Key to Continue
```

Press any key to display further information about the IRD.

```
Receiver (IRD) Card
ST90 Software:   4.1

Any Key to Continue
```

Press any key to start the test and display the results.

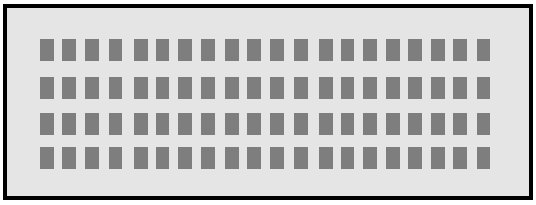
```
Receiver (IRD) Card
                 PASS

Any Key to Continue
```

Test Results
(PASS or error message
and FAIL screens)

Press any key to return to the Diagnostics / Off-Line Diags / Receiver screen.

Diagnostics / Off-Line Diags / Front Panel Disply

The following diagnostics screen enables a test of the front panel display to be performed. The test sends various patterned blocks, both stationary and moving, to the display in order for the user to be able to check whether any areas or pixels of the screen are no longer functioning. The test takes approximately 12 seconds to complete.



The test sequences runs automatically and returns to the Diagnostics / Off-Line Diags screen upon completion.

Diagnostics / Off-Line Diags / Keyboard

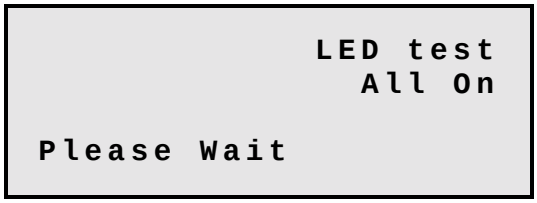
The following diagnostics screen displays the name of the last front panel key pressed.

```
Last Key Pressed:
                Setup

Clear to Exit
```

Press any front panel key to see its name identified on this display. Key presses are accompanied by the beeper. Press **Clear** followed by **Enter** in order to exit and return to the Diagnostics / Off-Line Diags screen.

Diagnostics / Off-Line Diags / Front Panel LEDs

The following diagnostics screen enables a test of all the front panel LEDs to be performed. The test takes approximately 20 secondes to complete.



The screen displays the corresponding key name which is being lit. The LEDs are lit in sequence around the front panel in order for the user to be able to check whether any LEDs are no longer functioning. The test starts with the mode keys, the function keys, then the status LEDs at the bottom left-hand side of the equipment. The test sequences runs automatically and returns to the Diagnostics / Off-Line Diags screen upon completion.

Diagnostics / Off-Line Diags / Alarm Relay

The following diagnostics screen enables a test of the Alarm and Fail relays to be performed. The relay is toggled ON and OFF approximately every half second. The click of the relay can be heard, plus the front panel **Alarm** LED is lit corresponding to the ON condition.

Press any key to continue to test the FAIL relay in the same way as the Alarm relay described above. Connections to the relay contacts are available at the rear panel RESET / STATUS connector (see *Chapter 2, Installation* for connector details).

Press any key again to return to the Diagnostics / Off-Line Diags screen.

BLANK

Chapter 4

Equipment Description

Contents

List of Illustrations

List of Tables

BLANK

4.1 Introduction

This chapter provides a simplified overview of the DSNG Codec and explains the functions of each of the cards. A description of the on-card LEDs visible at the rear panel is also given here.

4.2 Video Coding

4.2.1 General

The fundamental objective of the coding scheme is to exploit information redundancy in the input video signal to minimise the amount of data required for successful transmission. To achieve this, the DSNG Codec uses a number of interactive processes. The resultant compressed bit-stream syntax conforms to the ISO 13818 standard. An explanation of the overall coding strategy follows.

4.2.2 Frame Types

Coding operates on a frame (or picture) based principle. There are three frame types:

- I (intra-coded frames),
- P (predicted frames),
- B (bi-directionally predicted frames).

P and B frames are known as inter-coded frames. Coding of I frames occurs without reference to any other frames. P frames use motion compensation from a previous I or P frame. B frames are coded using motion compensation from a previous and/or a future I or P frame. Thus, a coding scheme may contain a mix of I, B and P. *Figure 4.1* illustrates the coding process.

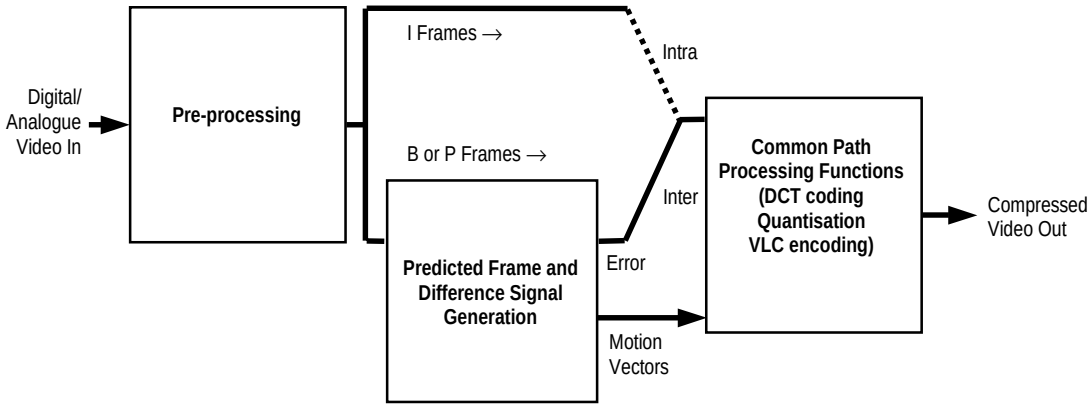


Figure 4.1: Coding Scheme Block Diagram

The motion-compensated-predicted frame is subtracted from the current frame to produce a frame difference or prediction-error value. This prediction-error value is coded instead of the complete frame information, thus affording a considerable saving in bit-rate; this mode of operation is known as "inter-frame" coding. The prediction-error information is augmented by motion vector information which is also coded and enables recovery of the current complete frame information by a Decoder.

The I frames and prediction-error values are processed in blocks of 8x8 pixels which are first transformed by a Discrete Cosine Transform (DCT). For typical images, the distribution of the coefficients is not uniform due to spatial redundancy, and the energy tends to be concentrated into the low frequency coefficients. The number of bits required for a block is reduced by not transmitting the near-zero coefficients and by quantising the remaining ones. Quantisation results in a reduction of the number of possible values to be transmitted. These values are then entropy-coded using a Variable Length Code (VLC). The VLC allocates codes which have different length depending upon the probability with which they are expected to occur.

> **NOTE...**
>
> The motion estimation and DCT coding can be field or frame based to achieve a better coding efficiency.

4.2.3 Frame Sequence

Depending on the coding mode used, P or B frames are produced for inter coding.

The regular transmission of an I frame provides a regular reference from which predicted frames can be generated, thereby ensuring that predictions do not become wildly inaccurate and give a starting point for decoding.

The run of frames from the start of an I frame to the start of the next I frame is known as a group of pictures (GOP). Each GOP is identified by a unique header.

The GOP structure for **PAL** is fixed in length at 12 frames, and can be of the following format:

- IPPPPPPPPPPPI, for non-B frame operation (IP)
- IBPBPBPBPBPBI, for operation with B frames (IPB)
- IBBPBBPBBPBBI, for successive B frames (IBBP)

The GOP structure for **NTSC** is either 14 or 15 frames, and can be of the following format:

- IPPPPPPPPPPPI, for non-B frame operation (IP) - 15 frames
- IBPBPBPBPBPBI, for operation with B frames (IPB) - 14 frames
- IBBPBBPBBPBBI, for successive B frames (IBBP) - 15 frames

4.3 Audio Coding

Audio encoding is to the MPEG-2 encoding standard ISO/IEC 13818-3 (layer 1 or 2) at a sampling rate of 48 kHz.

The spectrum of the received broad-band audio signal is divided into sub-bands of equal bandwidth by filtering. Each of these sub-bands is separately sampled and quantised to convert the input analogue signal into a sequence of discrete sample values. The samples associated with each sub-band are separately coded according to the psycho-acoustic properties of the human auditory system. Critical regions are coded more accurately, with less bits being assigned to frequencies at which the ear is less sensitive. Coding is also dependent on dynamic information such as audio masking, in which a loud sound at one frequency dominates over any quieter sounds at adjacent frequencies.

Adaptive Differential Pulse Code Modulation (ADPCM) techniques are used to reduce the bit-rate by coding the difference values between successive samples rather than absolute values. Quantisation step size is adjusted depending on the magnitude of the difference value: a rapid change produces a coarse approximation followed by smaller, more precise successive samples.

For all coding modes (stereo, mono, dual mono and joint stereo) the digitally coded bits are formatted into distinct frames, each of which contains a header which defines the frame in detail (coding scheme, mode, bit-rate, etc.). Since the number of useful bits varies depending on the psycho-acoustic properties of the corresponding sound samples, the frame can be padded. The resultant encoded audio output bit-rate is software selectable in the range 32 kHz to 384 kHz, depending on the mode selected (see *Chapter 1, Introduction* for table of supported bit-rates).

4.4 Data Handling

The synchronous and asynchronous data channels provided by the Encoder are simple bit-pipes and are **not** coded in any way. This is due to the fact that the nature of the data to be transmitted is expected to be different for individual customers and, therefore, a suitable coding scheme cannot be provided with any guarantee of performance.

4.5 Codec Functional Description

4.5.1 Overview

Either analogue composite / component, or digital parallel / serial video may be applied to the Video Input Card (*Figure 4.2*). The Video Input Card synchronises the input video to an internal reference clock and digitises the video signal to a Y/Cb/Cr 656 format and provides down-sampling, if required.

The MPEG-2 Video Encoder Card takes in the digitised video signal and processes it to a compressed encoded bit-stream in accordance with the MPEG-2 video specification.

Coded video information (the amount of redundant information removed can be as high as 95%) is routed to the Multiplexer / Baseband Modulator Card were it is combined with coded audio and data (uncoded) information from the Audio, Data and Teletext (ADT) Card.

The Multiplexer / Baseband Modulator Card provides a DVB-compliant multiplexed output of the video, audio and data signals and inserts user Conditional Access (CA) and Programme Specific Information (PSI). The output is routed directly to an output connector and to the IRD Card. Data is passed through a convolutional encoder and a pulse shaping filter (√35% cosine roll-off) before being routed to the IF Modulator Card. The card also provides the user control interface to the front panel for local control, and to a rear panel connector for remote control.

The IF Modulator provides the satellite conditioning to the multiplexed MPEG-2 / DVB transport packets. A 70 / 140 MHz carrier is QPSK modulated with the data output for routing to Up-converter and HPA.

The IF output may be monitored locally by the Integrated Receiver-Decoder (IRD) Card (M2/ESN/SNGB option only) which provides the necessary demodulation and demultiplexing to restore the original video, audio and data signals. Additionally, the IRD also accepts an L-band input or an unmodulated DVB parallel input.

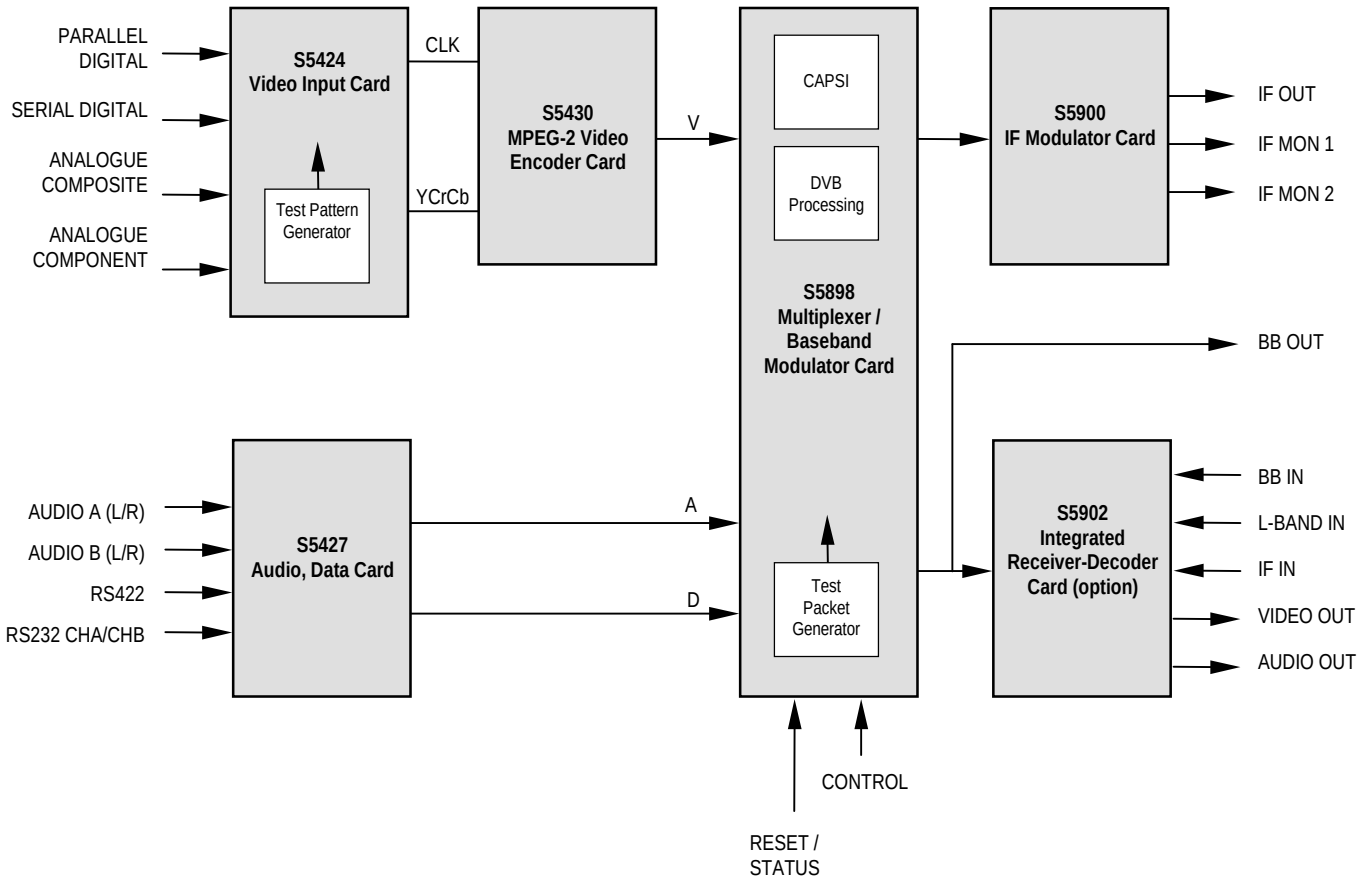


Figure 4.2: DSNG Codec Block Diagram

4.5.2 Codec Enclosure

The DSNG Codec is constructed in a 5U enclosure. Mounted at the side of the enclosure are six 24 V d.c. fans for general cooling. The rear panel (*Figure 4.3*) of the enclosure has holes and slots cut into it to allow LEDs on the cards to show through (see following headings for a description of each of the LEDs).

4.5.3 Power Supply Unit

The power supply unit used in this equipment is autosensing, accepting an input in the range 100-120 V a.c., or 220-240 V a.c., 45-440 Hz (see *Annex B, Technical Specification* for a details) to provide the regulated voltage supplies required by the cards in the DSNG Codec.

4.5.4 Backplane S5882

The 5U Backplane is mounted toward the front of the enclosure. All cards mate with the Backplane to allow inter-card communications and power supply distribution.

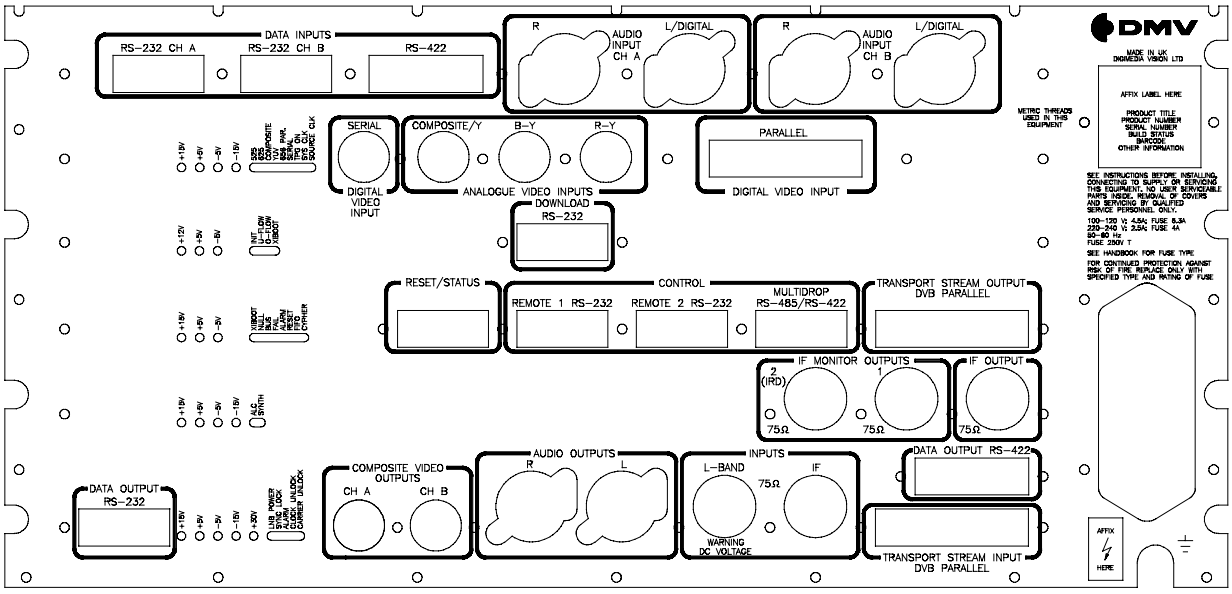
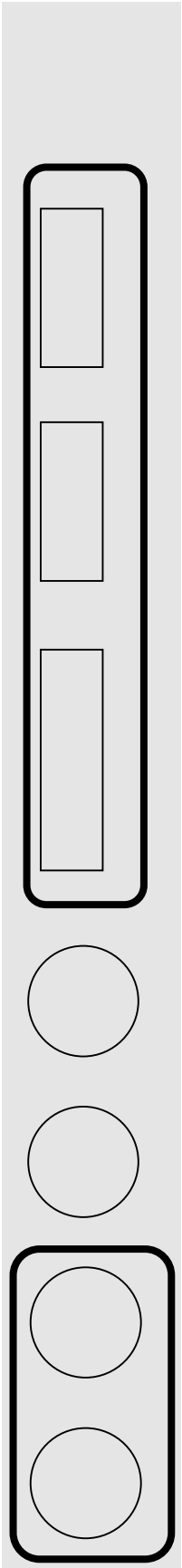


Figure 4.3: Rear Panel LEDs



4.5.5 Audio, Data and Teletext Card S5427

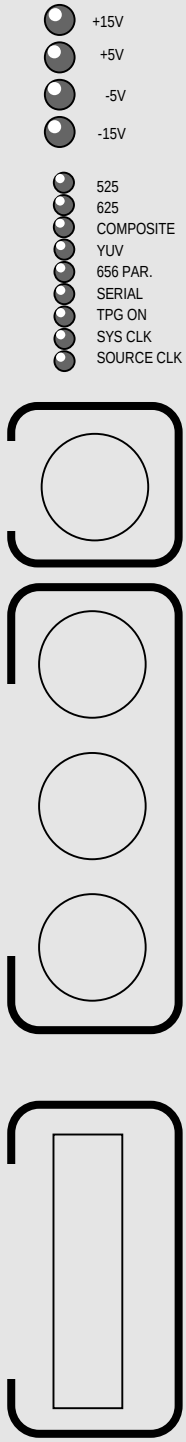
The Audio, Data and Teletext Card is fitted in slot position 1 (top) of the Backplane. It performs the following functions:

- Provides an interface between the non-video sources: audio and synchronous / asynchronous data, and the Multiplexer/Baseband Modulator Card.
- Accepts up to four analogue audio inputs, digitises and compresses to MPEG-2 standard, or accepts AES/EBU digital inputs.
- Accepts two RS-232 asynchronous data channels running at up to 9600 baud (not compressed).
- Accepts one RS-422 synchronous data channel at up to 1 Mbit/s (not compressed).

> **NOTE...**
> The teletext feature of this card is not supported in this application.

There are no LED or other indicators displayed at the rear panel.

4.5.6 Video Input Card S5424



The Video Input Card is fitted in slot position 2 of the Backplane. It performs the following functions:

- Provides a single video input channel to the MPEG-2 Video Encoder Card, accepting a variety of input types, and conditions the input in preparation for video encoding
- Converts analogue PAL/NTSC composite video signal into digital YCbCr component CCIR (ITU-R) 656 format
- Converts analogue YUV or Betacam component video signals into digital YCbCr component CCIR (ITU-R) 656 format
- Accepts parallel digital video input CCIR (ITU-R) 656 directly
- De-serialises serial digital video input CCIR (ITU-R) 656
- Incorporates polyphase filters to enable the resolution to be changed. Resolutions supported are 352, 480, 544 and 704 (horizontal)
- Provides loss of video detection which results in switching to an internally-generated test pattern or freeze frame (selectable)
- Synchronises input video frames to the 27 MHz system clock reference provided by the Multiplexer / Baseband Modulator Card.
- Provides internal Test Pattern Generator which may be used as the video source for testing purposes

Various LEDs are located along the edge of the card to indicate the card status and functionality.

Table 4.1: Video Input Card LEDs

Annotation	Colour	Function
+15V	Green	Lights to indicate supply present
+5V	Green	Lights to indicate supply present.
-5V	Green	Lights to indicate supply present
-15V	Green	Lights to indicate supply present
525	Yellow	Lights to indicate equipment configured to accept a 525 line signal.
625	Yellow	Lights to indicate equipment configured to accept a 625 line signal.
COMPOSITE	Yellow	Lights to indicate equipment configured to accept an analogue composite video signal.
YUV	Yellow	Lights to indicate equipment configured to accept an analogue component video signal.
656 PAR.	Yellow	Lights to indicate equipment configured to accept a parallel digital video signal.
SERIAL	Yellow	Lights to indicate equipment configured to accept a serial digital video signal.
TPG ON	Yellow	Lights to indicate that the internal Test Pattern Generator is active.
SYS CLK	Yellow	Lights to indicate that video is synchronised with the system reference clock.
SOURCE CLK	Yellow	Lights to indicate that video is synchronised with the video source itself.

4.5.7 MPEG-2 Video Encoder Card S5430

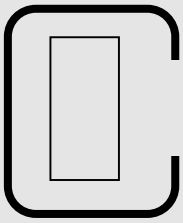
The MPEG-2 Video Encoder Card is fitted in slot position 3 of the Backplane. It performs the following functions:

- Receives digital YC_rC_b component CCIR (ITU-R) 656 format video input from the Video Input Card and compresses it according to the MPEG-2 standard to minimise the required bit-rate to transmit the video information
- Provides the MPEG-2 video packetised elementary stream to the Multiplexer / Baseband Modulator Card.

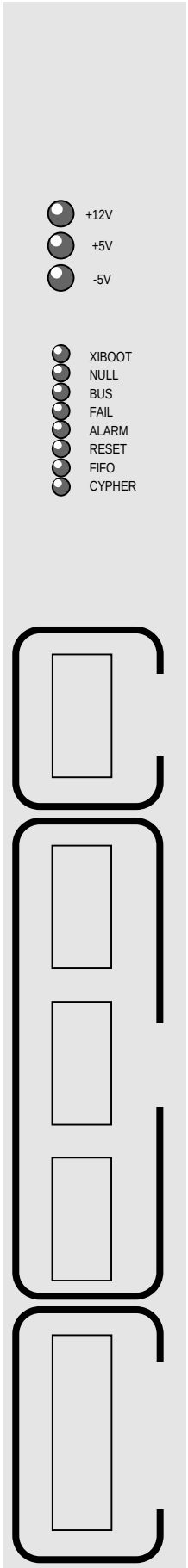
Various LEDs are located along the edge of the card to indicate the card status and functionality.

Table 4.2: MPEG-2 Video Encoder Card LEDs

Annotation	Colour	Function
+12V	Green	Lights to indicate supply present
+5V	Green	Lights to indicate supply present.
-5V	Green	Lights to indicate supply present
INIT	Green	Lights to indicate that the Encoder has been initialised correctly and the initial MPEG-2 bit-stream has been output. This LED should be ON when the Encoder is running.
U-FLOW	Red	Lights to indicate underflow of the Encoder buffer.
O-FLOW	Red	Lights to indicate overflow of the Encoder buffer.
XIBOOT	Yellow	Lights to indicate that the output stage of the card has been configured correctly. This LED should always be ON.



4.5.8 Multiplexer / Baseband Modulator Card S5898



The Multiplexer / Baseband Modulator Card is fitted in slot position 4 of the Backplane. It performs the following functions:

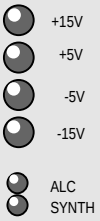
- Receives / stores video data from the Video Encoder Card and audio / data information from the ADT Card and multiplexes them together into a single baseband transport stream
- Forms 188 byte MPEG-2 transport stream packets by adding headers to the 184 bytes of data received from the requested source (video, audio and data). Inserts NULL packets if no data is available
- Data scrambling
- Baseband transport stream output to parallel DVB interface
- Provides serial transport stream output to the IRD
- Provides digital baseband signals to the IF Modulator
- Spectral Scrambling and Sync Inversion
- Reed-Solomon (204,188) forward error correction and Interleaving
- Convolutional Forward Error Correction (FEC)
- Pulse shaping filter (√35% cosine roll-off)
- Controls the output of CA and PSI packets into the transport stream.
- Controls the reset for the entire Codec
- Real Time Clock, Temperature Sensor and Front Panel Interface

Various LEDs, indicating card status and functionality, are placed along the edge of the card and are visible through cut-outs in the rear panel.

Table 4.3: Multiplexer / Baseband Modulator Card LEDs

Annotation	Colour	Function
+15V	Green	Lights to indicate supply present
+5V	Green	Lights to indicate supply present
-5V	Green	Lights to indicate supply present
XIBOOT	Yellow	Lights to indicate Mux circuitry is correctly configured. Should always be ON.
NULL	Yellow	Lights to indicate that the currently transmitted packet is a null. Should always be ON. Once the system is operating, the LED may glow dimly due to occasional nulls. If this LED is completely OFF the Multiplexer is in test mode or failed.
BUS	Yellow	Should always be ON if any of the input sources are active. LED brightness depends on the relative number of non null packets sent. If this LED is OFF, there is no information from other sources passing through the Multiplexer.
FAIL	Red	Lights in conjunction with energising FAIL relay (contacts at RESET/STATUS connector). A software-controlled indication of problems in the system.
ALARM	Red	Lights in conjunction with the energising of the ALARM relay (contacts available at the RESET / STATUS connector). This is a software controlled indication of less serious (than FAIL) problems in the system.
RESET	Red	Lights when the external RESET is asserted.
FIFO	Red	Lights if there is a problem with the clock circuitry on the Multiplexer / Modulator interface. This LED should always be off when the equipment is set for IF output, but may light for a brief period during configuration changes to the Multiplexer / Modulator, and be on when set for baseband output.
CYPHER	Red	Lights when the data at the input to the cypher module is of an incorrect format (missing hex 47 sync bytes). This LED should always be OFF.

4.5.9 IF Modulator Card S5900



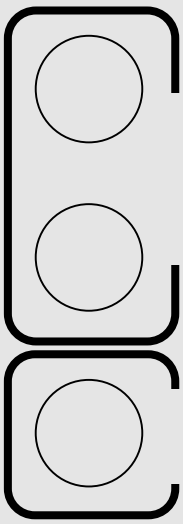
The IF Modulator Card is fitted in slot position 5 of the Backplane. It performs the following functions:

- Receives digital baseband signals from the Multiplexer / Baseband Modulator Card and modulates it for transmission as an IF signal to uplink equipment.
- Modulates a 70 or 140 MHz carrier with the data output signal using Quadrature Phase Shift Keying (QPSK)
- IF output frequency control over the ranges 70 MHz ± 20 MHz and 140 MHz ± 40 MHz in 125 kHz steps
- IF output power level control over the range –27 dBm to +5 dBm in 0.1 dB steps
- Provides the main IF modulated output for routing to the Up-converter / High Power Amplifier equipment
- Provides two modulated IF monitoring outputs, one of which is intended to provide a dedicated IF signal feed to the IRD Card (S5902)

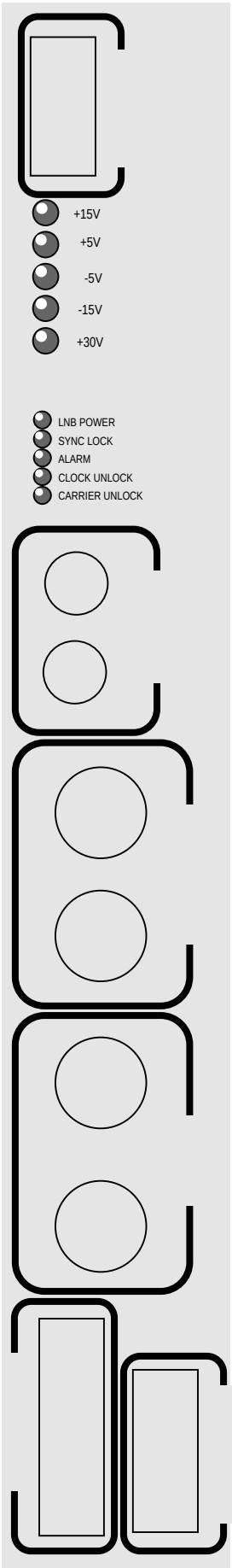
Various LEDs are located along the front edge of the cards to indicate card status and functionality.

Table 4.4: IF Modulator Card LEDs

Annotation	Colour	Function
+15V	Green	Lights to Indicate supply is present.
+5V	Green	Lights to Indicate supply is present.
-5V	Green	Lights to Indicate supply is present.
-15V	Green	Lights to Indicate supply is present.
ALC	Red	Automatic level control of the IF signal is not levelled.
SYNTH	Red	Synthesiser 1 or 2 out of lock.



4.5.10 Integrated Receiver-Decoder Card S5902



The Integrated Receiver-Decoder Card (M2/ESN/SNGB option only) is fitted in slot position 6 of the Backplane. It performs the following functions:

- Provides a local monitoring facility for the DSNG encoded, multiplexed and modulated video, audio and data channels. The DSNG output can be monitored at the following stages: baseband, IF or L-band. This facility may also be used to monitor other unrelated baseband or L-band transmissions
- Demodulates digital QPSK modulated IF signals
- Provides Viterbi and Reed-Solomon (204, 188) decoding
- Provides descrambling and demultiplexing to restore original video, audio and data signals
- Provides video, audio channel decoding, single synchronous and asynchronous data monitoring outputs
- Provides a tuneable frequency-synthesised local oscillator for the down-conversion of the L-band input
- Generates a dc supply voltage for a Low Noise Block (LNB) which may be connected via the L-band input

Various LEDs are located along the edge of the cards to indicate card status and functionality.

Table 4.5: Integrated Receiver-Decoder Card LEDs

Annotation	Colour	Function
+15V	Green	Lights to Indicate supply is present.
+5V	Green	Lights to Indicate supply is present.
-5V	Green	Lights to Indicate supply is present.
-15V	Green	Lights to Indicate supply is present.
+30V	Green	Lights to Indicate supply is present.
LNB POWER	Yellow	Lights to indicate that the dc power supply is enabled on the L-band connector.
SYNC LOCK	Green	Lights to indicate lock with the transport stream.
ALARM	Red	Lights to indicate an alarm condition within the IRD. May also light if either baseband input is used in the absence of L-band or IF inputs.
CLOCK UNLOCK	Red	Lights to indicate symbol rate clock synchronisation has been lost. May also light if either baseband input is used in the absence of L-band or IF inputs.
CARRIER UNLOCK	Red	Lights to indicate that carrier synchronisation has been lost. May also light if either baseband input is used in the absence of L-band or IF inputs.

BLANK

Chapter 5

Preventive Maintenance and Fault-finding

Contents

List of Illustrations

List of Tables

BLANK

5.1 Preventive Maintenance

This section provides the schedules and instructions, where applicable, for routine inspection, cleaning and maintenance which should be performed by an Operator.

5.1.1 Routine Inspection

Cooling Fans

Cooling fans are operated in two banks of three; at very low temperatures (below 0°C) all the fans are off, at cold temperatures (between 0°C and 20°C) three fans are off, and at normal / high temperatures (above 20°C) all six fans are on. If the front panel Status / System screen display indicates overtemperature or fans not working, or if the cooling fans are not rotating or in the event of overheating problems see *Table 5.6*.

> **NOTE...**
>
> Failure to ensure a free flow of air around the unit may cause overheating. This condition may be detected by a temperature sensor in the PSU which will trigger an automatic shut-down. The PSU will not reset until the temperature has fallen to within normal operational limits.

Rear Panel LEDs

It is possible for localised faults to arise on this equipment in circuits which are not currently used, i.e. in a different coding mode or screen resolution. Therefore, it is worthwhile periodically checking the rear of the equipment to check the status of the LEDs.

5.1.2 Cleaning

Unplug the equipment from the wall outlet before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a damp cloth for cleaning.

5.1.3 Servicing

Servicing

Do not attempt to service this product as opening or removing covers may expose dangerous voltages or other hazards. Refer all servicing to service personnel who have been authorised by NDS.

Damage Requiring Service

Unplug the equipment from the wall outlet and refer servicing to qualified service personnel under the following conditions:

1. When the power-supply cord or plug is damaged.
2. If liquid has been spilled, or objects have fallen into the product.
3. If the product has been exposed to rain or water.

4. If the product does not operate normally by following the operating instructions. Adjust only those controls that are covered by the operating instructions, as an improper adjustment of other controls may result in damage and will often require extensive work by a qualified technician to restore the product to its normal operation.
5. If the product case has been damaged.
6. When the product exhibits a distinct change in performance.

Replacement Parts

When replacement parts are required, be sure the service technician has used parts specified by the manufacturer or have the same characteristics as the original part. Unauthorised substitutions may result in fire, electric shock or other hazards.

Checks on Completion of Servicing

Upon completion of any service or repairs to this product, ask the service technician to perform safety checks to determine that the product is in a safe operating condition. Also, performance and EMC checks may be required.

5.1.4 Maintenance

Warranty

The equipment supplied to the customer is covered by standard NDS warranty service for a period of 12 months from delivery.

In the unlikely event that this item of equipment should fail, please use the Customer Support information at the front of this manual for the procedure covering its return.

The warranty covers the following:

- all material defects in the equipment for a period of 12 months;
- all parts and labour charges;
- repair of all returned items within 15 working days from receipt at the customer care centre;
- return of the repaired item to the customer, carriage paid;
- assistance to the customer through the Customer Help Line number (see the Customer Support information at the front of this manual).

The warranty does not cover any engineering visits to the customer’s premises.

Levels of Maintenance Support

During Warranty

The following support is available during the warranty period:

- 24 hr x 7 days telephone support;
- remote diagnostics;
- firmware revision control at a repair centre;
- NDS remote installation of software enhancements.

Continuing Support

There are four levels of continuing NDS maintenance offered to support this equipment. These offer extended warranty cover plus additional enhanced levels of support. A brief overview of the levels of support is given below:

- **Platinum**

  Unlimited on-site Technical Support Services

  Advanced exchange facility for repair (24 hour dispatch)

  On-site critical spares kit

  NDS on-site installation of software enhancements

  Software maintenance release

  Annual system check

- **Gold**

  Six on-site support visits

  Advanced exchange facility for repair (24 hour dispatch)

  NDS on-site installation of software enhancements

  Software maintenance release

  Annual system check

- **Silver**

  Two on-site support visits

  15 working day turn around for repair

  Software maintenance release

- **Bronze**

  15 working day turn around for repair

  Software maintenance release

More information can be obtained from NDS Customer Support; contact information is given in the preliminary pages of this manual.

5.2 Fault-finding

5.2.1 Maintenance Philosophy

The following sections provide fault-finding procedures to follow in the event of a suspected DSNG Codec failure. It is assumed that other equipment units have been eliminated as the possible cause of the failure (see relevant documentation).

WARNING...

HAZARDOUS VOLTAGES ARE PRESENT WITHIN THIS EQUIPMENT AND MAY BE EXPOSED IF THE COVERS ARE REMOVED. ONLY QUALIFIED AND TRAINED SERVICE ENGINEERS ARE PERMITTED TO SERVICE THIS EQUIPMENT.

It is the objective of this chapter to provide sufficient information to enable the rectification of apparent faults by Operator action, or else to identify the suspect card or module, where possible. In the event that the recommended action fails to clear the abnormal condition, call a Service Engineer or contact Customer Support using the information given in the preliminary pages of this manual.

IMPORTANT NOTE...

Unauthorised maintenance or the use of non-approved replacements may invalidate any warranties and/or affect the equipment specification.

5.2.2 Fault Diagnosis and Rectification for an Operator

Always investigate the failure symptoms fully, prior to taking remedial action. Fault diagnosis for the equipment Operator is limited to the following tasks, since the Operator is not expected to remove the covers of the equipment or handle the cards:

1. Monitor equipment status using the display screen error messages.
2. Check the front panel **Power** and **Alarm** LEDs.
3. Check the DSNG Codec on-card status LEDs. ALL green LEDs should be lit to indicate connected power supply. If any red LEDs are lit then refer to that card's section in *Chapter 4, Equipment Description* for a description of the LED function.
4. Replace external video, audio, data and power sources and cables by substitution to check their performance.
5. Confirm the equipment hardware configuration is suitable for the purpose and has been correctly installed and connected-up Reconfigure / reconnect as necessary.
6. Confirm that inappropriate Operator action is not causing the problem, and that the equipment software set-up, via the display screens, is capable of performing the task being asked of it. Change setup parameters as necessary.
7. Perform self-tests using the built-in facilities provided by the Diagnostics screens as necessary.
8. Replace fuse in the power connector at the rear panel.

9. Switch-off the equipment if it becomes unusable, or to protect it from further damage.
10. Call a trained and approved Service Engineer, or contact Customer Support) for further troubleshooting, or to replace an internal component or card.

> **NOTE...**
> The DSNG Codec must be connected to the monitor IRD in order to carry out tests in isolation.

5.2.3 Error Reporting

Categories of Error

Equipment status is monitored continuously by the Multiplexer / Baseband Modulator Card, and error messages are displayed on the Front Panel (and transmitted via the remote interface) in the event of a fault, or if poor operating procedure results in equipment capacity being exceeded. Relay contacts are also provided.

Three categories of error may be indicated:

1. **FATAL** - Errors of a serious nature requiring transmission to be terminated **immediately** to prevent possible damage to other equipment. The equipment will attempt to turn off the IF output automatically but may not be successful due to the nature of the fault. When a FATAL error is indicated, the IF output should be checked and, if necessary, turned off manually. Fatal failures trigger both the Alarm and Fail relays and cause the Front Panel Alarm LED to be lit.
2. **FAIL** - Errors of a serious nature which may stop the equipment from working successfully, but present no danger to other equipment. Failures cause both the Alarm and Fail relays to be triggered and the Alarm LED to be lit.
3. **ALARM** - Errors of a less serious nature which may or may not prevent the equipment from working successfully. Alarms cause the Alarm relay only to be triggered and the Alarm LED to be lit.

Alarm and Fail Relays

Alarm and **Fail** relays are located on the Multiplexer / Baseband Modulator Card and are switched in response to detected error conditions. Relay contacts are available at the rear panel RESET / STATUS connector (see *Chapter 2, Installation* for connector details) to enable the equipment status to be monitored from a remote location.

Error Masking and Selection

Any errors associated with the IF modulated output are classified as fatal failures and cannot be masked (disabled). Errors associated with multiplexing can be either alarms or failures depending on the nature of the error, and cannot be masked. Errors associated with the audio channels, data channels and the IRD can be set as alarms or failures or masked by the user using the **Setup / System / Alarm/Fail Relays** option. This option controls the relay contacts as well as the reporting of error messages on the Front Panel. Video errors can be either masked or enabled; when enabled, the nature of the fault determines whether an alarm or failure is appropriate. See *Table 5.1* for details.

Error Messages

Whenever an error occurs the current display is replaced by an error message display. A typical error message is shown in Figure 6.1.

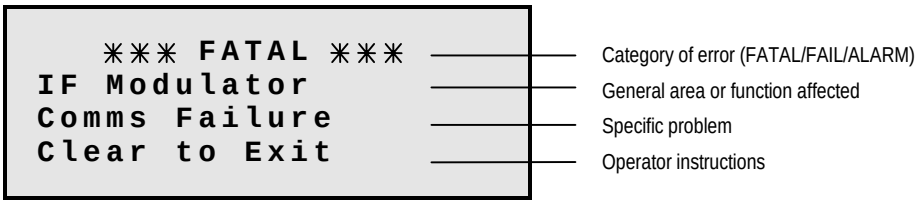


Figure 5.1: Typical Error Message

Error messages are accompanied by a beeper. After several seconds (2 to 3) the beeper is switched off automatically, and the screen cleared. Press **Clear** to remove both the beep and the screen immediately; the front panel Alarm LED will remain lit. To view this message again, and any other current error messages, go to the **Diagnostics / Display Errors** screen.

Table 6.1 lists the error messages which an Operator is likely to encounter, and the action which should be taken. In the event that an error message is displayed which is not listed here, check the rear panel LEDs for additional error indications and call a Service Engineer or contact Customer Support using the information in the preliminary pages of this manual.

Table 5.1: Error Messages

Error Message	Category	Possible Cause	Remedial Action
ADT Card Comms Failure	User selectable (**FAIL/ALARM/ IGNORE**)	ADT Card not fitted.	Check card is fitted. Call a Service Engineer to fit ADT Card.
		Faulty ADT Card.	Call a Service Engineer to replace ADT Card.
		Faulty MuxMod Card (if comms failure is also indicated on Video Encoder).	Call a Service Engineer to replace MuxMod Card.
ADT Card Audio Channel A	User selectable (**FAIL/ALARM/ IGNORE**)	Faulty ADT Card.	Call a Service Engineer to replace ADT Card.
ADT Card Audio Channel B	User selectable (**FAIL/ALARM/ IGNORE**)	Faulty ADT Card.	Call a Service Engineer to replace ADT Card.

Error Message	Category	Possible Cause	Remedial Action
ADT Card RS232 Channel A	User selectable (**FAIL/ALARM/ IGNORE**)	Faulty ADT Card.	Call a Service Engineer to replace ADT Card.
ADT Card RS232 Channel B	User selectable (**FAIL/ALARM/ IGNORE**)	Faulty ADT Card.	Call a Service Engineer to replace ADT Card.
ADT Card RS422 Channel	User selectable (**FAIL/ALARM/ IGNORE**)	Faulty ADT Card.	Call a Service Engineer to replace ADT Card.
IF Modulator Comms Failure	**FATAL**	IF Modulator Card not fitted.	Ensure the IF output is switched off. Check card is fitted. Call a Service Engineer to fit IF Modulator Card.
		Faulty IF Modulator Card.	Call a Service Engineer to replace IF Modulator Card.
		Faulty MuxMod Card.	Call a Service Engineer to replace MuxMod Card.
IF Modulator	**FATAL**	Faulty IF Modulator Card	Ensure the IF output is switched off. Call a Service Engineer to replace IF Modulator Card.
MuxMod Card	**FATAL**	Faulty Multiplexer / Baseband Modulator Card	Ensure the IF output is switched off. Call a Service Engineer to replace MuxMod Card.
MuxMod Card Invld Trnsprt Stream	**FATAL**	Invalid Transport Stream generated.	Call a Service Engineer to investigate and replace faulty card.
		Faulty Multiplexer / Baseband Modulator Card.	Ensure the IF output is switched off. Call a Service Engineer to replace MuxMod Card.
System Error Invalid Elem Stream	**FAIL**	Invalid Elementary Stream received from source on unknown card.	Call a Service Engineer to investigate and replace faulty card.
		Faulty MuxMod Card.	Call a Service Engineer to replace MuxMod Card.
Video Encoder Card Comms Failure	User selectable (**FAIL/IGNORE**)	Video Encoder Card not fitted.	Check card is fitted. Call a Service Engineer to fit Video Encoder Card.
		Faulty Video Encoder Card.	Call a Service Engineer to replace Video Encoder Card.
		Faulty MuxMod Card (if comms failure is also indicated on ADT Card).	Call a Service Engineer to replace MuxMod Card.
Video Encoder Card	User selectable (**FAIL/IGNORE**)	Faulty Video Encoder Card.	Call a Service Engineer to fit Video Encoder Card.
		Faulty/missing Video Input Card	Call a Service Engineer to fit Video Input Card.
Video Encoder Card Skipped Frames	User selectable (**FAIL/IGNORE**)	Bad video source or input termination.	Check video source and cable by substitution, if available.
		Faulty Video Input Card.	Call a Service Engineer to replace Video Input Card.
Video Encoder Card Startup Error	User selectable (**ALARM/IGNORE**)	Faulty Video Encoder Card.	Call a Service Engineer to replace Video Encoder Card.

Error Message	Category	Possible Cause	Remedial Action
Video Encoder Card Video Input Comms	User selectable (**ALARM/IGNORE**)	Video Input Card not fitted.	Check card is fitted. Call a Service Engineer to fit Video Input Card.
		Faulty Video Input Card.	Call a Service Engineer to replace Video Input Card.
		Faulty Video Encoder Card	Call a Service Engineer to replace Video Encoder Card.
Video Input Card	User selectable (**FAIL/IGNORE**)	Wrong line standard.	Check line standard specification.
		Faulty Video Input Card.	Call a Service Engineer to replace Video Input Card.
		Faulty MuxMod Card.	Call a Service Engineer to replace MuxMod Card.
Video Input Card Video Input Loss	User selectable (**ALARM/IGNORE**)	Loss of, or poor, input video signal.	Check video source and cable by substitution, if available.
		Faulty Video Input Card.	Call a Service Engineer to replace Video Input Card.
Video Input Card Serial Module	User selectable (**FAIL/IGNORE**)	Faulty Serial Module on Video Input Card.	Call a Service Engineer to replace Video Input Card.
Video Input Card Frame Sync Error	User selectable (**ALARM/IGNORE**)	Poor input video.	Check video source and cable by substitution, if available.
		Faulty Video Input Card.	Call a Service Engineer to replace Video Input Card.
MuxMod Card Time & Date	**ALARM**	Faulty Real-Time Clock Module on MuxMod Card.	Call a Service Engineer to replace MuxMod Card.
Cooling Fans	**ALARM**	Faulty cooling fan(s).	Inspect the fans at the left-hand side grill to see and feel if the fans are working as intended (see *Fan(s) Not Working / Overheating*). If not, switch off and call a Service Engineer.
		Power supply failure.	Check to see if any of the rear panel green power LEDs are not lit. Call Customer Support.
Over-Temperature XX°C	**ALARM**	Faulty cooling fan(s).	Check cooling fans (see above).
		Ambient air is too hot (greater than +55°C).	Switch off equipment to protect it. Inspect the grills at both sides of the equipment to ensure good air-flow (see *Chapter 2, Installation*). Re-locate equipment if necessary, or provide additional cooling.
Under-Temperature XX°C	**ALARM**	Ambient air is too cold (less than -20°C).	Re-locate equipment if necessary, or provide additional heating.
		Equipment may have been stored / transported in a cold environment.	Leave the equipment switched on for 30 minutes to warm-up.
Receiver (IRD) Card Comms Failure	User selectable (**FAIL/IGNORE**)	IRD Card not fitted.	Check card is fitted. Call a Service Engineer to fit IRD Card.
		Faulty IRD Card.	Call a Service Engineer to replace IRD Card.
Receiver (IRD) Card Up-converter	User selectable (**FAIL/IGNORE**)	Faulty IF input on the IRD Card.	Check operation using the internal baseband and L-band inputs. Call a Service Engineer to replace IRD Card.

Error Message	Category	Possible Cause	Remedial Action
Receiver (IRD) Card Signal Level	User selectable (**FAIL/IGNORE**)	Loss of, or poor, IF modulated signal. Faulty IRD Card.	Check stream input transmission equipment and cable by substitution, if available. Call a Service Engineer to replace IRD Card.
Receiver (IRD) Card RS422 Data Lock	User selectable (**FAIL/IGNORE**)	No RS-422 data present on the input stream. Faulty IRD Card.	Check the synchronous data source and re-send data to refresh the clock signal. Call a Service Engineer to replace IRD Card.
Receiver (IRD) Card RS232 Data Lock	User selectable (**FAIL/IGNORE**)	No RS-232 data present on the input stream. Faulty IRD Card.	Check the asynchronous data source and re-connect the stream to refresh the clock signal. Call a Service Engineer to replace IRD Card.
Receiver (IRD) Card Audio Lock	User selectable (**FAIL/IGNORE**)	No audio present on input stream. Faulty IRD Card.	Check the audio source and re-send. Call a Service Engineer to replace IRD Card.
Receiver (IRD) Card Unsupported Vid Std	User selectable (**FAIL/IGNORE**)	Unsupported Video Standard. Faulty IRD Card.	Check video source specification. Call a Service Engineer to replace IRD Card.
Receiver (IRD) Card Video Lock	User selectable (**FAIL/IGNORE**)	No video present on input stream. Faulty IRD Card.	Check video source and re-send. Call a Service Engineer to replace IRD Card.
Receiver (IRD) Card Demux Lock	User selectable (**FAIL/IGNORE**)	No valid internal baseband stream. Faulty IRD Card.	Check IF and L-band operation. Call a Service Engineer to replace IRD Card.
Receiver (IRD) Card BER Threshold	User selectable (**FAIL/IGNORE**)	Loss of, or poor, IF modulated signal. Faulty IRD Card.	Check input stream transmission equipment and cable by substitution, if available. Call a Service Engineer to replace IRD Card.
Receiver (IRD) Card Demod Lock	User selectable (**FAIL/IGNORE**)	No valid external modulated stream. Faulty IRD Card.	Check internal baseband operation. Call a Service Engineer to replace IRD Card.
System Error PSU Error (+15V)	**FATAL**	Faulty PSU or MuxMod Card.	Ensure the IF output is switched off. Switch off the DSNG Codec and call Customer Support.
System Error PSU Error (-15V)	**FATAL**	Faulty PSU or MuxMod Card.	Ensure the IF output is switched off. Switch off the DSNG Codec and call Customer Support.
System Error PSU Error (-5V)	**FATAL**	Faulty PSU or MuxMod Card.	Ensure the IF output is switched off. Switch off the DSNG Codec and call Customer Support.

5.2.4 Front Panel Display Problems

Introduction

Use the following techniques to troubleshoot the Codec when controls, LEDs or the display is not functioning as expected. The problem may also be accompanied by alarm indications at the rear panel LEDs. If the front panel **Alarm** LED is displayed accompanied by an error message, then troubleshoot in accordance with the message (see *Error Messages*).

Self-Test functions are described under the relevant screen heading in *Chapter 3, Local Control and Operation*.

If the actions described below fail to clear the fault symptoms, the fault probably lies with either the Display Module itself or with the Multiplexer / Baseband Modulator Card. In this event, call a Service Engineer or contact Customer Support.

Screen is Blank

The display may be too dim to be seen in the ambient light conditions. Adjust the contrast setting. Press **Setup**, **System**, **v**, **v**, **Enter**, **1**, **Enter**, to set to maximum (100%) contrast.

If the screen remains blank, check that the front panel **Power** LED and the rear panel power supply LEDs on each of the cards are lit. If not, refer to *Power Supply Problems / LEDs Unlit*.

Area of the Screen is Permanently Blank or Lit

If an area of the screen is suspect (either permanently blank or lit), perform a self-test using the Diagnostics / Off Line Diags option to check the Front Panel Display.

Front Panel LED(s) / Key(s) are Not Functioning

If the front panel **Power** LED is not lit, refer to *Power Supply Problems / LEDs Unlit.*

If an LED or a Key appears not to be functioning, perform a self-test using the Diagnostics / Off Line Diags option to check the Front Panel LEDs and Keyboard. See also *Setup and / or Diagnostics Screens Cannot be Accessed.*

Setup and / or Diagnostics Screens Cannot be Accessed

If the Setup and/or Diagnostics screens are not displayed when the key is pressed it is probable that these have been deliberately protected, to prevent changes being made to the equipment configuration. A Setup / System / Disable Setup/Diags screen enables a password to be set, which must be entered before access to these screens is possible (see *Chapter 3, Local Control and Operation*).

Password Does Not Work / Forgotten

In the event that a password used on the equipment does not work or has been forgotten, contact Customer Support.

Parameters Cannot be Adjusted

If parameters cannot be adjusted on screen, check the following:

1. Check that you are in Setup or Diagnostics mode. Changes cannot be made to the Status screens (see *Chapter 3, Local Control and Operation*).
2. Check that the Keys are functioning. Perform a self-test using the Diagnostics / Off Line Diags option to check the Keyboard.

Commands are not Carried Out

If changes to parameters entered at the front panel display are seemingly not carried out, check the following:

1. Check that all changes to parameter settings and values are accepted by the equipment. The **Enter** key must be pressed after a parameter has been adjusted in order to implement the changes which have been selected.
2. Try using remote control to carry out the same instruction, if available. Does the problem still occur?

5.2.5 Video Channel Problems

In the event of video channel problems, if video has been lost altogether or performance is degraded, use *Table 5.2* to troubleshoot the Codec. In the event of persistent problems call a Service Engineer or Customer Support.

Table 5.2: Video Channel Troubleshooting

Step	Action	If Result of Action is Yes...	If Result of Action is No...
1	**Check for Error/Alarm Indications**. Is an error message displayed or alarm indicated at the rear panel LEDs.	Troubleshoot according to the displayed message (see *Table 5.1*) or identify the alarm LED (see *Chapter 4, Equipment Description*). Try to identify the source of the problem and the knock-on effects.	Proceed to next step.
2	**Check Video Input and Cables**. Check the video source is functioning correctly by connecting it directly to local monitoring equipment. Is the video signal present/clean?	Check the SYS CLOCK LED is lit to confirm that the video signal is properly synchronised. Check the input cables by swapping them with ones of known quality / performance, to see whether it is a cable problem. Freeze frame or black is indicative of video loss at the input.	Check the video cables by swapping them with ones of known quality / performance, to see whether it is a cable problem. If the cables are fine, troubleshoot the video source.
3	**Check Configuration**. Is the configuration valid? Is there sufficient output power, error correction, FEC, RS encoding. Is the correct input type set? output scrambled? Are the parameters which have been selected, workable (see *Getting Started* in *Chapter 3, Local Control and Operation*)?	Proceed to next step.	If in doubt about the configuration, load a configuration which has previously proven successful, and try again. Try temporarily turning off any audio/data services and reconfigure the equipment using the auto-calculation and selection mode. This will give better bit-rate and resolution to the video channel.
4	**Check Video Input Card**. Insert a video signal of known quality / performance or use the Setup / Video / Video Source option to insert a test pattern or choose a different video source. Is problem fixed?	Possible problem with the Video Input Card. Use the Diagnostics / Off-Line Diags / Video option to perform a self-test. Call a Service Engineer.	Proceed to next step.
5	**Check Video Output and Cables**. If the problem is present using the main IF output, does the problem exist when using the baseband output?	Check the output cable by swapping it with ones of known quality / performance, to see whether it is a cable problem.	Proceed to next step.
6	**Check IRD and Cables (M2/ESN/SNGB option only)**. Are the problems only exhibited on the monitoring IRD and not on the transmitted signal?	Possible problem with the IRD Card or associated cables. Use the Diagnostics / Off-Line Diags / Receiver screen to perform a self-test. Check IRD cables by swapping them for ones of known quality / performance. Call a Service Engineer.	Proceed to next step.
7	**Check IF Modulator Card**. Is the problem only present when using the main IF output?	Possible problem with the IF Modulator Card. Check whether IF Monitor Outputs are affected. Use the Diagnostics / Off-Line Diags / Modulator option to perform a self-test. Call a Service Engineer.	Proceed to next step.
8	**Check MuxMod Card**. Are audio/data channels also affected?	Possible problem with the Multiplexer / Baseband Modulator Card. Use the Diagnostics / Off-Line Diags / Multiplexer to perform a self-test. Call a Service Engineer.	Proceed to next step.
9	**Check Video Encoder Card**. Picture distortion may indicate a possible problem with the MPEG-2 Video Encoder Card. Is the picture distorted?	Try a different coding mode and see which areas of the picture are distorting. Use the Diagnostics / Off-Line Diags / Video option to perform a self-test. Call a Service Engineer.	If the fault persists, call a Service Engineer.

5.2.6 Audio Channel Problems

In the event of audio channel problems, if audio has been lost altogether or performance is degraded, use *Table 5.3* to troubleshoot the Codec. If the video channel is also affected, troubleshoot as for *Video Channel Problems*. In the event of persistent problems call a Service Engineer or contact Customer Support.

Table 5.3: Audio Channel Troubleshooting

Step	Action	If Result of Action is Yes…	If Result of Action is No…
1	**Check for Error/Alarm Indications**. Is an error message displayed or alarm indicated at the rear panel LEDs.	Troubleshoot according to the displayed message (see *Table 5.1*) or identify the alarm LED (see *Chapter 4, Equipment Description*). Try to identify the source of the problem and the knock-on effects.	Proceed to next step.
2	**Check Audio Input and Cables**. Check the audio source is functioning correctly by connecting it directly to local monitoring equipment. Is the audio signal present/clean?	Check the audio level bargraphs on the Setup / Audio / Ch Level screen to confirm that the audio signal is being received. Check the input cables by swapping them with ones of known quality / performance, to see whether it is a cable problem.	Check the audio cables by swapping them with ones of known quality / performance, to see whether it is a cable problem. If the cables are fine, troubleshoot the audio source.
3	**Check Configuration**. Is the configuration valid? Are the parameters which have been selected, workable (see *Getting Started* in *Chapter 3, Local Control and Operation*)?	Proceed to next step.	If in doubt about the configuration, load a configuration which has previously proven successful, and try again.
4	**Check ADT Card**. Use the Diagnostics / Off-Line Diags / Audio option to perform a self-test. Is a fault indicated?	Possible problem with the ADT Card. Check whether other audio channels are affected. Call a Service Engineer.	Proceed to next step.
5	**Check MuxMod Card**. Use the Diagnostics / Off-Line Diags / Multiplexer option to perform a self-test. Is a fault indicated?	Possible problem with the Multiplexer / Baseband Modulator Card. Check whether the video channel is affected. Call a Service Engineer.	Proceed to next step.
6	**Check IRD and Cables (M2/ESN/SNGB option only)**. Are the problems only exhibited on the monitoring IRD and not on the transmitted signal?	Possible problem with the IRD Card or associated cables. Use the Diagnostics / Off-Line Diags / Receiver screen to perform a self-test. Check IRD cables by swapping them for ones of known quality / performance. If the fault persists, call a Service Engineer.	If the fault persists, call a Service Engineer.

5.2.7 Data Channel Problems

In the event of data channel problems, if data has been lost altogether or performance is degraded, use *Table 5.4* to troubleshoot the Codec. If the video channel is also affected, troubleshoot as for *Video Channel Problems*. In the event of persistent problems call a Service Engineer or contact Customer Support.

> **NOTE...**
> Data inputs are not compressed by the DSNG Codec.

Table 5.4: Data Channel Troubleshooting

Step	Action	If Result of Action is Yes...	If Result of Action is No...
1	**Check for Error/Alarm Indications**. Is an error message displayed or alarm indicated at the rear panel LEDs.	Troubleshoot according to the displayed message (see *Table 5.1*) or identify the alarm LED (see *Chapter 4, Equipment Description*). Try to identify the source of the problem and the knock-on effects.	Proceed to next step.
2	**Check Data Input and Cables**. Check the data source is functioning correctly by connecting it directly to local monitoring equipment. Is the data signal present/clean?	Check the input cables by swapping them with ones of known quality / performance, to see whether it is a cable problem.	Check the input cables by swapping them with ones of known quality / performance, to see whether it is a cable problem. If he cables are fine, troubleshoot the data source..
3	**Check Configuration**. Is the configuration valid? Are the parameters which have been selected, workable (see *Getting Started* in *Chapter 3, Local Control and Operation*)?	Proceed to next step.	If in doubt about the configuration, load a configuration which has previously proven successful, and try again.
4	**Check ADT Card**. Use the Diagnostics / Off-line Diags / Data option to perform a self-test. Is a fault indicated?	Possible problem with the ADT Card. Check whether other data channels are affected. Call a Service Engineer.	Proceed to next step.
5	**Check MuxMod Card**. Use the Diagnostics / Off-Line Diags / Multiplexer option to perform a self-test. Is a fault indicated?	Possible problem with the Multiplexer / Baseband Modulator Card. Check whether the video channel is affected. Call a Service Engineer.	Proceed to next step.
6	**Check IRD and Cables (M2/ESN/SNGB option only)**. Are the problems only exhibited on the monitoring IRD and not on the transmitted signal?	Possible problem with the IRD Card or associated cables. Use the Diagnostics / Off-Line Diags / Receiver screen to perform a self-test. Check IRD cables by swapping them for ones of known quality / performance. If the fault persists, call a Service Engineer.	If the fault persists, call a Service Engineer.

5.2.8 Alarm(s) Indicated but Signals are Good

If the front panel **Alarm** LED is displayed, accompanied by an error message, then troubleshoot in accordance with the message (see *Error Messages*).

If the DSNG Codec alarm is raised but video, audio and data transmission appear to be unaffected, this suggests that there is a very localised problem with functions not currently in use. Use the **Diagnostics / Off-Line Diags / Complete Self-Test Perform** option (see *Chapter 3, Local Control and Operation*) to perform a check on the unit. In the event of persistent problems call a Service Engineer or contact Customer Support

> **NOTE...**
> If operating in baseband mode, the red LEDs relating to the IF output stage will be on.

5.2.9 Power Supply Problems/LEDs Unlit

Introduction

WARNING...

IN THE EVENT OF A POWER SUPPLY FAULT, HAZARDOUS ENERGY LEVELS MAY BE PRESENT ON THE DSNG CODEC CARDS OR ON INTERFACES. IF SUCH A FAULT HAS OCCURRED, OR IS SUSPECTED, DO NOT TOUCH ANY EXPOSED WIRES, CONNECTORS OR CIRCUITRY.

In the event of a power supply problem, troubleshoot according to the observed symptom(s).

In the event of persistent problems call a Service Engineer or contact Customer Support

Power LED Unlit

If the DSNG Codec front panel **Power** LED is unlit, use *Table 5.5* to troubleshoot the problem.

Table 5.5: Power LED Troubleshooting

Step	Action	If Result of Action is Yes…	If Result of Action is No…
1	**Check for Error/Alarm Indications**. Is an error message displayed or alarm indicated at the rear panel LEDs.	Troubleshoot according to the displayed message (see *Table 5.1*) or identify the alarm LED (see *Chapter 4, Equipment Description*)	Proceed to next step.
2	**Check Power LED**. Is the Codec actually still working? Check the rear panel on-card LEDs.	If the Codec is clearly working normally then the **Power** LED itself is probably at fault. Call a Service Engineer.	If none of the rear panel on-card green d.c. supply LEDs are lit, proceed to next step.
3	**Check AC Power Source**. Connect a known-working piece of equipment to the power source outlet. Does it work?	The problems lies within the Codec or power cable. Proceed to next step.	The problem lies with the a.c. power source. Check building circuit breakers, fuse boxes, etc. If problem persists, contact the electricity supplier.
4	**Check Power Cable and Fuse**. Unplug the power connector from the Codec and try it in another piece of equipment. Does it work?.	The problems lies within the Codec. Proceed to next step.	The problem lies with either the cable itself, or with the fuse in the plug. Replace the fuse or try substitute another cable.
5	**Check PSU Module and Fuse**. Ensure the power connector is unplugged. Remove the fuse from the rear panel connector and inspect it. Has the fuse blown?	Replace the fuse with one of the correct type and rating (see *Chapter 2, Installation*). If the PSU still does not work, unplug the power cable and call a Service Engineer.	Possible problem with the PSU Module, call a Service Engineer.

> **NOTE...**
>
> The PSU contains over-temperature sensing circuitry which will shut down the DSNG Codec in the event of a problem (*see Fan(s) Not Working/Overheating*).

Rear Panel DC Supply LED(s) Unlit

If all the green LEDs at the left-hand side of the rear panel are unlit, troubleshoot as for *Power LED Unlit.* If the front panel **Alarm** LED is displayed, accompanied by an error message, then troubleshoot in accordance with the message (see *Error Messages*).

If one or more of the d.c. supply LEDs is unlit, call a Service Engineer to check the continuity of the d.c. supply from the PSU Module to the card(s), and to check that the card(s) is (are) seated properly in the Backplane connector.

Alarm LED Unlit when Alarm Occurs

If front panel **Alarm** LED is not lit when an alarm condition is reported on the front panel, then call a Service Engineer to check the LED signal path continuity.

> **NOTE...**
>
> Some card alarm LEDs do not generate a unit fault condition.

Fan(s) Not Working/Overheating

Cooling fans are operated in two banks of three. At very low temperatures (below 0°C), all the fans are off; at cold temperatures (between 0°C and 20°C), three fans are off, and at normal / high temperatures (above 20°C), all six fans are on.

If the front panel Status / System screen displays indicates an overtemperature or fans not working warning, or if the cooling fans are not rotating or in the event of other overheating problems, troubleshoot as detailed in *Table 5.6.*

CAUTION...

Failure to ensure a free air flow around the unit may cause overheating. This may be detected by the PSU and trigger an automatic shut-down. The PSU will not reset until the temperature is within normal operational limits.

Table 5.6: Fans Troubleshooting

Step	Action	If Result of Action is Yes...	If Result of Action is No...
1	**Check Panels**. All panels must be fitted to the enclosure for normal operation, to ensure correct air-flow around the enclosure. Are the panels fitted?	Proceed to next step.	Ensure missing panel(s) are fitted and secured in position.
2	**Check Fan Rotation**. Inspect the fans located at the sides of the enclosure. Are the fans rotating as expected (see text above)?	Check that the Codec has been installed with sufficient space allowed for air flow (see *Chapter 2, Installation*). If the ambient air is too hot, additional cooling may be required.	Possible break in the dc supply from the PSU Module to the suspect fan(s). Call a Service Engineer.

5.3 Disposing of this Equipment

5.3.1 General

Dispose of this equipment safely at the end of its life. Local codes and/or environmental restrictions may affect its disposal. Regulations, policies and/or environmental restrictions differ throughout the world. Contact your local jurisdiction or local authority for specific advice on disposal.

5.3.2 Lithium Batteries

The Multiplexer / Baseband Modulator Card uses a Dallas Semiconductor DS1286 device. This component contains a Panasonic BR1225 Poly-carbon monofluoride Lithium battery. This cell is not a USA Environmental Protection Agency listed hazardous waste. It is fully encapsulated and should not be tampered with.

BLANK

Annex A

Glossary

The following list is intended to cover most of the abbreviations, acronyms and terms used in System 3000 Technical Manuals. All terms may not be included in this manual.

µm	Micro metres (10-6 metres).
3:2 pulldown	A technique used when converting film material (which operates at 24 pictures per second) to 525-line video (operating at 30 pictures per second).
4:2:0	Digital video coding method in which the colour difference signals are sampled on alternate lines at half the luminance rate.
4:2:2	Digital video coding method in which the colour difference signals are sampled at half the luminance rate.
5B6B	Block code (5 binary bits encoded to 6 binary bits).
ac	Alternating Current.
ADPCM (Adaptive Differential Pulse Code Modulation)	A reduced bit rate variant of PCM audio encoding (see also PCM). This algorithm encodes the difference between an actual audio sample amplitude and a predicted amplitude and adapts the resolution based on recent differential values.
ADT	Audio, Data And Teletext.
AFC	Automatic Frequency Control.
AGC	Automatic Gain Control.
AMOL I and II (Automatic Measure of Lineups I and II)	Used by automated equipment to measure programme viewing ratings.
ASI	Asynchronous Serial Interface.
ASIC (Application-Specific Integrated Circuit)	A customised chip designed to perform a specific function.
Async	Asynchronous.
ATM (Asynchronous Transfer Mode)	A source independent transport mechanism, supporting variable bit-rate transmission, which uses fixed length packets (called cells) to transfer user data.
ATSC	Advanced Television Standards Committee.
B3ZS	Interface code (bipolar with three successive zeros substituted). Similar coding scheme to HDB3.
Backward Compatibility	A newer coding standard is backward compatible with an older standard if decoders designed to operate with the older coding standard are able to continue to operate by decoding all or part of a bit stream produced according to the newer coding standard.
BAT (Bouquet Association Table)	Part of the service information data. The BAT provides information about bouquets. It gives the name of the bouquet and a list of associated services.
Baud Rate	The rate of transfer of digital data when the data comprises information symbols that may consist of a number of possible states. Equivalent to bit rate when the symbols only have two states (1 and 0). Measured in Baud.

BER	Bit Error Rate: A measure of transmission quality. It is generally shown as a negative exponent, (e.g., 10^{-7} which means 1 out of 107 bits are in error or 1 out of 10,000,000 bits are in error). *Also:* Bit Error Ratio: The ratio of error bits to total error bits in a transport stream.
Bit-Rate	The rate of transfer of digital data when the data comprises two logic states, 1 and 0. Measured in bit/s.
Block; Pixel Block	An 8 row by 8 column matrix of luminance sample values, or 64 DCT coefficients (source, quantised, or dequantised).
Bouquet	A collection of services (TV, radio, and data, or any combination of the three) grouped and sold together, and identified in the SI as a group. A single service may be in several bouquets.
B-Picture; B-Frame (Bidirectionally Predictive Coded Picture/Frame)	A picture that is coded using motion-compensated prediction from previous I or P frames (forward prediction) and/or future I or P frames (backwards prediction). B frames are not used in any prediction.
BPSK (Binary Phase Shift Keying)	A data modulation technique.
Buffer	A memory store used to provide a consistent rate of data flow.
BW	Bandwidth.
CA (Conditional Access)	The technology used to control the access to viewing services to authorised subscribers through the transmission of encrypted signals and the programmable regulation of their decryption by a system such as viewing cards.
CAT (Conditional Access Table)	Part of the Service Information data. The CAT identifies the PID in which conditional access management data (EMMs) is being carried, per CA provider.
C-Band	The portion of the electromagnetic spectrum which spans the frequency range of approximately 4 GHz to 6 GHz. Used by communications satellites. Preferred in tropical climates because it is not susceptible to fading.
CCIR	*See:* ITU-R.
CCITT	*See:* ITU-T.
Channel	A particular bandwidth on which an individual viewing service is broadcast.
Channel Coding	A form of coding for the conversion of a digital signal into a signal that is matched to the characteristics of the transmission channel.
Closed Captioning	A TV picture subtitling system used with 525-line analogue transmissions.
Codec	The combination of a coder followed by a complementary decoder located respectively at the input and output of a transmission path.
COFDM (Coded Orthogonal Frequency Division Multiplex)	A modulation system used particularly for terrestrial digital broadcasting.
Compression	Reduction in the number of bits used to represent an item of data. For the purposes of a broadcast system, it is the process of reducing digital information by discarding redundant portions of information that are not required upon reconstitution to produce viewing clarity.
Compression System	Responsible for compressing and multiplexing the video/audio/data bit streams, together with the authorisation stream. The multiplexed data stream is then transmitted to the satellite or cable headend.
Cr/Cb	Chrominance difference signals. These signals, in combination with the luminance signal (Y), define the colour of a particular point on a TV line.
CRC (Cyclic Redundancy Check)	A mathematical algorithm that computes a numerical value based on the bits in a block of data. This number is transmitted with the data and the receiver uses this information and the same algorithm to insure the accurate delivery of data by comparing the results of algorithm and the number received. If a mismatch occurs, an error in transmission is presumed.
CVBS (Composite Video Blanking and Synchronisation)	Analogue TV signals, e.g. PAL, NTSC.
dB (Decibels)	A ratio of one quantity (usually signal power) to another. Common variants are suffixed by an additional letter signifying that a single power measurement is referenced to a standard value: dBm - decibels relative to 1 mW dBW - decibels relative to 1 W.
DCE	Data Communications Equipment.
DCT (Discrete Cosine Transform)	An invertible, discrete orthogonal transformation. The values associated with blocks of pixel samples are transformed from the spatial domain into the frequency domain, producing coefficients in which spatially redundant information can be removed. Can be forward DCT or inverse DCT.

DDS	Direct Digital Synthesiser.
Decoder	The unit containing the electronic circuitry necessary to decode encrypted signals. Some decoders are separate from the receiver but, in satellite TV broadcasting, the term is often used interchangeably as a name for an Integrated Receiver Decoder (IRD). (The term IRD, or IRD/Decoder, is usually associated with satellite TV broadcasting while Cable systems are based on Converters or on Set-Top Boxes/Converters.)
Decoding Time Stamp	A field that may be present in a PES packet header that indicates the time that an access unit is to be decoded in the system target decoder.
Differential Coding	Method of source coding using the difference between the value of a sample and a predicted value.
DIL	Dual In Line.
DIN	Deutsches Institut für Normung.
Downlink	The part of the communications satellite circuit that extends from the satellite to the Earth.
DPCM (Differential Pulse Code Modulation)	A process in which a signal is sampled and the difference between each sample of a signal and its predicted value is derived from the succession of quantised values is converted by coding into a digital signal.
DSNG	Digital Satellite News-Gathering.
DSP	Digital Signal Processor.
DTE/DCE (Data Terminal Equipment/Data Communication Equipment)	Components in a packet switching network.
DTH (Direct To Home)	The term used to describe uninterrupted transmission from the satellite directly to the subscriber - that is, no intermediary cable or terrestrial network utilised.
DVB (Digital Video Broadcasting)	A European project which has defined transmission standards for digital broadcasting systems using satellite (DVB-S), cable (DVB-C) and terrestrial (DVB-T) media, created by the EP-DVB group and approved by the ITU. Specifies modulation, error correction, etc. (see ETS 300 421).
DVB SI	Digital Video Broadcasting Service Information.
Earth	Technical Earth: Ensures that all equipment chassis within a rack are at the same potential, usually by connecting a wire between the Technical earth terminal and a suitable point on the rack. This is sometimes known as a Functional earth. Protective Earth: Used for electric shock protection. This is sometimes known as a safety earth.
EBU	European Broadcast Union.
EIA	Electronics Industries Association (USA).
EIT (Event Information Table)	A component of the Service Information (SI) stream which contains information about events or programmes such as event name, start time, duration, etc.
Elementary Stream	A generic term for a coded video, coded audio or coded other bit stream.
EMC	Electromagnetic Compatibility.
Ethernet	A means by which machines are connected and communicate over a network.
ETS	European Telecommunications Standard.
ETSI	European Telecommunications Standards Institute.
FCC	Federal Communications Commission.
FDM (Frequency Division Multiplex)	A common communication channel for a number of signals, each with its own allotted frequency.
FEC	Forward Error Correction. *Also:* Future ECM Computer: responsible for preparation of FECMs from Programme Information.
FFT (Fast Fourier Transformation)	A fast algorithm for performing a discrete Fourier transform.
FIFO (First In, First Out)	A type of buffer.
Footprint	The area of the Earth's surface covered by a satellite's downlink transmission. Also (generally) the area from which the satellite can receive uplink transmissions.
FTP	File Transfer Protocol.
G.703	The ITU-T standard which defines the physical and electrical characteristics of hierarchical digital interfaces.

GOP (Group of Pictures)	MPEG video compression works more effectively by processing a number of video frames as a block. The NDS System Encoder uses a 12 frame GOP, every twelfth frame is an I frame.
GUI	Graphical User Interface.
HDTV	High Definition Television.
HPA (High Power Amplifier)	Used in the signal path to amplify the modulated and up-converted broadcast signal for feeding to the uplink antenna.
Hub	A device in a multipoint network at which branch nodes interconnect.
ICAM (Integrated Conditional Access Module)	Embedded in the IRD and responsible for descrambling and packet filtering and reception. It also contains the physical interface to the subscriber's viewing card.
IEC	International Electrotechnical Committee.
IF (Intermediate Frequency)	Usually refers to the 70 MHz or 140 MHz output of the modulator in satellite and cable transmission applications.
Interframe Coding	Predictive coding where values for prediction are taken from the previous and the current frame. That is, coding exploits temporal redundancy by using forward or backward prediction to produce P or B Frames.
Intraframe Coding	Coding of a macroblock or picture that uses information only from that macroblock or picture. Exploits spatial redundancy by using DCT to produce I Frames.
IP	Internet Protocol.
I-picture; I-frame (Intracoded Picture/Frame)	A picture/frame which is coded using purely intra coding, with reference to no other field or frame information. The I frame is used as a reference for other compression methods.
IPPV (Impulse Pay Per View)	One-time events that the subscriber purchases 'on impulse' IRD using pre-arranged credit from the SMS, not as part of a subscription.
IRD (Integrated Receiver Decoder)	The receiver with an internal decoder which is connected to the subscriber's TV. The IRD is responsible for receiving and de-multiplexing all signals. The unit receives the incoming signal and decodes it when provided a control word by the viewing card. (Domestic IRDs are also known as Set Top Units or Set Top Boxes.)
IRE (Institute of Radio Engineers)	No longer in existence but the name lives on as a unit of video amplitude measurement. This unit is 1% of the range between blanking a peak white for a standard amplitude signal.
ISDN (Integrated Services Digital Network)	An ISDN line usually refers to a 64 kbit/s data line.
ISO	International Standards Organisation.
ITS (Insertion Test Signal)	A suite of analogue test signals placed on lines in the VBI. Also known as VITS.
ITT	Invitation To Tender.
ITU-R	International Telecommunications Union - Radiocommunications Study Groups (was CCIR).
ITU-T	International Telecommunications Union - Telecommunications Standardisation Sector (was CCITT).
JPEG (Joint Photographic Experts Group)	An ISO/IEC international standards group developing an image compression algorithm for continuous tone still colour pictures.
Kbps	Kilo (thousand) bits per second.
Ku-band	The portion of the electromagnetic spectrum which spans the frequency range of approximately 12 GHz to 14 GHz. Used by communications satellites. Preferred for DTH applications because this range of frequency is less susceptible to interference.
LAN (Local Area Network)	A network which provides facilities for communications within a defined building or group of buildings in close proximity.
L-band	The frequency band from 950 MHz to 2150 MHz which is the normal input frequency range of a domestic IRD. The incoming signal from the satellite is down-converted to L-band by the LNB.
LED	Light Emitting Diode.
LNB (Low Noise Block Down-Converter)	The component of a subscriber satellite transmission receiving dish which amplifies the incoming signal and down-converts it to a suitable frequency to input to the IRD (typically 950 MHz - 1600 MHz).
LO	Local Oscillator.
LSB	Least significant bit.
LVDS	Low Voltage Differential Signal. *Also:* Low Voltage Differential Serial interface.

Macroblock	The four 8 x 8 blocks of luminance data and the two (for 4:2:0 chrominance format), four (for 4:2:2) or eight (for 4:4:4) corresponding 8 x 8 blocks of chrominance data coming from a 16 x 16 section of the luminance component of the picture. Macroblock can be used to refer to the sample data and to the coded representation of the sample values and other data elements.
Mbps	Mega (million) bits per second.
MCC (Multiplex Control Computer)	A component of the compression system. Using information from the AFS, the MCC sets up the configuration for the multiplexes under its control. An MCC controls the main and backup multiplexer for each transport stream.
MCPC	Multiple Channels Per Carrier.
MMDS (Multichannel Microwave Distribution System)	A terrestrial microwave direct-to-home broadcast transmission system.
Motion Compensation	The use of motion vectors to improve the efficiency of the prediction of sample values. The prediction uses motion vectors to provide offsets into the past and/or future reference frames or fields containing previously decoded sample values that are used to form the prediction error signal.
Motion Estimation	The process of estimating motion vectors in the encoding process.
Motion Vector	A two-dimensional vector used for motion compensation that provides an offset from the co-ordinate position in the current picture or field to the co-ordinates in a reference frame or field.
MP@ML (Main Profile Main Level)	A subset of the MPEG-2 standard which supports digital video transmissions from around 2 to 15 Mbit/s over both satellite and cable channels.
MPEG (Moving Pictures Experts Group)	The name of the ISO/IEC working group which sets up the international standards for digital television source coding.
MPEG-2	Industry standard for video and audio source coding using compression and multiplexing techniques to minimise video signal bit-rate in preparation for broadcasting. Also known as ISO/IEC 13818 [1]. Supersedes the MPEG-1 standard. The standard is split into layers and profiles defining bit-rates and picture resolutions.
MSB	Most significant bit.
MSymbol/s	Mega Symbols per second (10^6 Symbols per second)
Multiplex	A number of discrete data streams (typically 8 to 12) from encoders that are compressed together in a single DVB compliant transport stream for delivery to a modulator.
MUSICAM (Masking pattern adapted Universal Sub-band Integrated Coding And Multiplexing)	An audio bit rate reduction system relying on sub-band coding and psycho-acoustic masking.
Mux (Multiplexer)	Transmission multiplexer: receives EMMs from the ACC, ECMs from the BCC, video/audio data from the encoders, and the SI stream from the SIC. It then multiplexes them all into a single DVB-compliant transport stream, and delivers the signal to the uplink after modulation. The multiplexer also contains the cypher card which scrambles the services according to the control words supplied by the BCC.
Network	In the context of broadcasting: a collection of MPEG-2 transport stream multiplexes transmitted on a single delivery system, for example, all digital channels on a specific cable system.
NICAM	Near Instantaneously Companded Audio Multiplex.
NIT (Network Information Table)	Part of the service information data. The NIT provides information about the physical organization of each transport stream multiplex, and the characteristics of the network itself (such as the actual frequencies and modulation being used).
nm	Nano metres (10^{-9} metres).
NTSC (National Television Systems Committee)	The group which develops standards used in television broadcast systems in the United States. Also adopted in other countries (e.g. Mexico, Canada, Japan). This system uses 525 picture lines and a 60 Hz field frequency.
NVOD (Near Video On Demand)	A method of offering multiple showings of movies or events. The showings are timed to start at set intervals, determined by the broadcaster. Each showing of a movie or event can be sold to subscribers separately.
NVRAM (Non-volatile Random Access Memory)	Memory devices which, although permitting random read/write access, will not lose their information when power is removed. Stores the default configuration parameters set by the user.
OFDM	Orthogonal Frequency Division Multiplexing.
OSD (On-screen display)	Messages and graphics, typically originating from the SMS, and displayed on the subscriber's TV screen by the IRD, to inform the subscriber of problems or instruct the subscriber to contact the SMS.

Packet	A unit of data transmitted over a packet-switching network. A packet consists of a header followed by a number of contiguous bytes from an elementary data stream.
PAL (Phase Alternation by Line)	A colour television broadcasting system developed in Europe that uses 625 picture lines and a 50 Hz field frequency.
PAT (Program Association Table)	Part of the service information data. For each service in the multiplex, the PAT carries the basic mapping of all the data in the transport stream, associating each programme with a Program Map Table.
PCM (Pulse Code Modulation)	A process in which a signal is sampled, each sample is quantised independently of other samples, and the resulting succession of quantised values is encoded into a digital signal.
PCR (Program Clock Reference)	A time stamp in the transport stream from which the decoder timing is derived.
Pel (Picture Element)	Also known as a pixel.
PES (Program Elementary Stream)	A sequential stream of data bytes that has been converted from original elementary streams of audio and video access units and transported as packets. Each PES packet consists of a header and a payload of variable length and subject to a maximum of 64 kBytes. A time stamp is provided by the MPEG-2 systems layer to ensure correct synchronisation between related elementary streams at the decoder.
PID	Packet Identifier: the header on a packet in an elementary data stream which identifies that data stream. An MPEG2/DVB standard. *Also:* Project Initiation Document, Programme ID.
PIN (Personal Identification Number)	A password used to control access to programming and to set purchase limits. Each subscriber household can activate several PINs and may use them to set individual parental rating or spending limits for each family member.
Pixel; Picture Element	The digital representation of the smallest area of a television picture capable of being delineated by the bit stream.
pk-pk	Peak to peak.
PLL	Phase-Locked Loop.
PMT (Program Map Table)	Part of the Service Information data. Each programme has a PMT which lists the component parts (the elementary streams of video, audio, etc.) for the various programmes being transmitted.
P-picture/P-frame	A picture/frame produced using forward prediction. It contains predictions from either previous I frames or previous P frames. The P frame is used as a reference for future P or B frames.
ppm	Parts per million.
PPV (Pay Per View)	A system of payment for viewing services based on a usage/event basis rather than on on-going subscription. Subscribers must purchase viewing rights for each PPV event that they wish to view. PPV events may be purchased as IPPV or OPPV (q.v.).
Program	A sequence of instructions for a computer. A concept having a precise definition within ISO 13818-1 (MPEG-2). For a transport stream, the time base is defined by the PCR. The use of the PCR for timing information creates a virtual channel within the stream.
Programme	A linking of one or more events under the control of a broadcaster. For example, football match, news show, film show. In the MPEG-2 concept, the collection of elementary streams comprising the programme have a common start and end time. A series of programmes are referred to as events.
PROM (Programmable Read-Only Memory)	A device which may be written once with data for permanent storage, and then read whenever required. Special types of PROM permit the erasure of all data by Ultra Violet light (EPROM) or by application of an electronic signal (EEPROM).
PS (Program Stream)	A combination of one or more PESs with a common timebase.
PSI (Program Specific Information)	Consists of normative data which is necessary for the demultiplexing of transport streams and the successful regeneration of programs. (*See also:* service information).
PSIP (Program System Information Protocol)	The ATSC equivalent of SI for DVB.
PSK (Phase Shift Keying)	A method of modulating digital signals particularly suited to satellite transmission.
PSR (Professional Satellite Receiver)	*See also:* IRD.
PSU	Power Supply Unit.
QAM (Quadrature Amplitude Modulation)	A method of modulating digital signals which uses combined techniques of phase modulation and amplitude modulation. It is particularly suited to cable networks.

QPSK (Quadrature Phase Shift Keying)	A form of phase shift keying modulation using four states.
Quantising: Quantisation	A process in which the continuous range of values that a quantity may assume is divided into a number of predetermined adjacent intervals and in which any value within a given interval is represented by a single predetermined value within the interval. *Also:* A restriction of the number of DCT coefficient values, resulting in a limiting of the luminance and chrominance information.
RAM (Random Access Memory)	A volatile storage device for digital data. Data may be written to, or read from, the device as often as required. When power is removed, the data it contains is lost.
RF	Radio Frequency.
ROM (Read-Only Memory)	A non-volatile storage device for digital data. Data has been stored permanently in this device. No further information may be stored (written) there and the data it holds cannot be erased. Data may be read as often as required.
RS (Reed Solomon coding)	An error detection and correction coding system which is applied to the Transport Stream before transmission to counter the effects of interference.
RLC (Run Length Coding)	Minimisation of the length of a bit stream by replacing repeated characters with an instruction of the form 'repeat character *x y* times'.
SCPC	Single Channel Per Carrier.
Scrambling	Alteration of the characteristics of a television signal in order to prevent unauthorised reception of the information in clear form. *Also:* A process (in digital transmission) used to combine a digital signal with a pseudo-random sequence, producing a randomised digital signal, conveying the same information, in order to facilitate transmission.
SDT (Service Description Table)	Provides information in the SI stream about the services in the system; for example, the name of the service, the service provider, etc.
SELV	Safety Extra Low Voltage (EN 60950).
Set-Top Box (STB)	The cable equivalent of the IRD (q.v.)
SFN	Single Frequency Network.
SI (Service Information)	Digital data describing the delivery system, content and scheduling/timing of broadcast data streams. SI data provides information to enable the IRD to automatically demultiplex and decode the various streams of programmes within the multiplex. Specified in ISO/IEC 13818[1].
Smart Card	*See:* Viewing Card.
SMATV (Satellite Mast Antenna Television)	A distribution system which provides sound and television signals to the households of a building or group of buildings, typically used to refer to an apartment block.
SMPTE	Society of Motion Picture and Television Engineers.
SMS (Subscriber Management System)	A system which handles the maintenance, billing, control and general supervision of subscribers to conditional access technology viewing services provided through cable and satellite broadcasting. The SMS system provided by NDS links a number of Users on a LAN with Batch Processors and a File Server providing access to a Database and a separate dedicated Conditional Access Interface Server which communicates with an Authorisation Control Centre (ACC). An SMS can be an automatic (e.g. Syntellect) system where subscribers order entitlements by entering information via a telephone. Alternatively, an SMS can be a manual system which requires subscribers to speak with an operator who manually enters their entitlement requests. Some systems support multiple SMSs.
SNG	Satellite News-Gathering.
SNMP	Simple Network Management Protocol.
Spatial Redundancy	Information repetition due to areas of similar luminance and/or chrominance characteristics within a single frame. Removed using DCT and Quantisation (Intra-Frame Coding).
SPI	Synchronous Parallel Interface.
Statistical Redundancy	Data tables are used to assign fewer bits to the most commonly occurring events, thereby reducing the overall bit rate. Removed using Run Length Coding and Variable Length Coding.
STB (Set-Top Box)	*See*: IRD.

TAXI (Transparent Asynchronous Tx/Rx Interface)	A proprietary multiplexer interface.
TCP/IP (Transmission Control Protocol/Internet Protocol)	A set of communications protocols that may be used to connect different types of computers over networks.
TDM (Time Division Multiplex)	One common, physical communications channel for a number of signals, each with its own allotted time slot.
TDT (Time and Date Table)	Part of the Service Information. The TDT gives information relating to the present time and date.
Temporal Redundancy	Information repetition due to areas of little or no movement between successive frames. Removed using motion estimation and compensation (Inter-Frame Coding).
Time Stamp	A term that indicates the time of a specific action such as the arrival of a byte or the presentation of a presentation unit.
Transport Stream	A set of packetised elementary data streams and SI streams which may comprise more than one programme, but with common synchronisation and error protection. The data structure is defined in ISO/IEC 13818-1 [1] and is the basis of the ETSI Digital Video Broadcasting standards.
Transport Stream Packet Header	A data structure used to convey information about the transport stream payload.
TS	Transport stream. A combination of one or more fixed length PESs with independent timebases into a single stream.
TSP	Transport Stream Processor.
U	44.45 mm (rack height standard).
UART (Universal Asynchronous Receiver Transmitter)	Located in the ICAM, provides byte and packet level communication with the viewing card. Also prepares information for serial communication.
Upconvert/ Downconvert	The process by which the frequency of a broadcast transport stream is shifted to a higher (lower) frequency range.
Uplink	The part of the communications satellite circuit that extends from the Earth to the satellite.
UPS (Uninterruptable Power Supply)	A device that conditions the power supply to equipment to ensure continuous power and the avoidance of power surges. It also provides power from batteries, for a short time, in case of mains failure.
UTC	Universal Time, Co-ordinated (previously Greenwich Mean Time or GMT). *Also* Unique Title Code.
VideoCrypt I VideoCrypt II	A brand name for NDS conditional access technology used by some analogue customers. Videocrypt was jointly developed by Videocrypt and NDS (formerly News Datacom at the time), and produces the chipset. Known as Thomson Multimedia in Europe. NDS later developed an independent system called NewsCrypt.
VideoGuard	A brand name for News Datacom conditional access technology.
Viewing Card	A credit-card sized programmable card. A CA security device in the subscriber's home, it receives and records entitlements from the ACC and checks these against the incoming programme information in the ECMs. If the subscriber is authorised by the SMS to view the current programme, the card provides the control word to the IRD. (Also known generally as a smart card or subscriber access card.)
VITS	Vertical Interval Test Signal. *See:* ITS.
VPS	Video Programming System.
WSS (Wide Screen Switching)	Data used in wide-screen analogue services which enables a receiver to select the appropriate display mode.
WST	World System Teletext.
XILINX	A type of programmable Integrated Circuit.
Y (Luminance)	Defines the brightness of a particular point on a TV line.

Annex B

Technical Specifications

Contents

List of Tables

BLANK

B.1 Signal Interface

Video Inputs

Composite (PAL or NTSC)

Table B.1: Composite Video Input Specification

Item	Specification
Analogue input:	625 line composite PAL System B, G, H, I as specified in CCIR (ITU-R) report 624-4 "Characteristics of Television Systems" and "Standards for 625-Line System I Transmissions in the United Kingdom", DTI 1984
or	525 line composite NTSC-M as specified in CCIR (ITU-R) report 624-4 "Characteristics of Television Systems"
Connector designation:	COMPOSITE/Y
Connector type:	BNC female socket
Input impedance:	75 Ω
Input level:	1 V pk-pk nominal ±5%
Return loss:	>30 dB up to 6 MHz

Analogue Component (YUV)

Table B.2: Component Video Input Specification

Item	Specification
Input standard:	Betacam Y, Pr, Pb, syncs on Y
Connector designation:	COMPOSITE/Y, B-Y, R-Y
Connector type:	Three BNC female sockets
Input impedance:	75 Ω
Input level:	1 V pk-pk nominal ±5%
Return loss:	>30 dB up to 6 MHz

Digital Parallel

Table B.3: Digital Parallel Video Input Specification

Item	Specification
Input standard (UK/EEC):	CCIR Rec. 656-1 (ITU-R BT.656) 4:2:2 YCbCr (625/525 lines, selectable)
Input standard (USA):	ANSI / SMPTE 125M -1992 "Television - Component Video Signal 4:2:2 - Bit Parallel Digital Interface"
Input format:	Digital parallel CCIR Rec. 656-1 part 2 (ITU-R BT.656)
Connector designation:	PARALLEL
Connector type:	25-way D-type female
Input impedance:	110 Ω ±10 Ω
Input level:	ECL-compatible, 2 V pk-pk max.
Int. Test Pattern Generator:	All ITU-R BT. 656 codes

Digital Serial

Table B.4: Digital Serial Video Input Specification

Item	Specification
Input standard (UK/EEC):	CCIR Rec. 656-1 (ITU-R BT.656) 4:2:2 YCbCr
Input standard (USA)	ANSI / SMPTE 259M -1993 “Television - 10-bit 4:2:2 - Component and 4fsc NTSC Composite Digital Signals - Serial Digital Interface”
Input format:	Digital serial CCIR Rec. 656-1 part 3 (ITU-R BT.656)
Connector designation:	SERIAL
Connector type:	BNC female socket
Input impedance:	75 Ω
Cable length:	125 m, maximum
Input level:	800 mV pk-pk nominal ±10%
Return loss:	>15 dB, 10-270 MHz

Video Compression

Table B.5: Video Compression Specification

Item	Specification
Resolution (625 line mode):	704 pixels x 576 lines 544 pixels x 576 lines 480 pixels x 576 lines 352 pixels x 576 lines 352pixels x 288 lines (SIF)
Resolution (525 line mode):	704 pixels x 480 lines 544 pixels x 480 lines 480 pixels x 480 lines 352 pixels x 480 lines 352 pixels x 240 lines (SIF)
Bit-rate:	1.5 - 5 Mbit/s (selectable) - SIF 2 - 15 Mbit/s (selectable) - all other resolutions
Compression standard:	MPEG-2, Main Profile, Main Level

Audio Inputs

Table B.6: Audio Input Specification

Item	Specification
Input standard (analogue):	Balanced analogue
Input level:	0, +3, +6, +9, +12 or 18 dBm (factory set). +12 dBm = default
Input impedance:	600 Ω or 20 kΩ (selectable)
Input standard (digital):	AES/EBU digital (selectable)
Sampling rate:	48 kHz
Connector designation:	L/DIGITAL, R
Connector type:	XLR female socket (left socket is digital I/P)
Coding algorithm:	MPEG-1 / MPEG-2 Layer 1 / Layer 2
Supported coding modes:	Single channel, dual channel, joint stereo and normal stereo
Supported coded data rate:	32-384 kbit/s (layer 2), 32-448 kbit/s (layer 1) depending on.
	selected mode - see *Chapter 1, Introduction* for details

RS-422 Synchronous Data Input

Table B.7: RS-422 Synchronous Data Input Specification

Item	Specification
Type:	ITU-T V.11 (RS-422), synchronous serial data and clock
Connector designation:	RS-422
Connector type:	15-way D-type female
Clock frequencies:	n x 64 kbit/s from 64 kbit/s to 1024 kbit/s (selectable)
Timestamp:	Not supported
Operational modes:	Bit-pipe - Transport packet and byte alignment relative to the incoming bit-stream are arbitrary.

RS-232 Asynchronous Data Inputs

Table B.8: RS-232 Asynchronous Data Input Specification

Item	Specification
Type:	ITU-T V.24/V.28 (RS-232D) asynchronous serial data
Connector designation:	RS-232 CH A, RS-232 CH B
Connector type:	9-way D-type female
Supported baud rates:	1200, 2400, 4800, 9600 baud
Control mechanism:	XON/XOFF
Timestamp:	Not supported
Transport package alignment:	Transparent to data source. Port operates as a bit-pipe

Transport Stream Output

Table B.9: Transport Stream Output Specification

Item	Specification
Format:	Parallel LVDS, as defined in the DVB Physical Interface Rec.
Connector designation:	TRANSPORT STREAM OUTPUT DVB PARALLEL
Connector type:	25-way D-type female
Output data rate:	2-32 Mbit/s
Output data format:	DVB compliant

IF Output (Main)

Table B.10: IF Output (Main) Specification

Item	Specification
Connector type:	BNC female socket
Connector designation:	IF OUTPUT
Output Impedance:	75Ω
Output Power:	-27 dBm to +5 dBm in 0.1 dB steps
Return loss:	20 dBm min.
Symbol rate:	1.5-16 MSymbol/s
Convolutional FEC rates:	1/2, 2/3, 3/4, 5/6 and 7/8.
Pulse-shaping filter:	Nominally square root 35% cosine roll-off
Modulation:	QPSK (as per ETS 300 421)
IF spectrum inversion:	Selectable on/off
Transmission modes:	Modulation on/off Carrier on/off
Carrier frequency:	70 MHz ± 20 MHz 140 MHz ± 40 MHz Tuneable in 125 kHz steps
Carrier frequency error:	< 5 kHz
Carrier ON/OFF ratio:	> 50 dB min. 60 dB typical at +5 dBm output power
Carrier suppression (QPSK mode):	> 40 dB

Modulator implementation margin is compliant with ETS 300 421, tested with NDS MPEG-2 Professional IRD. Receive E_b/N_0 ratios (referred to the packet bit-rate R_r) for BER = 2×10^{-4} at Viterbi Decoder output, Quasi Error Free at RS Decoder output are summarised below:

Table B.11: Signal-to-Noise Ratio and FEC Rate

Convolutional FEC rate	E_b/N_0 ratio
1/2	4.5
2/3	5.0
3/4	5.5
5/6	6.0
7/8	6.4

IF Monitor Output 1

Table B.12: IF Monitor Output 1 Specification

Item	Specification
Format:	70 / 140 MHz QPSK modulated output (tuneable)
Connector type:	BNC female socket
Connector designation:	IF MONITOR OUTPUT 1
Output power:	-10 dB nominal, ±1 dB dependent on IF output power level
Output Impedance:	75 Ω
Return loss:	15 dBm min.

IF Monitor Output 2 (IRD)

Table B.13: IF Monitor Output 2 (IRD) Specification

Item	Specification
Format:	70 / 140 MHz QPSK modulated output (tuneable)
Connector type:	BNC female socket
Connector designation:	IF MONITOR OUTPUT 2 (IRD)
Output power:	-10 dB nominal, ±1 dB dependent on IF output power level
Output Impedance:	75 Ω
Return loss:	15 dBm min.

IRD Inputs (M2/ESN/SNGB option only)

L-Band

Table B.14: IRD L-band Input Specification

Item	Specification
Connector type:	BNC female socket
Connector designation:	L-BAND
Input Impedance:	75 Ω
Input power:	-30 to -65 dBm
Input frequency:	950 to 2050 MHz
Tuning increment:	125 kHz
IF filter bandwidth:	27 MHz/36 MHz (automatic selection dependent on symbol rate)
LNB control:	Receive polarisation control by electrical command via LNB IF feeder (normal and inverse spectrum)
Control voltage:	11.5 to 14 V (polarisation 1), 16 to 19 V (polarisation 2) as ETS 300 249 and ETS 300 158
Signal format:	As per ETS 300421
Symbol rate:	1.5 to 30 Msym/s

70 / 140 MHz IF

Table B.15: IRD IF Input Specification

Item	Specification
Connector type:	BNC female socket
Connector designation:	IF
Input power:	-10 dBm
Input Impedance:	75 Ω
Input frequency:	70 MHz ±20 MHz 140 MHz ±40 MHz
Tuning increment:	125 kHz

Transport Stream

Table B.16: IRD Transport Stream Input Specification

Item	Specification
Format:	Parallel LVDS as defined in the DVB Physical Interface Rec.
Connector type:	25-way D-type female socket
Connector designation:	TRANSPORT STREAM INPUT DVB PARALLEL

IRD Outputs (M2/ESN/SNGB option only)

Composite Video

Two composite video outputs provide the same video signal.

Table B.17: IRD Composite Video Output Specification

Item	Specification
Connector type:	BNC female socket
Connector designation:	COMPOSITE VIDEO OUTPUTS CH A, CH B
Video standards:	PAL-B, -D*, -G, -H, -I, -M NTSC-M * = some fine detail may be filtered out.
Load Impedance:	75 Ω
Output level:	1 V pk-pk

Audio

Two analogue channels are useable for stereo or two mono outputs.

Table B.18: IRD Audio Output Specification

Item	Specification
Connector type:	XLR male socket
Connector designation:	AUDIO OUTPUTS R, L
Load Impedance:	600 Ω
Output level:	+9, +12, +15, +18 dBm

RS-232 Data

Table B.19: RS-232 Asynchronous Data Output Specification

Item	Specification
Type:	CCITT V.24/V.28 (RS-232D) asynchronous serial data
Connector designation:	DATA OUTPUT RS-232
Connector type:	9-way D-type female
Supported baud rates:	1200, 2400, 4800, 9600 baud
Transport package alignment:	XON/XOFF

RS-422 Data

Table B.20: RS-422 Synchronous Data Output Specification

Item	Specification
Type:	CCITT V.11 (RS-422), synchronous serial data and external clock
Connector designation:	DATA OUTPUT RS-422
Connector type:	15-way D-type male
Clock frequencies:	n x 64 kbit/s from 64 kbit/s to 1024 kbit/s

B.2 Control and Monitoring Interface

Local Control

Local control and operation of the unit is effected by a front panel membrane keypad and associated 20 character by 4 line Vacuum fluorescent display. These are used to display, select and change parameters which are arranged on a series of display menus (for details see *Chapter 3, Local Control and Operation*).

Remote Control RS-485 / RS-422

An RS-485 / RS-422 interface is provided for the connection of a remote control terminal. This may be used to control the system configuration and operation (for details see *DSNG Codec Remote Control Interface Specification ST.TS.E5910*).

Table B.21: Remote Control (RS-485 / RS-422) Port Specification

Item	Specification
Connector designation:	CONTROL MULTIDROP RS-485/RS-422
Connector type:	9-way D-type female
Baud rate:	Selectable - 1200, 2400, 4800, 9600 or 19200 baud
Protocol:	Selectable - 7/8 data bits, 1/2 stop bits, no parity

Reset/Status

A relay-driven interface provides remote indication of alarm or fail conditions for the unit and provides a simple means to reset the unit.

Table B.22: Reset/Status Port Specification

Item	Specification
Connector designation:	RESET / STATUS
Connector type:	9-way D-type female
Series resistance:	5 Ω
Reset circuitry:	Two wire connection which is short circuit to reset Open circuit voltage <6 V Short circuit current <50 mA

B.3 Power Supply

Power Requirements

Table B.23: Power Supply Specification

Item	Specification
Power distribution system:	Type TN (IEC 950): Power distribution system having one point directly earthed, the exposed conductive parts of the installation being connected to that point by protective earth conductors.
Connection to supply:	Pluggable Equipment Type A (IEC 950): Equipment which is intended for connection to the building power supply wiring via a non-industrial plug and socket-outlet or a non-industrial appliance coupler or both.
Class of equipment:	Class I Equipment (IEC 950): electric shock protection by basic insulation and protective earth.
Rated voltage:	100-120 / 220-240 V_{RMS} (single phase)
Rated frequency:	45 - 440 Hz
Voltage selection:	Autosensing
Rated current:	4.5 A, power 300 W (100 - 120 V range) 2.5 A, power 300 W (220 - 240 V range)
Input connector:	CEE 22/IEC 3-pin male receptacle
Fuse:	Fuse in live conductor in power input filter at rear of unit. Do not use reversible plugs with this equipment.
Fuse type:	5 x 20 mm time delay (T) IEC 127 (EN60217-2 sheet 5) 1500 A
Fuse current rating:	6.3 A(T) for 100 - 120 V operation 4 A(T) for 220 - 240 V operation
Consumption:	250 W nominal

B.4 Physical Details

Table B.24: Physical Details

Item	Specification
Height:	222 mm (8.75”), 5U chassis
Width:	435 mm (17.13”) excluding fixing brackets
Overall width:	482 mm (19”) including fixing brackets
Depth:	470 mm (18.5”) excluding rear connector clearance
Mounting holes:	465 mm (18.3”) horizontal
Ventilation:	6 PAPST fans located in the right-hand side of the unit
Air flow:	Intake on LHS. Exhaust on RHS.
Approximate weight:	23 kg (50.7 lb.)

B.5 Environmental Conditions

Table B.25: Environmental Specification

Item	Specification
Operational	
Temperature:	-20°C to +50°C ambient with free air flow **NOTE...** The operation of this unit to specification can not be guaranteed below 0°C due to the commercial specification of the semiconductors used. However, extensive tests show that in practice the unit will operate reliably under these conditions.
Humidity:	0% to 90% (non-condensing)
Cooling requirements:	Free air flow for 50 mm around the sides of the unit
Handling/movement:	Designed for fixed use when in operation
Warm-up:	Unit may require up to 10 minutes warm-up time when operating at -20°C
Waterproofing:	Front Panel is splashproof
Storage/ Transportation	
Temperature:	-20°C to +70°C
Handling/movement:	Designed for truck or flyaway transportation (when mounted in a suitable flight case)
Humidity:	0% to 90% (non-condensing)
Transportation Survivability (when properly mounted in a suitable flight case)	
Free fall:	BS EN 60068-2-32:Part 2 Test Ed:1993 Height of fall: 0.5m Test surface: concrete Number of falls: 2 per face
Vibration (sinusoidal):	BS 2011:Part 2.1 Fc:1983 Frequency range: 5-8.5 Hz, amplitude 3.5 mm Frequency range: 8.5-350 Hz, amplitude 1.0g Sweep rate: 1 octave/minute Duration: 20 cycles in each mutual perpendicular axis
Vibration (random):	BS 2011:Part 2.1 Fdb:1973 with Amendments No. 1 (1977) and No. 2 (1984) Frequency range: 20-20000 Hz ASD level: 0.048 m^2/s^3 Duration: 2 hours in each mutually perpendicular axis
Bump:	BS 2011:Part 2.1 Eb:1987 with Amendment No. 1 (1993) Pulse shape: half-sine Pulse duration: 6 ms Amplitude: 25 g Number of bumps: 500 per direction

Please contact Customer Support at the address given at the front of this manual for recommendations regarding flight case suitability.

B.6 Compliance[1]

Safety

This equipment has been designed and tested to meet the following:

EN 60950: 1992	European	Safety of information technology equipment including business equipment (including amendment 2).
IEC950: 1992	International	Safety of information technology equipment including business equipment (including amendment 2).

EMC[2]

This equipment has been designed and tested to meet the following:

EN55022: Aug 1994 AS/NZS 3548	European Australian/ New Zealand	Emission Standard Limits and methods of Measurement of Radio Frequency Interference Characteristics of Information Technology Equipment – Class B.
EN50082-1: Jan 1992	European	Generic Immunity Standard Part 1: Residential, commercial and light industry.
FCC	USA	Conducted and radiated emission limits for a Class A digital device, pursuant to the Code of Federal Regulations (CFR) Title 47-Telecommunications, Part 15 Radio frequency devices, subpart B - Unintentional Radiators, Section 15.107 15.109. (FCC Part 15 Class B for computer devices)

B.7 CE Marking

CE

The CE mark is affixed to indicate compliance with the following directives:

89/336/EEC of 3 May 1989 on the approximation of the laws of the Member States relating to electromagnetic compatibility.

73/23/EEC of 19 February 1973 on the harmonisation of the laws of the Member States relating to electrical equipment designed for use within certain voltage limits.

> **NOTE...**
> The CE mark was first affixed to this product in 1996.

[1] The version of the standards shown is that applicable at the time of manufacture.
[2] The EMC tests were performed with the Technical earth attached, and configured using recommended cables.

B.8 C-Tick Mark[3]

The C-Tick mark is affixed to denote compliance with the Australian "Radiocommunications (Compliance and Labelling – Incidental Emissions) Notice made under s.182 of Radiocommunications Act 1992.

[3] All units comply with the C-Tick Mark but only those manufactured after March 1999 carry the label.

Annex C

Default Configurations

Contents

List of Tables

BLANK

C.1 Using / Restoring Default Configurations

The DSNG Codec is supplied with 16 default configurations which have been set up to suit a wide variety of applications. These configurations are undeleteable and may be restored to the current / editable configurations by using the **Setup / Restore Orig Confgs** option.

> **NOTE...**
> Restoring the default configuration files will erase all 16 of the current editable files and the current configuration being used. In order to preserve these customer specific configurations use the **Setup / Backup Configs** option.

The default configuration parameter values and settings are listed here to enable you to see what you are getting before carrying out a Restore command.

C.2 Default Configuration 0 (Current)

Configuration 0 is the configuration currently in use.

Table C.1: Default Configuration 0 (Current)

Function	Parameter	Value / Setting
System	Service Name	9 MHz, PAL, 2 Audio
	Config Title	9 MHz/PAL 2
	Setup/Diagnostics Mode	Enbaled
	Local/Remote Control	Local
	Remote Control Address	49
	Remote Control Baud Rate	19200
	Remote Control Parity	None
	Remote Ctrl No. of Data Bits	8
	Remote Ctrl No. of Stop Bits	1
	Display Brightness	50%
Modulator	Tx Bandwidth	9 MHz
	Symbol Rate	7.031 MSym/s
	FEC Rate	3/4
	Spectrum Inversion	Off
	Modulation	Off
	IF Output	Off
	IF Frequency	70 MHz
	IF Preset Output Power	-15 dBm
Multiplexer	Output Format	IF output
	Bit-rate	18 Mbit/s
	RS Code	On
	Scrambling	Off
	Scrambling Code	0000000

Function	Parameter	Value / Setting
	Packet Length	204 Bytes
	Baseband Output	On
Video	Source	PAL
	Line Standard	625
	Bit-rate	Maximum (8.62 Mbit/s)
	Pixel Resolution Mode	Auto
	Pixel Resolution	3/4 - 544 pixels
	Coding Mode	IBBP
	Low Delay Mode	Off
	Output On Video Loss	Freeze Frame
	Video PID	308
	VBV Buffer Size	0x1C0000
	Initial VBV Buffer Size	0x193333
Audio Channel A	Mode	Stereo
	Signal Type	Analogue (20 kΩ)
	Bit-rate	256 kbit/s
	Audio (On/Off/Tone)	On
	Language (Left)	English
	Language (Right)	English
	Delay	0 ms
	Audio PID	256
Audio Channel B	Mode	Stereo
	Signal Type	Analogue (20 kΩ)
	Bit-rate	256 kbit/s
	Audio (On/Off/Tone)	On
	Language (Left)	English
	Language (Right)	English
	Delay	0 ms
	Audio PID	257
Data	RS232 Channel A	Off
	RS232 Ch A Baud Rate	9600 baud
	RS232 Ch A PID	258
	RS232 Channel B	Off
	RS232 Ch B Baud Rate	9600 baud
	RS232 Ch B PID	259
	RS422 Channel	Off
	RS422 Bit-rate	1024 kbit/s
	RS422 PID	260
Receiver	Operating Mode	Tracking
	Input Interface	Baseband Serial (Internal)
	Symbol Rate	7.031 Msym/s
	FEC Rate	3/4
	Spectrum Inversion	Off

Function	Parameter	Value / Setting
	Polarisation (L-band)	Off
	LNB Power (L-band only)	Off
	LNB Local Oscillator Freq (L-band only)	10 GHz
	Carrier Frequency (L-band & 70 MHz only)	11.07 GHz
	Scramble (On/Off)	Off
	Scramble Code	0000000
	Video Stream PID	308
	Audio Stream PID	256
	RS232 Stream PID	258
	PCR Stream PID	8190
	BER Threshold	1e-4
	Signal Threshold	130
	525 Line Standard	NTSC
	625 Line Standard	PAL
	Output on Video Loss	Freeze Frame
	No. Sync on Video Loss	0 (syncs maintained forever)
	On-Screen Display on Signal Loss	On
	Audio Routing	Stereo, L to left, R to right
	Audio Gain	+12 dBm

C.3 Default Configuration 1

As configuration 0 except for:

Table C.2: Default Configuration 1

Function	Parameter	Value / Setting
System	Service Name	9 MHz, PAL, 1 Audio
	Config Title	9 MHz/PAL 1
Video	Bit-rate	Maximum (8.82 Mbit/s)
Audio Channel B	Audio (On/Off/Tone)	Test Tone

C.4 Default Configuration 2

As configuration 0

C.5 Default Configuration 3

As configuration 0 except for:

Table C.3: Default Configuration 3

Function	Parameter	Value / Setting
System	Service Name	9 MHz, PAL, 1 RS232
	Config Title	9 MHz/PAL 3
Video	Bit-rate	Maximum (8.81 Mbit/s)
Audio Channel B	Audio (On/Off/Tone)	Test Tone
Data	RS232 Ch A	On
	RS232 Ch A Baud Rate	9600 baud

C.6 Default Configuration 4

As configuration 0 except for:

Table C.4: Default Configuration 4

Function	Parameter	Value / Setting
System	Service Name	9 MHz, PAL, RS422
	Config Title	9 MHz/PAL 4
Video	Bit-rate	Maximum (7.79 Mbit/s)
Audio Channel B	Audio (On/Off/Tone)	Test Tone
Data	RS422 Channel	On
	RS422 Bit-rate	1024 kbit/s

C.7 Default Configuration 5

As configuration 0 except for:

Table C.5: Default Configuration 5

Function	Parameter	Value / Setting
System	Service Name	9 MHz, PAL, Interview
	Config Title	9 MHz/PAL Int
Video	Bit-rate	Maximum (8.82 Mbit/s)
	Low Delay Mode	Manual Resolution
Audio Channel B	Signal	Test Tone

C.8 Default Configuration 6

As configuration 0 except for:

Table C.6: Default Configuration 6

Function	Parameter	Value / Setting
System	Service Name	13.5 MHz, PAL, 2 Aud
	Config Title	13.5 MHz/PAL
Modulator	Tx Bandwidth	13.5 MHz
	Symbol Rate	10.547 MSym/s
Video	Bit-rate	Maximum (13.37 Mbit/s)
Data	RS232 Ch A	On
	RS232 Ch A Baud Rate	9600 baud

C.9 Default Configuration 7

As configuration 0 except for:

Table C.7: Default Configuration 7

Function	Parameter	Value / Setting
System	Service Name	18 MHz, PAL, Aud/Data
	Config Title	18 MHz/PAL
Modulator	Tx Bandwidth	18 MHz
	Symbol Rate	14.063 MSym/s
Video	Bit-rate	Maximum (15.00 Mbit/s)
Data	RS232 Ch A	On
	RS232 Ch A Baud Rate	9600 baud
	RS232 Ch B	On
	RS232 Ch B Baud Rate	9600 baud
	RS422 Ch B	On
	RS422 Bit-rate	1024 kbit/s

C.10 Default Configuration 8

As configuration 0 except for:

Table C.8: Default Configuration 8

Function	Parameter	Value / Setting
System	Service Name	18 MHz, PAL, Aud/Data
	Config Title	Baseband/PAL
Modulator	Tx Bandwidth	18 MHz
	Symbol Rate	14.063 Msym/s
Multiplexer	Output Format	IF output
	Bit-rate	18 Mbit/s
	RS Code	On
	Packet Length	204 Bytes
	Baseband Output	On
Video	Bit-rate	Maximum (14.30 Mbit/s)
Data	RS232 Ch A	On
	RS232 Ch A Baud Rate	9600 baud
	RS232 Ch B	On
	RS232 Ch B Baud Rate	9600 baud
	RS422 Channel	On
	RS422 Bit-rate	1024 kbit/s

C.11 Default Configuration 9

As configuration 0 except for:

Table C.9: Default Configuration 9

Function	Parameter	Value / Setting
System	Service Name	9 MHz, NTSC, 1 Audio
	Config Title	9 MHz/NTSC 1
Video	Video Source	NTSC
	Bit-rate	Maximum (8.82 Mbit/s)
Audio Channel B	Audio (On/Off/Test Tone)	Test Tone

C.12 Default Configuration 10

As configuration 0 except for:

Table C.10: Default Configuration 10

Function	Parameter	Value / Setting
System	Service Name	9 MHz, NTSC, Audio
	Config Name	9 MHz/NTSC 2
Video	Video Source	NTSC

C.13 Default Configuration 11

As configuration 0 except for:

Table C.11: Default Configuration 11

Function	Parameter	Value / Setting
System	Service Name	9 MHz, NTSC, 1 RS232
	Config Title	9 MHz/NTSC 3
Video	Video Source	NTSC
	Compression Bit-rate	Maximum (8.81 Mbit/s)
Audio Channel B	Audio (On/Off/Test Tone)	Test Tone
Data	RS232 Ch A	On
	RS232 Ch A Baud Rate	9600 baud

C.14 Default Configuration 12

As configuration 0 except for:

Table C.12: Default Configuration 12

Function	Parameter	Value / Setting
System	Service Name	9 MHz, NTSC, RS422
	Config Title	9 MHz/NTSC 4
Video	Video Source	NTSC
	Compression Bit-rate	Maximum (7.79 Mbit/s)
Audio Channel B	Audio (On/Off/Test Tone)	Test Tone
Data	RS422 Channel	On
	RS422 Bit-rate	1024 kbit/s

C.15 Default Configuration 13

As configuration 0 except for:

Table C.13: Default Configuration 13

Function	Parameter	Value / Setting
System	Service Name	9 MHz, NTSC Interview
	Config Title	9 MHz NTSC Int
Video	Video Source	NTSC
	Compression Bit-rate	Maximum (8.82 Mbit/s)
	Low Delay Mode	Manual Resolution
Audio Channel B	Signal	Test Tone

C.16 Default Configuration 14

As configuration 0 except for:

Table C.14: Default Configuration 14

Function	Parameter	Value / Setting
System	Service Name	13.5 MHz, NTSC, 2 Aud
	Config Title	13.5 MHz/NTSC
Modulator	Tx Bandwidth	13.5 MHz
	Symbol Rate	10.547 MSym/s
Video	Video Source	NTSC
	Compression Bit-rate	Maximum (13.37 Mbit/s)
Data	RS232 Ch A	On
	RS232 Ch A Baud Rate	9600 baud

C.17 **Default Configuration 15**

As configuration 0 except for:

Table C.15: Default Configuration 15

Function	Parameter	Value / Setting
System	Service Name	18 MHz, NTSC Aud/Data
	Config Title	18 MHz/NTSC
Modulator	Tx Bandwidth	18 MHz
	Symbol Rate	14.063 MSym/s
Video	Video Source	NTSC
	Compression Bit-rate	Maximum (15.00 Mbit/s)
Data	RS232 Ch A	On
	RS232 Ch A Baud Rate	9600 baud
	RS232 Ch B	On
	RS232 Ch B Baud Rate	9600 baud
	RS422 Ch	On
	RS422 Bit-rate	1024 kbit/s

C.18 **Default Configuration 16**

As configuration 0 except for:

Table C.16: Default Configuration 16

Function	Parameter	Value / Setting
System	Service Name	Bsbnd, NTSC Aud/Data
	Config Title	Bsband/NTSC
Modulator	Tx Bandwidth	18 MHz
	Symbol Rate	14.063 Msym/s
Multiplexer	Output Format	IF format
	Bit-rate	18 Mbit/s
	RS Code	On
	Packet Length	204 Bytes
	Baseband Output	On
Video	Video Source	NTSC
	Compression Bit-rate	Maximum (14.30 Mbit/s)
Data	RS232 Ch A	On
	RS232 Ch A Baud Rate	9600 baud
	RS232 Ch B	On
	RS232 Ch B Baud Rate	9600 baud
	RS422 Ch	On
	RS422 Bit-rate	1024 kbit/s

BLANK

Index

The following conventions are used in this manual: a page number entry in **bold** indicates a reference to a heading; a page number entry in *italic* is a reference to a table or figure; otherwise the page number indicates a reference to an entry on that page.

D

E

F

G

H

I

J

K

L

M

N

O

P

Q

R

S

T

U

V

W

Y

BLANK