TANDBERG
Television

ST.TM.E10100.1
Issue 1
ENGLISH (UK)

INSTRUCTION MANUAL

TT1260

Standard Definition
Professional Receiver/Decoder

Software Version 2.1 (and later)

TT1260/DIRBAS and Options

Typical TT1260 Satellite Receiver or Decoder

ENGLISH (UK)

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About this Manual

This manual provides instructions and information for the installation and operation of the TT1260 1U digital integrated Receiver/Decoder (IRD). It should be kept in a safe place for reference during the life of the equipment. Further copies of this manual can be ordered from the address shown on *page vii*. If passing the equipment to a third party, pass on the relevant documentation also.

Issues of this Manual

Issues of this manual are listed below:

Issue	Date	Software Version	Comments
1	March 2002	2.1	Initial release.

The following associated manual is also available:

- ST.QR.E10100: Quick Reference Guide

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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 TANDBERG Customer Services.

Contact Information

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Internet Address	http://www.tandbergtv.com

Customer Services and Technical Training Postal Address

Tandberg Television
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Comines Way
Hedge End
Southampton
Hampshire
SO30 4DA
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If you need to return equipment for repair, please contact the Customer Services Helpdesk on +44 (0) 23 8048 4455. A Returns Authorisation Number (RAN) will be issued and full details of the unit will be logged.

Technical Publications

If you need to contact TANDBERG Television Technical Publications regarding this publication, e-mail: techpubs@tandbergtv.com.

Chapter 1

Introduction

Contents

List of Figures

List of Tables

1.1 Scope of this Manual

1.1.1 Who Should Use this Manual

This manual is written for operators/users of the TT1260 Professional Receivers and Decoders. It describes the unit's functions and operation. The manual is written to assist in the installation and day-to-day care and operation of the unit. Maintenance information requiring the covers to be removed is not included.

> CAUTION...
>
> Removing the covers of this equipment may invalidate the warranty.

1.1.2 What this Manual Describes

Identifying the Equipment

The Receivers and Decoders are designated by the marketing numbers shown in *Table 1.1.*

Figure 1.1: Front View of a TT1260 Satellite Receiver

The Marketing Number and fitted options are defined by the following:

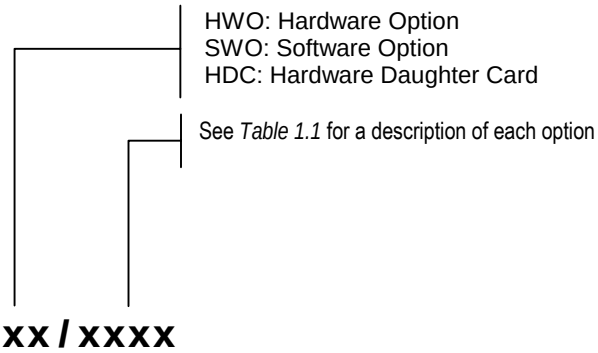

Figure 1.2: Make-up of TT1260 Marketing Numbers

Marketing Codes

Table 1.1 gives a description of each hardware Marketing Code and *Table 1.2* gives a description of each software key Marketing Code.

Table 1.1: Hardware Marketing Codes

Option Number	Marketing Codes	Engineering Number	Description
	TT1260/DIRBAS	E10100	TT1260 Base unit with Director Smart Card reader hardware, chassis
	TT1260/HDC/ALRM	S12316	Alarm Relay Card
3	TT1260/HWO/ASI	S12495	ASI Input Card, chassis backplate for ASI Input Card
4	TT1260/HWO/QPSK	S12496	QPSK Input Card, chassis backplate for QPSK Card
5	TT1260/HWO/HM	S12501	8PSK/16QAM Input Card, QPSK, 8PSK and 16QAM DVB-S capable, chassis backplate
6	TT1260/HWO/HSDATA	S12595	High Speed RS-422 Data Enabler Card
	TT1260/CABLE/XLR	S12667	Cable for 9-pin D-type to XLR stereo pair

Table 1.2: Software Key Marketing Codes

Option Number	Marketing Codes	Engineering Number	Description
	TT1260/SWO/16QAM	S12666	Software key for TT1260/HWO/HM, enabling QPSK, 8PSK, 16QAM
	TT1260/SWO/8PSK	S12666	Software key for TT1260/HWO/HM, enabling QPSK and 8PSK
	TT1260/SWO/SP	S12666	Software key for Signal Protection CA
	TT1260/SWO/RAS	S12666	Software key for RAS Mode-1 CA
	TT1260/SWO/DIR	S12666	Software key for VideoGuard Director CA/TANDBERG Director NCP
	TT1260/SWO/BISS	S12666	Software key for BISS-1/BISS-E

Software Versions

This manual has been written to cover the functions of software **versions 2.1 and later**. To verify the installed version access the *Systems Menu (#6)*. The menus are described in *Annex C, Menus.*

Table 1.3: Main Features of the Decoder Range

Marketing Code	Inputs	Input Data-rate	Coding	Digital Outputs
TT1260/HWO/ASI	2 x ASI	0.350-160 Mbit/s		✓

Table 1.4: Main Features of the Satellite Receiver Range

	Marketing Code	Inputs	Input Frequency	Input Symbol rate	FEC Rates	Digital Outputs
Satellite 8PSK	TT1260/HWO/HM TT1260/HWO/8PSK	2 x 8PSK	950 – 2150 MHz	1 – 44.5 Msymbols/s	QPSK: 1/2, 2/3, 3/4, 5/6, 7/8 8PSK: 2/3, 5/6, 8/9	✓
Satellite 8PSK 16QAM	TT1260/HWO/HM TT1260/SWO/16QAM	2 x 8PSK/16QAM	950 – 2150 MHz	1 – 44.5 Msymbols/s	QPSK: 1/2, 2/3, 3/4, 5/6, 7/8 8PSK: 2/3, 5/6, 8/9 16QAM: 3/4, 7/8	✓
Satellite QPSK	TT1260/HWO/QPSK	2 x QPSK	950 – 2150 MHz	1 – 44.5 Msymbols/s	QPSK: 1/2, 2/3, 3/4, 5/6, 7/8	✓

> NOTE...
> All models have analogue outputs as standard.

1.2 Summary of Features

1.2.1 Main Features

The TT1260 is fully compliant with the appropriate sections of the MPEG-2[1], DVB-S[2] and DSNG[3] specifications and offers the following features:

- Front Panel Controls and Indications:
  - ✧ A vertical split two line x 40 character back-lit dot matrix LCD display with pushbuttons for Up, Down, Left, Right, Edit, and Save to provide information and operator choice entry
  - ✧ LEDs to indicate lock and general alarm conditions
- Service Selection:
  - ✧ Chosen from a menu list of available services carried in the currently received transport stream
  - ✧ Up to 40 pre-selected choices can be stored within the unit
- Multiple Inputs (Satellite Receivers)
  - ✧ L-band Satellite Receivers have two inputs (either QPSK or QPSK, 8PSK and 16QAM)
- Video Decoding:
  - ✧ 4:2:0 mode support video resolutions up to 720 pixels x 576 active lines (25 frame/s) or 720 pixels x 480 active lines (30 frame/s)
  - ✧ 4:2:2 mode support video resolutions up to 720 pixels x 608 active lines (25 frame/s) or 720 pixels x 512 active lines (30 frame/s)
  - ✧ Support for PAL- I, B, G, D, PAL- N, PAL- M, and NTSC-M (with pedestal or without) composite video output via two 75Ω BNC connectors
- Audio Decoding:
  - ✧ Sampling rates 32, 44.1, 48 kHz
  - ✧ All MPEG-1 data rates
  - ✧ All Dolby Digital AC-3 data rates, decoded as a Dolby Stereo downmix
  - ✧ Linear uncompressed audio, data rates as defined by SMPTE 302M
- Data:
  - ✧ Low Speed Data: RS-232 asynchronous (up to 38.4 kbit/s)
  - ✧ High Speed Data: RS-422 synchronous (up to 2.048 Mbit/s) (option)
- Transport Stream Output:
  - ✧ ASI transport stream output with maximum data rate 160 Mbit/s

[1] Moving Pictures Expert Group: MPEG-2 specification ISO 13818.
[2] European Digital Video Broadcasting (DVB) Project. EN 300 421 Digital broadcasting systems for television, sound and data services: Framing structure, channel coding and modulation for the 11/12 GHz satellite service.
[3] European Digital Video Broadcasting (DVB) Project : EN 301 210 Digital broadcasting systems for television, sound and data services: Framing structure, channel coding and modulation for digital satellite news gathering (DSNG) and other contribution applications by satellite.

- Conditional Access/Scrambling:
  - ✧ Remote Authorisation System (RAS) version I
  - ✧ EBU Basic Interoperable Scrambling System (BISS) Mode-E
  - ✧ EBU Basic Interoperable Scrambling System (BISS) Mode-1
  - ✧ VideoGuard Director
  - ✧ TANDBERG Television Signal Protection
- TANDBERG Director system:
  - ✧ Over-air remote control is available if the TT1260 is used as part of a TANDBERG Director system (Over-air software downloading, Re-start, Tuning and Retuning etc.)

> NOTES...
> 1. The TANDBERG Director system GUI counts the inputs from zero (i.e. 0, 1).
> 2. TANDBERG Director versions 4 and onward allow selection of the L-band (RF) input.

- Remote Control:
  - ✧ RS-232 or RS-485
  - ✧ NCP Over-the-Air remote control via VideoGuard Director
  - ✧ When the remote control is active, front panel control is disabled but status information is still available (protocol is available from TANDBERG Television Limited)
- Clock/Calendar:
  - ✧ Available to co-ordinate universal and local time
  - ✧ Constantly updated when locked to a valid transport stream
- Transport Stream Demultiplexing:
  - ✧ Maximum capability is 160 Mbit/s, depending on CA in use and input front end
- Video Decoding:
  - ✧ Maximum Video Demultiplexing capability of 50 Mbit/s
- Audio:
  - ✧ Audio embedding in the digital video output
- Vertical Blanking Interval (VBI) signalling support:
  - ✧ World System Teletext (WST)
  - ✧ Support for Closed Captions and VITS/ITS/VITC
  - ✧ Inverted Teletext
  - ✧ Video Programming System (VPS)/Programme Delivery Control (PDC)
  - ✧ Neilson Coding AMOL 1 and AMOL 2
  - ✧ Vertical Interval Time Code (VITC)
  - ✧ Video Index
  - ✧ Video Test Pattern Generator
- Error Data Handling (EDH):
  - ✧ EDH is supported on the SDI (digital video) output
- Frame Synchronisation of digital video output to analogue input

- Control Methods:
  - ✧ Front Panel User Interface
  - ✧ Asynchronous serial remote control
  - ✧ Over-air remote control (TANDBERG Director system) (optional)

1.2.2 Inputs

ASI Inputs (Decoders)

Two BNC connectors support both byte-mode and single packet burst mode.

L-Band Inputs

Two F-type connectors connect the L-band output of a suitable LNB either directly or via a suitable attenuator giving lightning and surge protection.

Remote Control

A 9-way D-type, male connector used to connect to a PC and can be switched between the RS-232 and RS-485 input standards.

Frame Synchronisation

A BNC connector accepts a composite video input to which the video output timing can be synchronised.

1.2.3 Outputs

Transport Stream Outputs

- Two BNC connectors output ASI transport streams with a maximum data rate of 160 Mbit/s.

Video Outputs

- Two analogue composite video outputs carried on BNC connectors.
- Two digital video outputs carried on BNC connectors.

Audio Outputs

- Two 9-way D-type, female connectors decode two PES streams of audio from the transport stream. The audio outputs simultaneous analogue and digital. The digital mode can be changed via the user interface.

Data Output

- RS-232 asynchronous low-speed data output carried on a 9-way, D-type, female connector.
- RS-422 synchronous high-speed data output carried on a 9-way, D-type, female connector.

Alarm Output

A 9-way D-type connector for alarm and failure monitoring is carried out within the equipment. This produces a summary alarm signal that lights the general front-panel **ALARM** LED.

There is a 25-way D-type connector on the optional Alarm Relay Card (TT1260/HDC/ALRM) with six relays for failure monitoring for NCP over-air. The operator can define (using the Alarm Menu pages) which alarm conditions that drive the relays and also the general front-panel **ALARM** LED. This is described in *Chapter 4, Alarms* and *Annex C, Menus*.

1.2.4 Conditional Access and Scrambling

The transport stream received by the IRD may be encrypted. The CA system is used to decrypt the required components of the transport stream so that they can be decoded.

The following Conditional Access and Scrambling options are available for the TT1260 range of Satellite Receivers and Decoders:

- No Conditional Access
- Basic Interoperable Scrambling System (BISS) Mode-1 and Mode-E only.
- VideoGuard Director and BISS
- Remote Authorisation System (RAS) and BISS
- VideoGuard Director, RAS and BISS
- Signal Protection

When the CA system uses a Smart Card, access by the user is via the back panel of the IRD.

1.3 The Satellite Receiver

1.3.1 Typical Satellite System

The TT1260 Satellite Receiver is a component of the MPEG-2/DVB compliant range of TANDBERG Television equipment. It is designed for use by broadcasters and distributors of video, audio and data services over satellite.

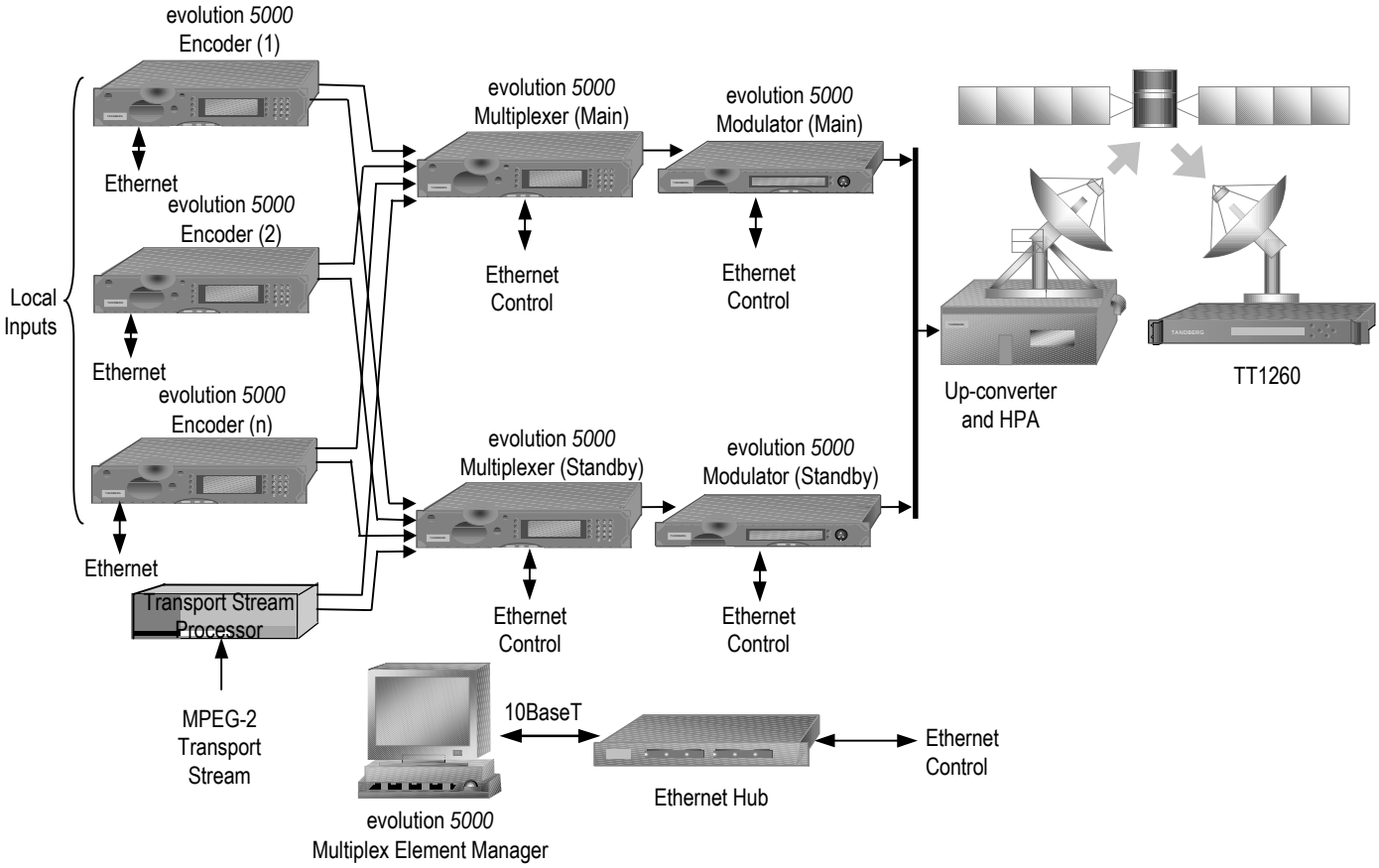

Figure 1.3: Typical Satellite Compression System

1.3.2 Input Connections

The Satellite Receiver interfaces directly to Low-Noise Block (LNB) and accepts an intermediate frequency (IF) input in the band 950 - 2150 MHz (L-band) for operation in the specified symbol-rate range (see *Annex B, Technical Specification*). The unit can provide dc power and polarisation switching to the LNB.

1.3.3 What the Satellite Receiver Does

The Receiver can be tuned to a specified satellite channel frequency and polarisation. The input is down-converted via a Low-Noise Block (LNB) to provide an L-band input to the Receiver. The front-end tuning is microprocessor controlled with a frequency synthesised local oscillator. A software tuning and acquisition algorithm resolves translation errors (mainly due to the LNB).

The signal is then passed to a demodulator that recovers the signal using soft-decision decoding. The resulting stream is Reed-Solomon decoded and descrambled to provide inputs to the Decoder circuit. The received channel may contain multiple services, therefore the Receiver's demultiplexer is configured to select a single video service and other audio/data components and present them at the output.

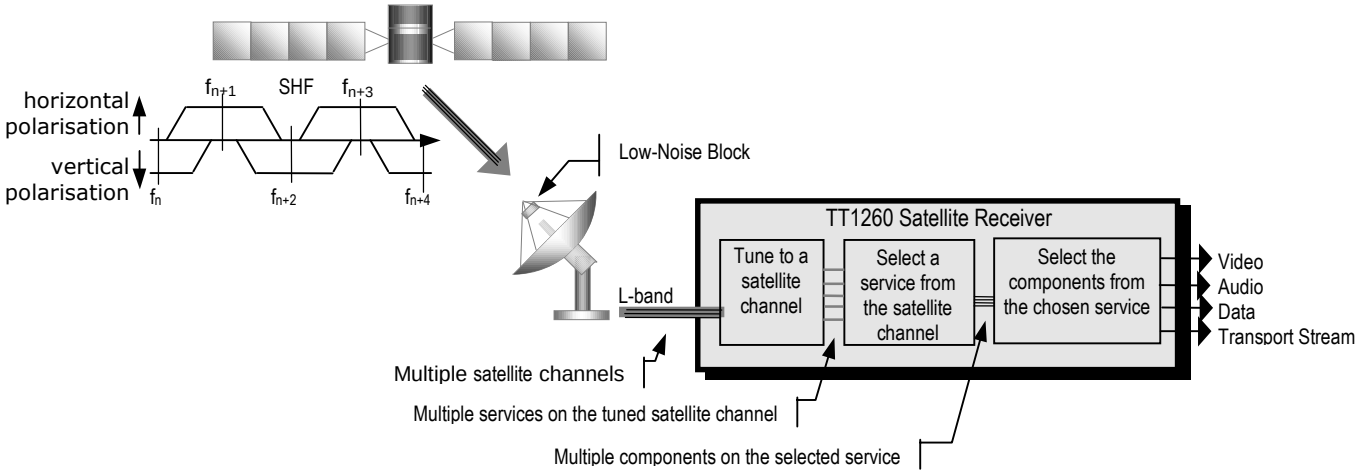

Figure 1.4: What the Satellite Receiver Does

1.3.4 Over-air Software Download (TANDBERG Director Systems)

The TT1260 Satellite Receiver is shipped with the appropriate software installed, but it is designed to allow replacement of this code by new versions of software transmitted over-air. The new code is downloaded as a background task in the same transport stream as used for the normal transmission of services.
Figure 1.5 shows the system required for this function. The existing software continues to function during the download process. Once all the new code has been received, installed and validated, it is loaded into the active memory and becomes the operating software for the Receiver.

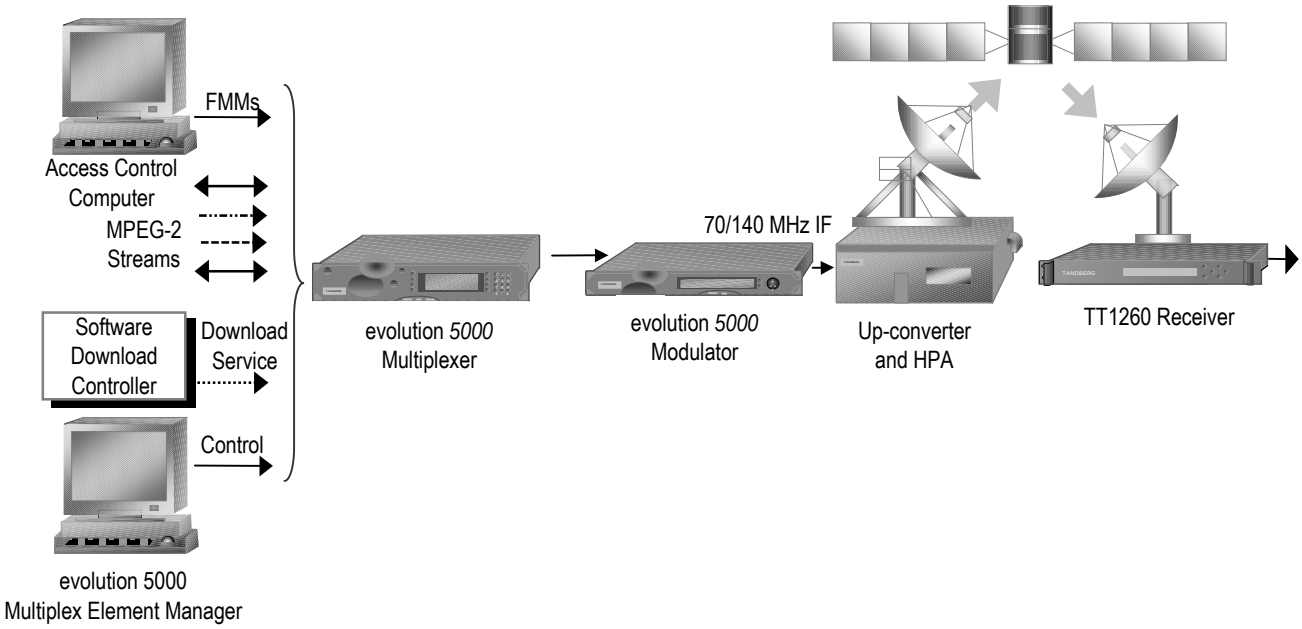

Figure 1.5: Typical Download Transmission System

1.4 The Decoder

1.4.1 Typical Decoder System

The Decoder is a component of TANDBERG Television's range of equipment. It is designed for use by broadcasters and distributors of video and audio services. It can be used as a transport stream monitor or to decode signals received over a telecommunications network.

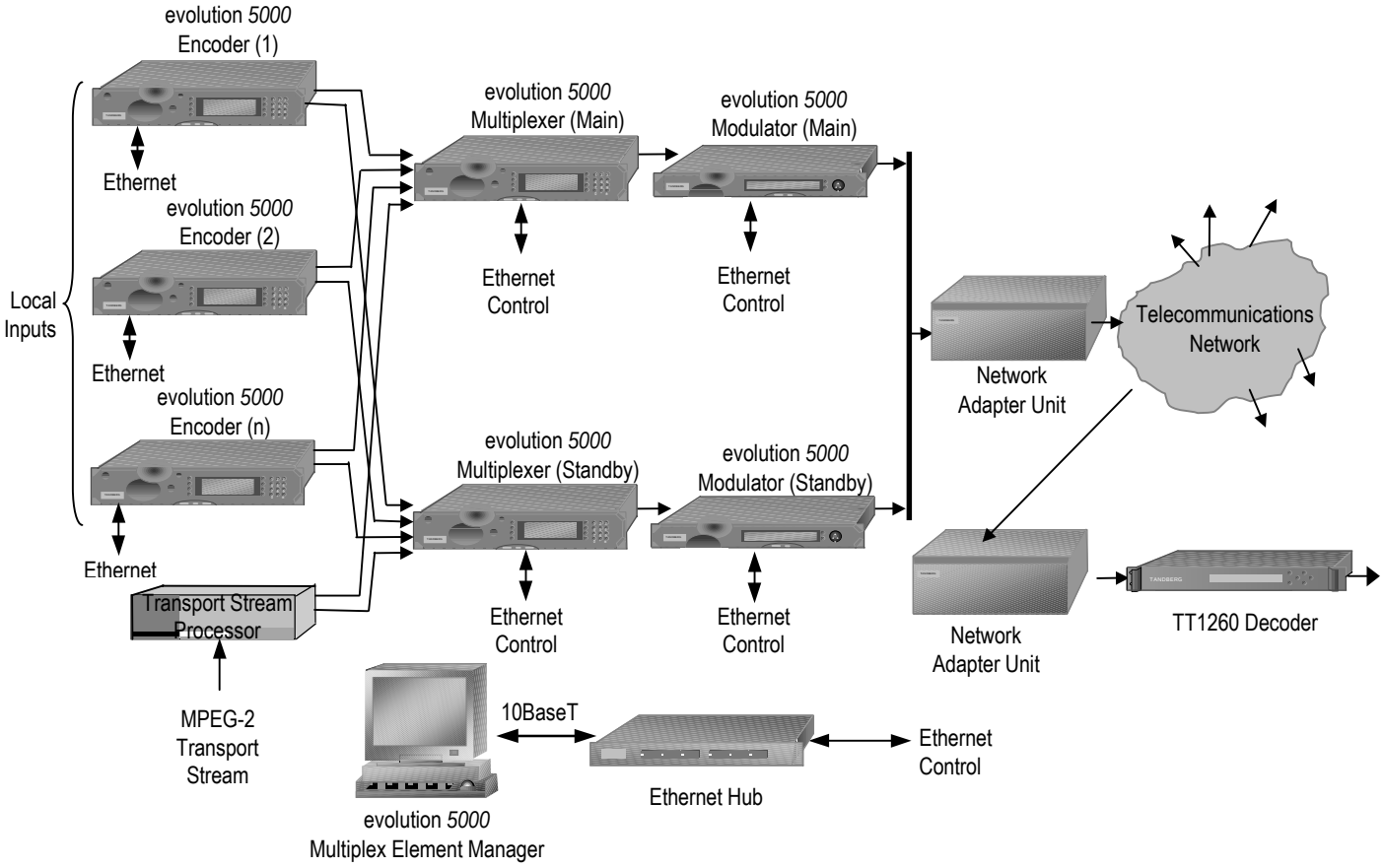

Figure 1.6: Typical Compression System

1.4.2 Input Connections

The Decoder has the following inputs:

Two ASI copper interfaces for operation up to 160 Mbit/s for 188 byte packets and 160 Mbit/s for 204 byte packets.

1.4.3 What the Decoder Does

The ASI interfaces are used to present the transport stream in the format required by the internal Decoder circuitry. At this point, the operation of the unit is the same as the Satellite Receiver.

The Decoder can be used to receive an input signal from a Public Telecom Network via a Network Adapter Unit (NAU). No error correction is supported at the input of the unit so a level of Quality of Service should be negotiated with the Telecom Network Provider.

The Decoder is configured to select a single video service and other audio/data components from the multiple services on the incoming transport stream and present them at the output.

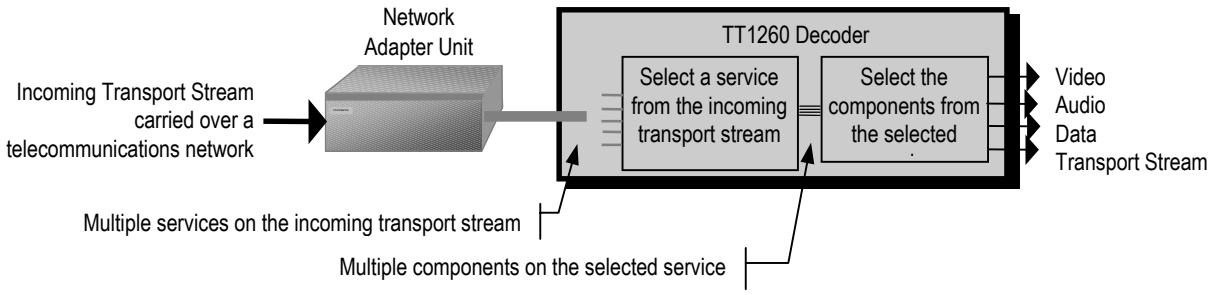

Figure 1.7: Role of the Decoder

1.5 TT1260 Control Modes

1.5.1 Introduction

The TT1260 is designed for unattended operation. Once set-up, the unit requires no further attention except to ensure the fan is working. There are up to three control modes associated with the Receiver (dependent upon options fitted). The unit remains in the chosen control mode until another mode is requested.

> NOTE...
> Local (Front Panel) Control is the factory default if TANDBERG Director is not installed.

1.5.2 Front Panel (Local) Modes

Operating the IRD from the Front Panel is via two main operating modes: **Navigate** and **Edit**. See *Section 3.3, Front Panel Operating Modes*.

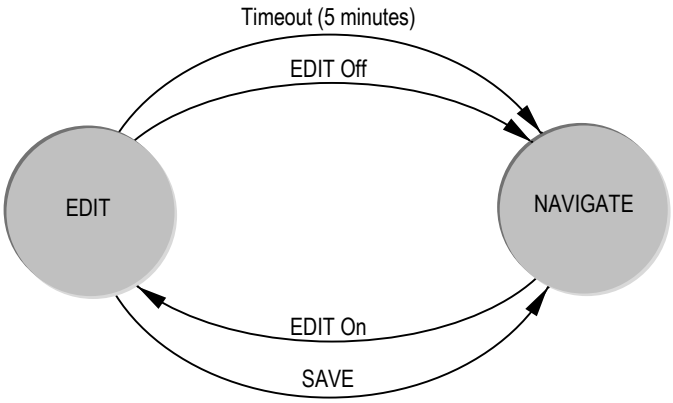

Figure 1.8: Front Panel States

1.5.3 Serial Remote Control Mode

The unit enters this state when the **RS232/RS485 REMOTE** port receives a configuration change command or the **Remote** control mode is selected in the System Menu (#6); see *Section C.9, System Menu*. During this state, local commands are ignored. When a modem is connected to the connector at the rear panel, it must be set to run at 9600 baud.

1.5.4 TANDBERG Director NCP Control Mode

With the VideoGuard Conditional Access software installed and a valid Smart Card inserted, a TT1260 Satellite Receiver can be put into Director NCP control mode.

> NOTE...
>
> Front Panel mode is the factory default for Receivers used in a TANDBERG Director system. To switch to Director NCP mode refer to *Section 3.8, Setting Up a System.*

All Front Panel and Serial Remote commands are ignored except the operating mode. The TT1260 can be put into a local lockout condition. When in this condition, there are two ways to recover control:

- Cancelling the local lockout using an over-air command.
- Entering a PIN number via the Conditional Access menu in Menu #4.3.6 (see *Section C.7.3, Director Menu*).

Either of these actions will put the Receiver out of local lockout mode.

1.6 Guided Tour

1.6.1 Construction

The TT1260 is constructed using a screened self-ventilated modular system; all operational inputs and outputs are via rear-panel connectors. The unit may be operated freestanding or mounted in a 19-inch rack.

1.6.2 Front Panel Controls

The physical interface for the Front Panel consists of an alphanumeric LCD display, pushbuttons, and status LEDs that are used to set up and monitor the unit. The general layout is shown in *Figure 1.9*. Information on the use of these controls is given in *Chapter 3, Operating the Equipment Locally.*

User input is via six pushbuttons comprising four cursor pushbuttons: **LEFT**, **RIGHT**, **UP**, and **DOWN**; and two edit control pushbuttons: **EDIT** and **SAVE**.

Each pushbutton has an integral green LED except **SAVE**, which has an integral red LED. When lit these LEDs indicate to the user which pushbutton is currently active.

Automatic repeat following an initial delay period is implemented for the LEFT, RIGHT, UP and DOWN pushbuttons in software.

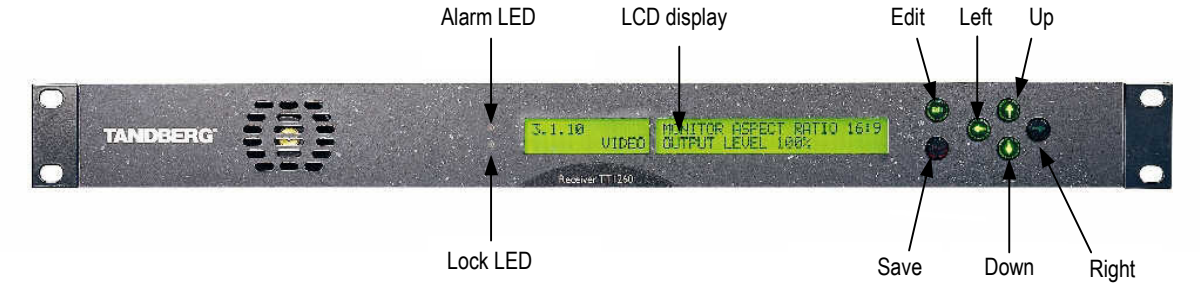

Figure 1.9: Front Panel Controls

1.6.3 Front Panel LEDs

Figure 1.9 shows the location of the LEDs on the front panel. The LEDs indicate the equipment status as follows:

The red **ALARM** LED is used to indicate an IRD fault condition, e.g. a missing or faulty input signal. It should be off for correct operation, although it may be lit briefly during power-up.

The green **LOCK** LED is used to indicate that the IRD is locked to a transport stream when lit, and indicates correct conditions and correct system functioning.

1.6.4 Bit Error Ratio Measurement

Bit Error Ratio (BER) measurement is done by an LCD display representation. See the QPSK Satellite menu (*Section C.5, Input Status Menu*).

1.6.5 Conditional Access and Scrambling Options

VideoGuard Director

There is a slot on the rear panel to allow the insertion of a Conditional Access (CA) card for the VideoGuard Director CA system.

Remote Authorisation System (RAS 1)

With the appropriate configuration, the TT1260 fully descrambles Remote Authorisation System (RAS) input transport stream. The ability to decrypt all the components in any other transport stream is a function of the specific CA system decryption.

Basic Interoperable Scrambling System (BISS)

With the appropriate configuration, the TT1260 fully descrambles the BISS mode-1 or mode-E input transport stream. This system has been developed by the European Broadcasting Union (EBU) as an open scrambling system.

BISS has five main levels of operation: Mode 0, Mode 1, Mode 2, Mode 3 and Mode-E

BISS Mode 0 corresponds to no scrambling.

BISS Mode 1 operation uses a fixed value for the control word to scramble the services in the transport stream from the Encoder. To descramble the transmission, the TT1260 needs to have the matching control word value.

BISS Mode E operation uses a fixed value for the control word to scramble the services in the transport stream from the Encoder. To descramble the transmission, the TT1260 needs to have the matching control word value.

BISS Modes 2 and 3 are not supported at this release.

1.6.6 Rear Panel

Inputs and outputs to the unit are taken via the rear panel. *Figure 1.10* shows a typical Decoder rear panel.

Figure 1.10: TT1260 Decoder Rear Panel

Connector descriptions are given in *Chapter 2, Installing the Equipment* and *Chapter 5, Options.*

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Chapter 2

Installing the Equipment

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List of Tables

2.1 Read This First!

2.1.1 Handling

The TT1260 must be handled and installed carefully and thoughtfully to prevent safety hazards and damage.

2.1.2 Installing the Equipment

Ensure the personnel designated to fit the unit have the appropriate skills and knowledge. If in any doubt, contact TANDBERG Television Customer Services (see *Preliminary Pages* for contact details).

Installation of the product should follow these instructions, and should only use installation accessories recommended by the manufacturers. When rack mounted, this equipment must have shelf supports as well as being fixed at the front panel.

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

2.1.3 Lifting

Although this product only weighs approximately 4 kg (8.8 lb), in some circumstances it might be awkward to lift. In which case, do not attempt to lift or move it without proper assistance or equipment. If in doubt, seek assistance.

2.2 Preliminary Checks

2.2.1 Mechanical Inspection

WARNING...

REMOVING THE COVERS OF THIS EQUIPMENT MAY INVALIDATE ANY WARRANTIES, CAUSE A SAFETY HAZARD OR/AND AFFECT THE EMC PERFORMANCE. CHECK WITH TANDBERG TELEVISION CUSTOMER SERVICES.

Inspect the equipment for damage-in-transit. If in doubt, please contact TANDBERG Television Customer Services (see *Preliminary Pages*).

2.2.2 Moving the Equipment Safely

Do not place this product on an unstable cart, stand, bracket, or table. The product may fall, causing serious injury and serious damage to the product. Use only with a cart, stand, bracket or table recommended by TANDBERG Television Ltd.

An appliance and cart combination should be moved with care. Quick stops, excessive force, and uneven surfaces may cause the appliance and cart combination to overturn. Do not move or carry the equipment whilst it is still connected to the supply or other leads, is live, or is in operation.

2.3 Installing the Equipment

2.3.1 Fixing

The TT1260 is designed for fixed use only and has been shipped with fixing brackets suitable for a standard 19 inch rack. When installed in a rack, it should be secured using the fixing brackets. In addition, support shelves must be used to reduce the weight on the brackets. Ensure it is firmly and safely located and it has an adequate flow of free-air.

A freestanding unit should be installed on a secure horizontal surface where it is unlikely to be knocked or its connectors and leads disturbed.

2.3.2 Ventilation

Openings in the Covers

Side openings in the cabinet, as well as a front-mounted cooling fan, are provided for ventilation. They ensure reliable operation of the product and protect it from overheating. The openings or the fan must not be blocked or covered.

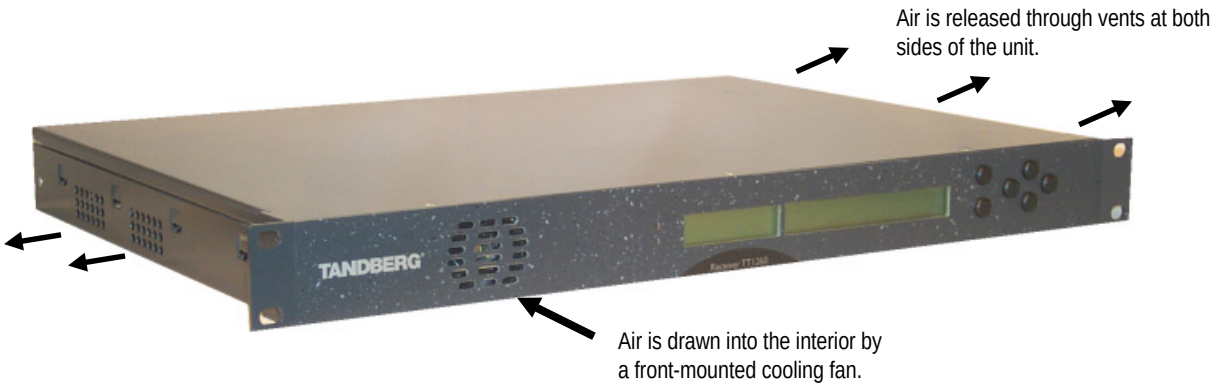


Figure 2.1: Air flow Through the Equipment

Care in Positioning

CAUTIONS...

1. The fan contained within this unit is not fitted with a dust/insect filter. Pay attention to the environment in which it is to be used.
2. Do not install units so that the air intake of one aligns with the outlet on another. Provide baffles and adequate spacing.

The TT1260 should never be placed near or over a radiator or other source of heat. It should not be placed in a built-in installation such as a rack unless proper ventilation is provided and the instructions have been adhered to.

Allow at least 40 mm free air-space at each side of the equipment to ensure adequate cooling. Racks containing stacked equipment may need to be forced air-cooled to reduce the ambient temperature within the rack.

Protection from Moisture

Do not install this equipment in areas of high humidity or where there is a danger of water ingress.

2.3.3 Installing Cables - Safety

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.

Do not run ac power cables in the same duct as signal leads. Do not move or install equipment whilst it is still attached to the mains supply. Ensure safety and ESD precautions are observed whilst inter-connecting equipment.

2.4 EMC Compliance Statements[1]

2.4.1 EN 55022/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.

2.4.2 FCC

This 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.

2.5 AC Supply Operating Voltage and Fusing - Safety Information

2.5.1 AC Power Supply

The TT1260 operates from an auto-ranging mains power supply (100-120 Vac or 220-240 Vac 50/60 Hz nominal) and is designed for use in ambient air temperature in the range 0°C to +40°C. There are no links etc. to be altered for operation from different supply voltages. The full Technical Specification is given in *Annex B, Technical Specification*.

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

WARNINGS...

1. THE TT1260 SHOULD ONLY BE OPERATED FROM THE TYPE OF POWER SOURCE INDICATED ON THE MARKING LABEL. IF YOU ARE NOT SURE OF THE TYPE TO YOUR BUSINESS, CONSULT YOUR APPLIANCE DEALER OR LOCAL POWER COMPANY. DO NOT OVERLOAD WALL OUTLETS AND EXTENSION CORDS AS THIS CAN RESULT IN A RISK OF FIRE OR ELECTRIC SHOCK. AC SUPPLY.
2. THE TT1260 RANGE OF RECEIVERS AND DECODERS ARE NOT FITTED WITH AN AC POWER ON/OFF SWITCH. ENSURE THE SUPPLY SOCKET OUTLET IS INSTALLED OR LOCATED NEAR THE EQUIPMENT SO THAT IT IS ACCESSIBLE.

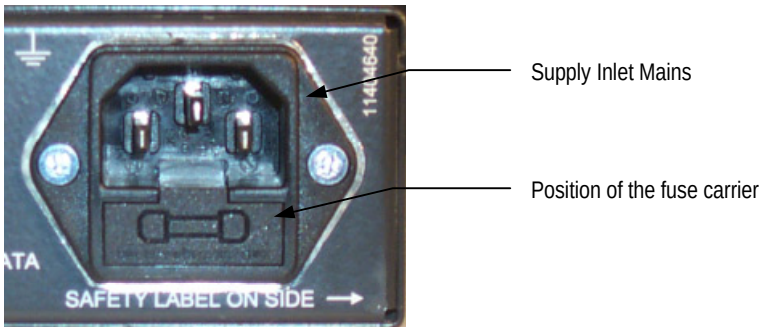


Figure 2.2: AC Power Inlet Assembly

Table 2.1: Fuse Information

Item	Specification
Fuse	Single pole, fitted in live conductor in power input filter at rear of unit.
Fuse type	5 mm x 20 mm anti-surge (T) HBC, IEC127 (sheet v)
Fuse rating	1.6 A
Fuse rated voltage	250 Vac
Power lead connector fuse (if appropriate)	5 A

NOTE...

See *Annex B, Technical Specification* for more fuse information.

2.5.2 AC Power Supply Cord

General

A two-metre mains supply cord is supplied with this product. It is fitted with a moulded plug suitable for the USA, UK or mainland Europe as advised at the time of ordering.

NOTE...

The TT1260 is not fitted with an ac power supply ON/OFF switch. Ensure the socket-outlet supplying the equipment is installed near the equipment so that it is easily accessible.

Wire Colours

The wires in the supply cord are coloured as shown in *Table 2.2*.

Table 2.2: Supply Cord 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

If the colours[2] do not correspond with the coloured markings identifying the terminals in a locally supplied plug, proceed as in *Table 2.3*. The inclusion of *Table 2.3* is for reference.

Table 2.3: Non Standard Supply Cord Wire Colours

Wire Colour (UK)	Action
green-and-yellow	...must be connected to the terminal in the plug which is marked with the letter E or the safety earth symbol ⏚ or coloured green or green-and-yellow.
blue	...must be connected to the terminal in the plug which is marked with the letter N or coloured black.
brown	...must be connected to the terminal in the plug which is marked with the letter L or coloured red.

2.5.3 Connecting the Equipment to the AC Power Supply

As there is no mains power switch fitted to this unit, ensure the local ac power supply is switched OFF before connecting the supply cord.

Connect the mains lead to the TT1260 and then to the local supply.

2.6 Technical Earth Connection

The terminal marked ⏚ at the rear panel is a Technical Earth. It 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 Technical Earth terminal and a suitable point on the rack
2. Eliminate the migration of stray charges when connecting between equipment.

The Technical Earth provides a suitable connection between the TT1260 and the installation to give a low impedance path at normal operating frequencies.

[2] BS 415 : 1990 - Safety Requirements for Mains-operated Electronic and Related Apparatus for Household and Similar General Use.

Figure 2.3: Location of the Technical Earth

2.7 Signal Connections

2.7.1 General

> CAUTION...
>
> It is strongly recommended that the terminal marked ⏚ at the rear panel of the equipment is connected to a site Technical Earth before any external connections are made and the equipment is powered. This limits the migration of stray charges.

All signal connections are made via the rear panel. A typical rear panel is shown in *Figure 2.4*. The connections are also shown schematically in *Figure 2.5*, and a full technical specification is given in *Annex B*.

The Receiver provides a flexible transport stream input interface. It is not a requirement for the equipment to support more than one optional input type in any one configuration.

The status information appropriate to each input type is available to the user via the User Interface, and also via the remote control interfaces.

Figure 2.4: Typical Decoder Rear Panel

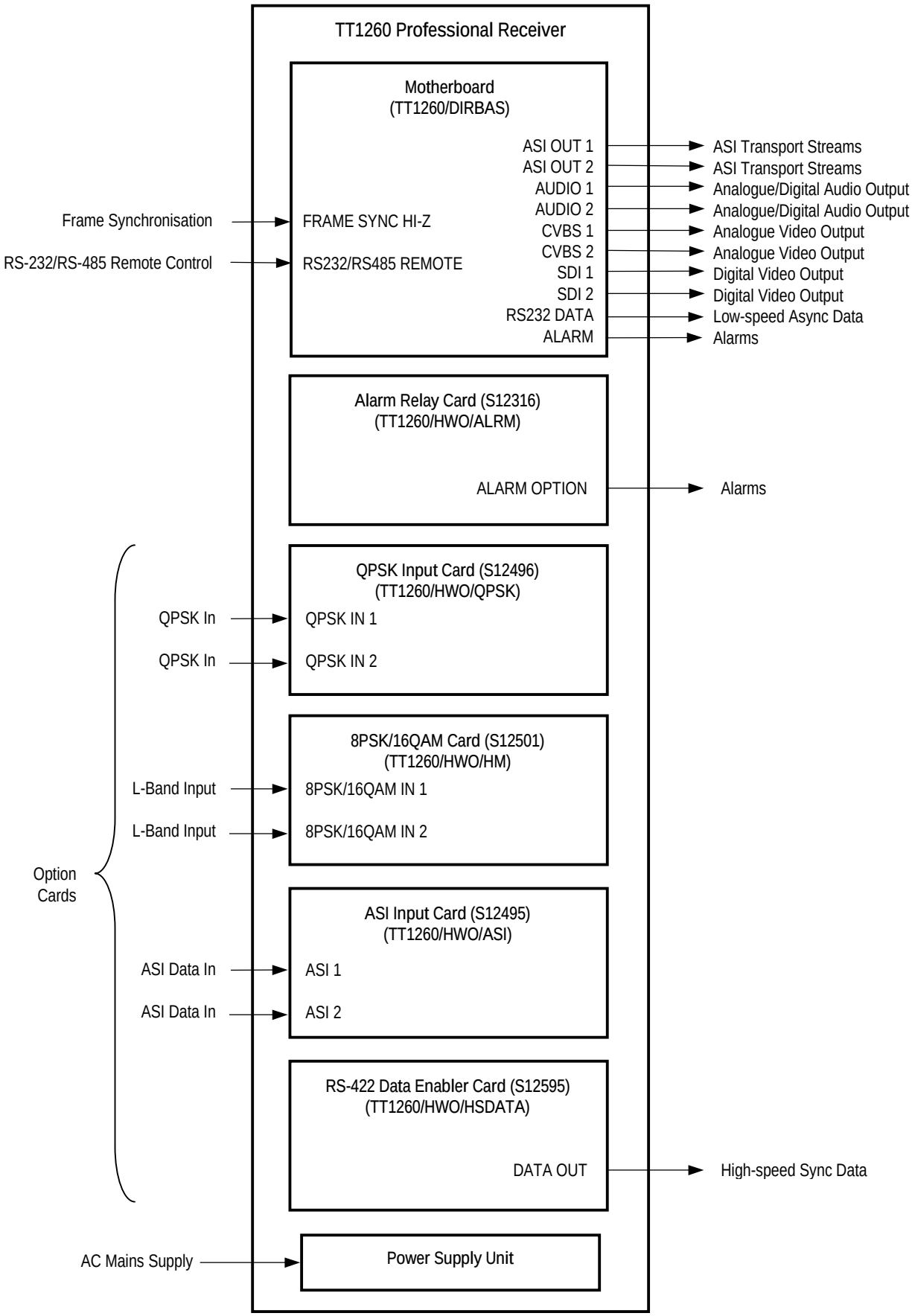


Figure 2.5: TT1260 Signal Connections

2.7.2 TT1260 Base Unit (TT1260/DIRBAS)

Rear Panel View

Figure 2.6: Typical Decoder Rear Panel, with ASI Input and Alarm Option Fitted

ASI Out

Two BNC sockets output ASI transport streams with a maximum data rate of 160 Mbit/s. The specification for these connectors are given in *Section B.5.2, Audio Outputs*.

ASI OUT 1/2

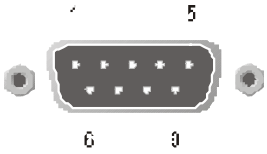
Table 2.4: ASI Out Connector (2 Off)

Item		Specification
Connector type		BNC 50 Ω socket
Connector designation		ASI OUT 1 ASI OUT 2
Pin-outs	Centre Shield	 Ground/Chassis

Audio Outputs

A pair of 9-way male D-type connectors provide two stereo channels. Each connector carries a single channel of a stereo pair in both analogue and digital form. The output can be varied according to service and unit configuration.

Audio control is through the Service Menu (#3). The specification for this connector is given in *Section B.5.2, Audio Outputs*.



AUDIO 1 / 2

Table 2.5: Audio Decoding Pin-outs

Item	Specification
Connector type	9-way, Female, D-type
Connector designations	AUDIO 1 AUDIO 2
Pin-outs	Pin 1 — Digital audio + Pin 2 — Ground Pin 3 — Left + Pin 4 — Right + Pin 5 — Ground Pin 6 — Digital audio - Pin 7 — Ground Pin 8 — Left - Pin 9 — Right -
Nominal output impedance	50 Ω
Maximum data rate	3.072 Mbit/s
Output level	+18dBm nominal clipping level. Selectable in range 12 to +24dBm.
Load impedance	≥600 Ω balanced

Analogue Video Output

This BNC socket provides the standard definition (SD) analogue output in the form of a composite video output. The output standard is configured using the Video Menu #3.1. The specification for these connectors are given in *Section B.5.1, Video Outputs*.

CVBS 1/2

Table 2.6: Analogue Output Connector (2 Off)

Item		Specification
Connector type		BNC 75 Ω socket
Connector designation		CVBS 1 CVBS 2
Pin-outs	Centre Shield	Video output Ground/Chassis

Digital Video Output

The serial digital video output is routed in 4:2:2 format to an SDI output at 270 Mb/s via two BNC sockets. Video control is through the Video Menu #3.1. The specification for these connectors are given in *Section B.5.1, Video Outputs*.

SDI 1/2

Table 2.7: Digital Output Connector (2 Off)

Item		Specification
Connector type		BNC 75 Ω socket
Connector designation		SDI 1 SDI 2
Pin-outs	Centre Shield	Video output Ground/Chassis

Frame Synchronisation

FRAME SYNC Hi-Z

A BNC socket is used by the Decoder to frame lock to an external video source. The frame information is input as a composite synchronise signal, with or without active video. The user can offset the synchronisation to the video output by ±8 lines, with a resolution of 1 pixel. Lip sync error introduced by the Receiver is in the range –10ms to +30ms. This implies audio frame skip and repeat.

The video and audio can be synchronised to an analogue studio reference signal. This supports both 625 and 525 frame locking.

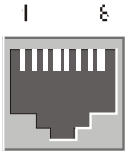
This F Sync is activated through the Service menu (#3). The specification for this connector is given in *Section B.4.4, Frame Sync Connector.*

Table 2.8: Frame Sync Hi-Z Connector

Item		Specification
Connector type		BNC 75 Ω socket
Connector designation		FRAME SYNC Hi-Z
Pin:	Centre	Analogue Black and Burst Input
	Shield	Ground/Chassis
Impedance		Last unit must be terminated with 75 Ω

Ethernet

The TT1260 has an Ethernet remote control port for TANDBERG engineering debug purposes and future functionality.



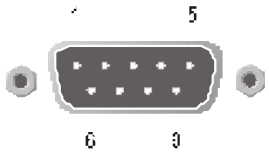
10/100 Base-T

Table 2.9: Ethernet Pin-outs

Item	Specification
Connector type	RJ-45 (100BaseT)
Connector designation	10/100Base-T
Pin-outs (Unused pins not connected)	Pin 1 — Tx Out (+) Pin 2 — Tx Out (-) Pin 3 — Rx In (+) Pin 6 — Rx In (-)

Remote Control

Connect to a PC and use the System Menu #6.1.2 to switch between the RS-232 and RS-485 input standards.



RS232/RS485 REMOTE

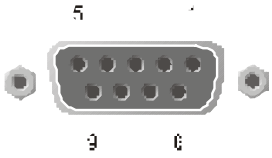
The specification for this connector is given in *Section B.5.4, Remote Connector.* The Remote Control Protocol is published in manual *ST.TS.E10100*, and in the TANDBERG Television RS-232 remote control protocol document.

Table 2.10: Remote Control Connector

Item	Specification				
Connector type	9-way, D-type, Male				
Connector designation	RS232/RS485REMOTE				
	RS-232			RS-485	
Pin-outs	Pin		Direction	Pin	
	1	Data Carrier Detected (DCD)	Input	1	Not connected
	2	Receive Data (RxD)	Input	2	Not connected
	3	Transmit Data (TxD)	output	3	Not connected
	4	Data Terminal Ready (DTR)	output	4	Rx
	5	Ground	—	5	Ground
	6	Data Set Ready (DSR)	input	6	Not Tx
	7	Request to Send (RTS)	output	7	Tx
	8	Clear to Send (CTS)	input	8	Not Rx
	9	Not connected	—	9	Not connected

Alarm Connector and Relay

The master alarm relay connector has a summary relay. The relay is activated whenever the unit is in alarm status, or the power is switched off.



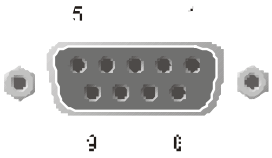
ALARM

Table 2.11: Alarm Connector

Item	Specification
Connector type	9-way, D-type, Female
Connector designation	ALARM
Pin-outs	Pin 1 — N/C Pin 2 — N/C Pin 3 — N/C Pin 4 — Common Pin 5 — N/C Pin 6 — N/C Pin 7 — N/C Pin 8 — Normally Closed (Open on Alarm) Pin 9 — Normally Open (Closed on Alarm)

RS-232 Low-speed Asynchronous Data Output

A 9-way, D-type female connector provides an asynchronous serial communications interface for the reception of low-speed data. The status of the data output on this connector is given in the Data menu #3.4. The technical specification for this connector is given in *Section B.5.3, Data Outputs*.



RS232 DATA

> NOTE...
>
> Low-speed asynchronous data output is disabled when the High Speed RS-422 Data Enabler Card (TT1260/HWO/HSDATA) is fitted.

Table 2.12: RS-232 Low-speed Data Connector

Item	Specification
Connector type	9-way, D-type, Female
Connector designation	RS232 DATA
Standards	RS-232 DATA
Configuration	DCE
Pin-outs	Pin 1 — Not used Pin 2 — Receive Data Output (RxD) Pin 3 — Not Used Pin 4 — Not Used Pin 5 — Ground Pin 6 — Not used Pin 7 — Not used Pin 8 — Not used Pin 9 — Not used

2.7.3 Alarm Relay Card (TT1260/HDC/ALRM)

General

The Alarm Relay Card has six additional relays. The alarm relays are programmable to reflect the state of one or more of the individual monitored alarm conditions.

Rear Panel View

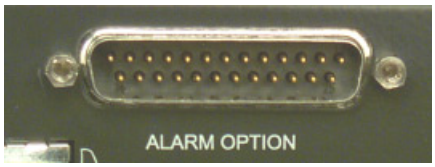
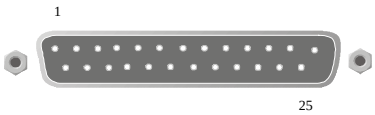


Figure 2.7: Alarm Relay Card Rear Panel

Connector Details

Alarm Option

The specification for this connector is given in *Annex B, Section B.5.5, Alarm Connectors*.



ALARM OPTION

Table 2.13: Relay Alarm Output Specification

Item	Specification
Connector type:	25-way, D-type, Female
Connector designation:	ALARM OPTION
Contact Configuration:	SPDT (Change-over) All volt-free contacts, fully isolated.
Contact Rating:	1A at 24Vdc 1A at 50Vac
Maximum Switching Current:	1A
Maximum Switching Voltage:	50Vdc/30Vac
Maximum Switching Power:	24W / 60VA
Minimum Switching Load:	0.1mA, 100mVdc
Alarm Relay Card Pin-outs	Pin 1 - Relay 1 – Normally Closed (Open on Alarm) Pin 2 - Relay 1 – Normally Open (Closed on Alarm) Pin 3 - Relay 2 – Common Pin 4 - Relay 3 – Normally Closed (Open on Alarm) Pin 5 - Relay 3 – Normally Open (Closed on Alarm) Pin 6 - Relay 4 – Common Pin 7 - Relay 5 – Normally Closed (Open on Alarm) Pin 8 - Relay 5 – Normally Open (Closed on Alarm) Pin 9 - Relay 6 – Common Pin 10 - N/C Pin 11 - N/C Pin 12 - N/C Pin 13 - N/C Pin 14 - Relay 1 – Common Pin 15 - Relay 2 – Normally Closed (Open on Alarm) Pin 16 - Relay 2 – Normally Closed (Open on Alarm) Pin 17 - Relay 3 – Common Pin 18 - Relay 4 – Normally Closed (Open on Alarm) Pin 19 - Relay 4 – Normally Open (Closed on Alarm) Pin 20 - Relay 5 – Common Pin 21 - Relay 6 – Normally Closed (Open on Alarm) Pin 22 - Relay 6 – Normally Open (Closed on Alarm) Pin 23 - N/C Pin 24 - N/C Pin 25 - N/C

2.8 Option Card Connectors

Option cards are described in *Chapter 5, Options*.

Chapter 3

Operating the Equipment Locally

Contents

List of Figures

List of Tables

3.1 Powering the Equipment

3.1.1 Switching On

> CAUTION...
>
> This equipment should not be operated unless the cooling fan is working and there is free-air flow around the unit. Refer to *Section 2.3.2 Ventilation.*

Connect the signal inputs and ac power supply to the TT1260 and power up the unit. After a short period of initialisation and the TT1260 gaining lock, the unit will power-up in **Navigate** mode. This is the usual operating condition.

The **Lock** LED will be on (green) when a signal is locked and off when unlocked. See *Figure 3.2* for the location of the Lock LED.

3.1.2 Power-up Operating Modes

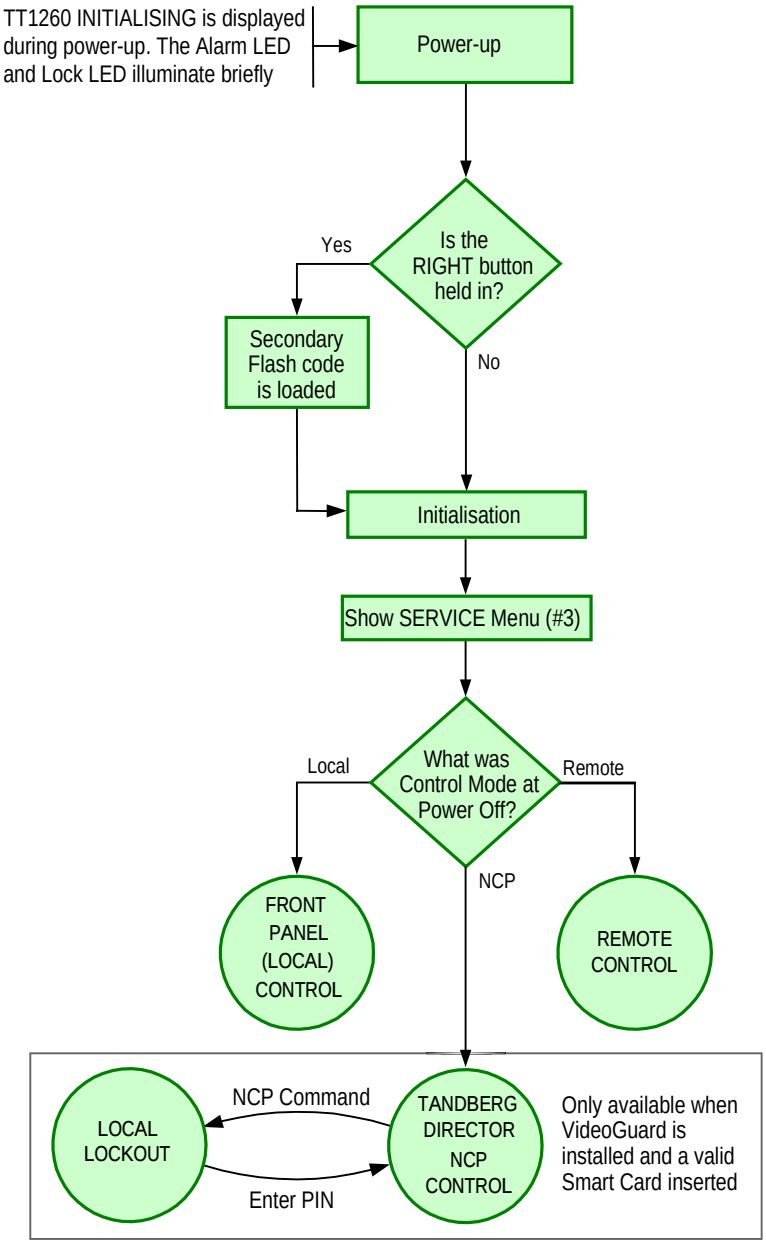


Figure 3.1: Power-up Operating Mode

3.2 Front Panel Controls and Pushbuttons

Front Panel items are described under *Section 1.6, Guided Tour*.

When the Front Panel pushbuttons are not used for approximately five minutes, the display will revert to Menu #1.1 and any unsaved edits will be lost.

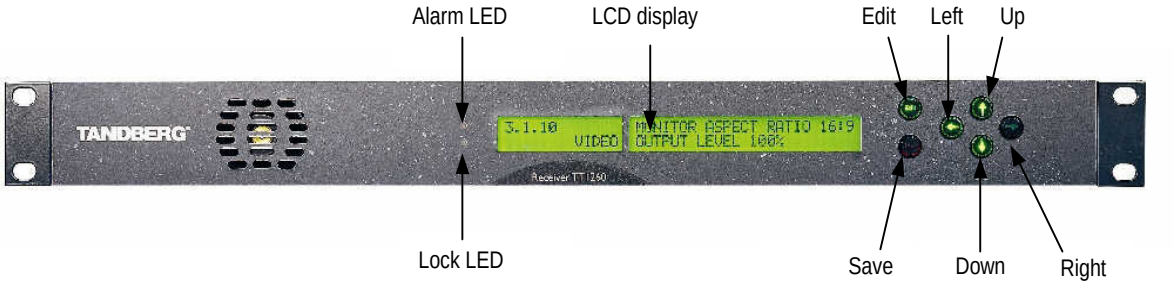


Figure 3.2: Front Panel Controls and Pushbuttons

3.3 Front Panel Operating Modes

3.3.1 General

Operating the TT1260 from the Front Panel is via two operating modes: **Navigate Mode** *(*see *Section 3.3.2)* and **Edit Mode** *(*see *Section 3.3.3).*

3.3.2 Navigate Mode

Navigate mode allows the user to move between menus and pages within menus (editing the left display area).

Table 3.1: Navigate Mode

Action	Result
Up Pushbutton Pressed	Go to page given by uplink of current page, obtain and display current data.
Down Pushbutton Pressed	Go to page given by down link of current page, obtain and display current data.
Left Pushbutton Pressed	Go to page given by left link of current page, obtain and display current data.
Right Pushbutton Pressed	Go to page given by right link of current page, obtain and display current data.
Edit Pushbutton Pressed	Enter Edit mode at current page (if permitted else no effect).
Save Pushbutton Pressed	No effect.

Pushbutton LEDs will be updated to indicate which pushbutton presses are still valid as each navigation pushbutton press event is processed. For example, a lit **Up** pushbutton LED indicates there are pages above the current one.

3.3.3 Edit Mode

Edit mode edits the right display area and allows the user to alter control parameters that define the TT1260 behaviour. To enter **Edit** mode press the Edit pushbutton when on a page containing an editable control parameter and the front panel is the controlling user interface. Edit may be entered on some special pages at all times, for example on the page defining the controlling user interface.

The Front Panel returns to Navigate mode when **Edit** is pressed again (abort edit with no save) or when **Save** is pressed (save modified parameter values). Processing of events from the front panel event queue depends on the current operating mode of the front panel.

Table 3.2: Edit Mode

Action	Result
Up Pushbutton Pressed	Increases value of current edit parameter by one unit.
Down Pushbutton Pressed	Decreases value of current edit parameter by one unit.
Left Pushbutton Pressed	Moves cursor one edit parameter/parameter digit left (making that the current edit parameter).
Right Pushbutton Pressed	Moves cursor one edit parameter/parameter digit right (making that the current edit parameter).
Edit Pushbutton Pressed	Aborts edit (no save/action of any modified parameters) and returns to Navigate mode, obtain and display current data.
Save Pushbutton Pressed	Save/action new parameter values and returns to Navigate mode, obtain and display current data.

Pushbutton LEDs are updated to indicate which pushbutton presses are still valid as each edit pushbutton press event is processed. For example, when the **LEFT** pushbutton LED is lit it indicates there are additional editable parameters to the left of the current cursor position.

There is a maximum idle period of five minutes when **Edit** mode will time out and return to **Navigate** mode.

3.4 Using the Local Controls

3.4.1 LCD Menu Descriptions

Detailed LCD menu descriptions are given in *Annex C, Menus*. This chapter concentrates on describing the use of the menus for local operation.

3.4.2 Selecting a Menu Option

Some items shown in the right display area of the front panel LCD display have a set number of options. An example of this is the VIDEO TEST PATTERN (Menu #3.1.6) which has a number of preset Video Test Patterns associated with it. Use the following steps as a general guide to selecting an option.

Table 3.3: Selecting a Menu Option

Step	Action	Result
1	Select the menu and display the required selection.	Normally there is only one selectable item. If there is more than one, use the RIGHT and LEFT pushbuttons as described in *Table 3.4.*
2	Press EDIT on the front panel.	The LED will come on to show the TT1260 is in EDIT mode.
3	Use the arrow pushbuttons to step through the options.	This action scrolls through the options in a continuous loop.
4	Press SAVE to store the option or press EDIT to cancel the selection and return to the source menu.	

3.4.3 Entering a Menu Value

Some items shown in the right display area of the front panel LCD display have a user-entered value. An example of this is the VIDEO OUTPUT LEVEL (Menu #3.1.10) in which the video output level has to be entered. Use the following steps as a general guide to entering a value.

Table 3.4: Entering a Menu Value

Step	Action	Result
1	Select the menu and display the required selection.	
2	Press EDIT on the front panel.	The LED will come on to show the TT1260 is in EDIT mode.
3	Use the RIGHT or LEFT pushbutton to move the cursor to the required digit.	Each pushbutton has a built-in LED that turns on if the pushbutton function is appropriate to the displayed information.
4	Change the value by using the arrow pushbuttons.	
5	Press SAVE to store the option.	

3.5 Setting Up the Input (Menu #2)

3.5.1 Satellite Receiver

Use *Table 3.5* to step through the set up procedure of the Satellite Receiver using Menu #2. The transmission parameters must be known before starting.

Table 3.5: Setting Up the Satellite Receiver

Step	Action	Result
1	Go to Menu #2.2 and select SOURCE 1.	The Receiver takes its signals from two sources. Set up both sources.
2	Scroll down to Menu #2.3. Enter the LNB FREQUENCY then press SAVE.	This sets up the LNB frequency for the selected Source in MHz.
3	Scroll down to Menu #2.3.1. Enter the SATELLITE FREQUENCY then press SAVE.	This sets up the Satellite frequency for the selected Source in MHz.
4	Scroll down to Menu #2.3.2. Enter the SYMBOL RATE then press SAVE.	Sets the symbol rate for the selected Source in megasymbols per second.
5	Scroll down to Menu #2.3.3. Enter the MODULATION and FEC RATES then press SAVE.	This sets up the Modulation (QPSK, 8PSK, 16QAM) and FEC (1/2, 2/3, 3/4, 5/6, 7/8, 8/9) rates for the selected Source. The FEC selection is limited to the valid values of the currently selected modulation type.
6	Scroll down to Menu #2.3.4. Enter the LNB POWER and VOLTAGE settings then press SAVE.	Sets the LNB power for the selected Source (ON, OFF, BOOSTED). BOOSTED provides 1V extra power over the ON setting. Also sets the LNB voltage settings (18v – Horiz, 13v – Vert).
7	Scroll down to Menu #2.3.5. Enter the LNB 22 KHz setting then press SAVE.	Enables or disables the LNB 22 kHz control tone for the selected Source (On, Off).
8	Scroll down to Menu #2.3.6. Enter the SEARCH RANGE then press SAVE.	This sets up the centre frequency Search Range for the selected Source in KHz.
9	Scroll down to Menu #2.2 and select SOURCE 2. Repeat steps 2 through 8.	

3.5.2 Decoder

Table 3.6: Setting Up the Decoder

Step	Action	Result
1	Go to Menu #2.1 and select the required input: 1, 2, or AUTO.	This sets the ASI input source for the TT1260. If AUTO is chosen, ensure that the signal is only routed to one connector at a time.
2	Press SAVE to store the option.	

3.6 Service Configuration (Menu #3)

3.6.1 Selecting a Service

Setting Up a Service

Each transport stream may contain many Services. Menu #3 allows a Service to be chosen as current and the profile of its components to be specified.

Table 3.7: Selecting a Service

Step	Action	Result
1	Go to Menu #3.1 and select the required Service. The EDIT mode cannot be entered unless there are available Services.	This page shows the total number of Services available in the incoming transport stream. Use EDIT and the arrow pushbuttons to select the required Service.
2	Press SAVE.	This stores the Service as the Current Service.

Setting Up the Power-up Service

Menu #3 allows a Service to be chosen as the Power-up default.

Table 3.8: Selecting a Power-up Service

Step	Action	Result
1	Go to Menu #3.1 and select the required Service (or last valid service).	This sets the service to which the TT1260 configures on power-up.
2	Press SAVE.	This stores the service as the power-up service.

3.6.2 Selecting the Video Component

Table 3.9: Selecting the Video Component

Step	Action	Result
1	Go to Menu #3.4 and select the PID.	Gains access to the Video Component menu.
2	Scroll down to Menu #3.1.4 and edit the 525 line video output coding (NTSC-M, PAL-M, NTSC-M NP) and the 625 line video output coding (PAL-I, PAL-N, PAL-N CMB). Press SAVE.	Edits the 525 line video output coding and the 625 line video output coding.
3	Scroll down to Menu #3.1.5 and edit the parameter for setting the default video line standard (525 or 625) and the parameter for setting the response to loss of video (FREEZE FRAME, BLACK FRAME, NO SYNCS). Press SAVE. Perform a system restart (see *Section 3.9 Restarting the Unit*).	Edits the parameter for setting the default video line standard and the parameter for setting the response to loss of video.
4	Scroll down to Menu #3.1.6 and edit the video test pattern to be displayed. Press SAVE.	Edits the video test pattern to be displayed.

5	Scroll down to Menu #3.1.7 and edit the parameter for framesync enable (ENABLED or DISABLED). Press SAVE.	Edits the parameter for framesync enable.
6	Scroll down to Menu #3.1.8 and edit the PAL framesync offset range (-199999 to +199999 pixels) and the NTSC framesync offset range (-199999 to +199999 pixels). Press SAVE.	Edits the PAL framesync offset range and the NTSC framesync offset range.
7	Scroll down to Menu #3.1.9 and edit the parameter for delaying 4:2:0 video (0 to 100ms) and the parameter for delaying 4:2:2 video (0 to 100ms). Press SAVE.	Edits the parameter for delaying 4:2:0 video and the parameter for delaying 4:2:2 video.
8	Scroll down to Menu #3.1.10 and edit the parameter for setting the video monitor aspect ratio (4:3, 16:9) and video output level (70 – 130%). Press SAVE.	Edits the parameter for setting the video monitor aspect ratio and video output level.
9	Scroll down to Menu #3.1.11 and edit the embedded audio data ID (0X0 – 0xFFF) and audio channel (NONE, ONE, TWO, or ONE & TWO). Press SAVE.	Edits the embedded audio data ID and audio channel.
10	Scroll down to Menu #3.1.12 and edit the first active video line (22 or 23) and the parameter for enabling EDH output (ENABLED or DISABLED). Press SAVE.	Edit the first active video line and the parameter for enabling EDH output.

3.6.3 Selecting the Audio Component

Introduction

Automatic audio component selection is based on component order in the PMT as follows:

- Audio 1 selects the first component in the PMT and Audio 2 selects the second component.
- Audio 1 does not select the same component as Audio 2 and vice versa when component-PIDs are reordered in a new PMT.
- Coding type and language are manually selectable through the user interfaces by specifying the correct PID.

Selecting the Audio Manually

It is possible to manually select any audio component from the active service by using the front panel controls or via the remote control interface. Select one of the audio components in the list or enter the correct PID. *Table 3.10* describes the procedure for selecting a component using a Satellite Receiver.

Table 3.10: Manually Selecting the Audio Components

Step	Action	Result
1	Go to the Menu #3.2 and press EDIT. Select one of the audio streams or enter an audio PID.	Selects the audio component.
2	Scroll down to Menu #3.2 and edit the Audio 1 delay adjustment (range ± 0 to 49ms). Press SAVE.	Edits the Audio 1 delay adjustment.
3	Scroll down to Menu #3.2.3 and edit the Audio 1 digital output format (IEC958 CON, AES3, or IEC958 AC3) and output routing (STEREO, MIXED TO BOTH, LEFT TO BOTH, or RIGHT TO BOTH). Press SAVE.	Edits the Audio 1 digital output format and output routing.
4	Scroll down to Menu #3.2.4 and edit the clipping value (12 – 24 dB). Press SAVE.	Edits the clipping value.
5	Scroll down to Menu #3.2.5 and edit the AC-3 downmix parameter (SURROUND STEREO or CONVENTIONAL STEREO) Press SAVE.	Edits the AC-3 downmix parameter.
6	Go to the Menu #3.3 for Audio 2 and repeat steps 2 through 4.	Selects the audio component.

3.6.4 Setting Up Async Data / Sync Data

These menu pages allow status monitoring and configuration of the low and high speed data.

> NOTE...
>
> When the High Speed RS-422 Data Enabler Card (S12595) is detected on power-up the unit will recover high speed data. If it is not installed the unit will recover low speed data. The unit can recover either low speed (RS-232) data or high speed (RS-422) data but not both simultaneously.

Table 3.11: Setting Up Async Data/Sync Data

Step	Action	Result
1	Go to Menu #3.4 and press EDIT. Select the data stream number.	Selects the data stream number.
2	Scroll down to Menu #3.4.1 and edit the low speed data output (ENABLED or DISABLED). Press SAVE.	The unit receives and displays the correct bit-rate.

3.6.5 Setting Up Teletext

The teletext data is transmitted in teletext PES packets. It uses its own PID to extract the teletext PES packets from the transport stream.

Table 3.12: Setting Up Teletext

Step	Action	Result
1	Go to Menu #3.5 and press EDIT.	Gains access to the Teletext insertion status.
2	Scroll down to Menu #3.5.1 and edit the insertion status (ENABLED or DISABLED). Press SAVE.	Edits the insertion status.

3.6.6 Setting Up VBI

The video index data is transmitted in VBI (vertical blanking interval) PES packets and is used in PAL and NTSC systems. One VBI PES packet can contain one frame of video index data.

Table 3.13: Setting Up VBI

Step	Action	Result
1	Go to Menu #3.6 and select the VBI PID.	Selects the VBI PID to be edited.
2	Scroll down to Menu #3.6.1 and edit the parameter for enabling VPS pass through (ENABLED or DISABLED). Press SAVE.	Edits the parameter for enabling VPS pass through.
3	Scroll down to Menu #3.6.2 and edit the parameter for enabling WSS pass through (ENABLED or DISABLED). Press SAVE.	Edits the parameter for enabling WSS pass through.
4	Scroll down to Menu #3.6.3 and edit the parameter for enabling VITC pass through (ENABLED or DISABLED). Press SAVE.	Edits the parameter for enabling VITC pass through.
5	Scroll down to Menu #3.6.4 and edit the parameters for specifying the first and second insertion lines for 525 VITC, and edit the parameters for specifying the first and second insertion lines for 625 VITC. Press SAVE.	Edits the parameters for specifying the first and second insertion lines for 525 VITC, and the parameters for specifying the first and second insertion lines for 625 VITC.
6	Scroll down to Menu #3.6.5 and edit the parameter for enabling Video Index pass through (ENABLED or DISABLED). Press SAVE.	Edits the parameter for enabling Video Index pass through.
7	Scroll down to Menu #3.6.6 and edit the parameter for enabling AMOL pass through (ENABLED or DISABLED). Press SAVE.	Edits the parameter for enabling AMOL pass through.
8	Scroll down to Menu #3.6.7 and edit the parameter for enabling Closed Captions pass through (ENABLED or DISABLED). Press SAVE.	Edits the parameter for enabling Closed Captions pass through.
9	Scroll down to Menu #3.6.8 and edit the parameter for enabling ITS insertion (ENABLED (CCIR), ENABLED (FCC/UK) or DISABLED). Press SAVE.	Edits the parameter for enabling ITS insertion.

3.6.7 Viewing the PCR PID Menu

Table 3.14: Viewing the PCR PID Menu

Step	Action	Result
1	Go to Menu #3.7. XXXX is the PCR PID YYYYYYYYY is (PRESENT or NOT PRESENT)	Gains access to the PCR PID selection menu.

3.6.8 Viewing the Network ID Menu

Table 3.15: Viewing the Network ID Menu

Step	Action	Result
1	Go to Menu #3.8. XXXXX is the Network ID from the current SDT (or ----- when SDT not available) YYYYY is the Original Network ID from the current SDT (or ----- when SDT not available)	Gains access to the Network ID and the Original Network ID.

3.6.9 Setting Up the Conditional Access/Scrambling (Menu #4)

Introduction

Menu #4 allows the status and configuration of the Conditional Access (CA) module to be checked. The structure and content of this group depends on the CA system. The available CA options are as follows:

- No Conditional Access
- Basic Interoperable Scrambling System (BISS) Mode-1 and Mode-E only.
- VideoGuard Director and BISS
- Remote Authorisation System (RAS) and BISS
- VideoGuard Director, RAS and BISS

The Transport Stream command may require altering to accommodate the installed CA software.

Remote Authorisation System (RAS) (Menu #4.1)

RAS has two levels of operation: FIXED KEY MODE and DSNG KEY MODE.

FIXED KEY MODE has a fixed control word to encrypt the data in the transport stream. Some control words are reserved for use in the TANDBERG Television DSNG Encoder.

DSNG KEY MODE is used for fixed head-end systems. Its main functionality is:

- Over-air addressing of Receivers for authorisation/de-authorisation to decrypt the transmission
- Group operation for authorisation/de-authorisation.

- Periodic control word changes during transmission.

VideoGuard, RAS and BISS

The process for setting this up is as for the RAS CA.

Changing the VideoGuard Customer ID (Menu #4.3.2)

The unit must be re-powered with the appropriate Smart Card installed after the Customer ID has been changed.

Basic Interoperable Scrambling System (BISS) (Menu #4.4)

BISS mode 1 is similar to RAS in that it uses a fixed control word to encrypt the data in the transport stream. Unlike RAS, the scrambling algorithm is non-proprietary, using the DVB Common Scrambling Algorithm to allow interoperability with other manufacturers' encoding/scrambling equipment.

Table 3.16: Setting Up the Conditional Access

Step	Action	Result
1	Go to Menu #4.	Gains entry into the Conditional Access menu.
2	Scroll down to Menu #4.1 and edit the RAS mode (FIXED KEY MODE or DSNG KEY MODE) and the DSNG key (7-digit number). Press SAVE.	Edits the RAS mode and the DSNG key.
3	Scroll down to Menu #4.2 and edit the Signal Protection (ENABLED or DISABLED). Press SAVE.	Edits the Signal Protection.
4	Scroll down to Menu #4.3 and edit the Videoguard Customer ID, the NCP Lock Override Pin (4-digit number), and the Reset Lock Override Pin (13-digit number). Press SAVE.	Edits the Videoguard Customer ID and the NCP Lock Override Pin and the Reset Lock Override Pin.
5	Scroll down to Menu #4.4 and edit the BISS mode (1, E FIXED, E TTV, E USER ONE, or E USER TWO) and the 48 or 64-bit control word key (12-digit number). Press SAVE.	Edits the BISS mode and the 48 or 64-bit control word key.
6	Scroll down to Menu #4.4.1 and edit the 56-bit control word for BISS E user ID One (14-digit number) and the 56-bit control word for BISS E user ID Two (14-digit number). Press SAVE.	Edits the 56-bit control word for BISS E user ID One and the 56-bit control word for BISS E user ID Two.
7	Scroll down to Menu #4.6 and edit the Transport Stream Output (ENCRYPTED, PARTIALLY DECRYPTED, or DECRYPTED) Press SAVE.	Edits the Transport Stream Output.

3.6.10 Setting up the Transport Stream Output (TSO)

Set-up Procedure

Use *Table 3.5* to step through the set up procedure of the Satellite Receiver using Menu #2.

Use *Table 3.17* to step through the Transport Stream Output set up procedure using Menu #4. This allows the transport stream for the current service to bypass the CA module on its way to the TSO module.

Table 3.17: Setting up the Transport Stream Output (TSO)

Step	Action	Result
1	Go to Menu #4.6 to enter the TRANSPORT STREAM OUTPUT setting.	Edits the Transport Stream Output.
2	Press EDIT then select one of the following: ENCRYPTED (ie input transport stream); PARTIALLY DECRYPTED (ie post TTV & RAS); DECRYPTED (ie post TTV, RAS, Common Interface BISS, DIRECTOR)	The Transport Stream Output will be formatted according to the choice made.
3	Press SAVE to store the choice.	The Transport Stream Output (TSO) is now set.

Packet Lengths

The output is an MPEG-2 bit-stream from the received services. The packet lengths input is 188/204/208; the output is 188.

- Spread mode in = > spread mode out.
- Burst mode in = > burst mode out (except when the TSO is set to DECRYPTED in step 2 in *Table 3.17.* Then the output is always bursted).

ASI Output Mode

- The output mode depends on the input mode. If the input mode is SPI, the ASI output is byte-mode. If the input is ASI, the ASI output is single packet burst mode.

3.7 Setting Up the Alarms (Menu #5)

Menu #5 allows a selection of Alarms to be edited.

Table 3.18: Setting up the Alarms

Step	Action	Result
1	Go to Menu #5.	Accesses the Alarms menu.
2	Scroll down to Menu #5.1 and edit the BIT ERROR RATE range (9.9 E-1 to 1.0 E-8) and status (NO ALARM, SET ALARM ONLY, SET ALARM AND RELAY 1, SET ALARM AND RELAY 2, SET ALARM AND RELAY 3, SET ALARM AND RELAY 4, SET ALARM AND RELAY 5, SET ALARM AND RELAY 6, SET RELAY 1 ONLY, SET RELAY 2 ONLY, SET RELAY 3 ONLY, SET RELAY 4 ONLY, SET RELAY 5 ONLY, or SET RELAY 6 ONLY). Press SAVE.	Edits the BER alarms menu.
2	Scroll down to Menu #5.2 and edit the TRANSPORT STREAM menu (NO ALARM, SET ALARM ONLY, SET ALARM AND RELAY 1 – 6, SET RELAY 1 – 6 ONLY). Press SAVE.	Edits the Transport Stream alarms menu.
3	Scroll down to Menu #5.3 and edit the VIDEO menu (NO ALARM, SET ALARM ONLY, SET ALARM AND RELAY 1 – 6, SET RELAY 1 – 6 ONLY). Press SAVE.	Edits the Video alarms menu.
4	Scroll down to Menu #5.4 and edit the AUDIO 1 menu (NO ALARM, SET ALARM ONLY, SET ALARM AND RELAY 1 – 6, SET RELAY 1 – 6 ONLY). Press SAVE.	Edits the Audio 1 alarms menu.
5	Scroll down to Menu #5.5 and edit the AUDIO 2 menu (NO ALARM, SET ALARM ONLY, SET ALARM AND RELAY 1 – 6, SET RELAY 1 – 6 ONLY). Press SAVE.	Edits the Audio 2 alarms menu.

3.8 Setting Up System Parameters (Menu #6)

This menu gives access to the Setup Menu to set up and edit System Parameters as well as the IRD Details menu (see *Table 3.20*).

Table 3.19: Setting Up a System

Step	Action	Result
1	Go to Menu #6.	Accesses the System menu.
2	Scroll down to Menu #6.1 and edit the Operating Mode (FRONT PANEL, SERIAL REMOTE or DIRECTOR NCP). Press SAVE.	Edits the Operating Mode menu.
3	Scroll down to Menu #6.1.1 and edit the LCD Contrast (LOW, MEDIUM or HIGH). Press SAVE.	Edits the LCD Contrast.
4	Scroll down to Menu #6.1.3 and edit the IP Address. Press SAVE.	Edits the IP Address.

Step	Action	Result
5	Scroll down to Menu #6.1.4 and edit the Subnet Mask. Press SAVE.	Edits the Subnet Mask.
6	Scroll down to Menu #6.1.5 and activate/deactivate the Restore system defaults. Press SAVE.	Edits the Restore System Defaults menu.
7	Scroll down to Menu #6.1.6 and edit the Service Hunt Mode (ENABLED or DISABLED). Press SAVE.	Edits the Service Hunt Mode menu.
8	Scroll down to Menu #6.1.7 and edit the Customisation Key. Press SAVE.	Edits the Customisation Key menu.

Table 3.20: Viewing the IRD Details Menu

Step	Action	Result
1	Go to Menu #6.2.	Accesses the IRD Details Menu and displays the Software Version.
2	Scroll down to Menu #6.2.1.	Displays the Firmware Version.
3	Scroll down to Menu #6.2.2.	Displays the Hardware Version.
4	Scroll down to Menu #6.2.3.	Displays the PLD Version.
5	Scroll down to Menu #6.2.4.	Displays the Electronic Serial Number.

3.9 Restarting the Unit

The **System Restart** submenu allows the user to reboot the unit without having to remove and insert the power cable.

Table 3.21: System Restart Menu

Step	Action	Result
1	Go to Menu #6.3.	Accesses the System Restart menu.
2	Press Edit.	ACTIVATE will be displayed.
3	Press Save to activate.	Unit is restarted.

3.10 Setting up Preset Services (Menu #1)

3.10.1 Using Preset Services

This group allows up to 40 services to be stored as presets. Selecting a Service from the preset list in Menu #1 automatically reconfigures the TT1260 to receive that Service with its associated parameters set as stored.

3.10.2 Setting up a Preset Service

Follow the steps in *Table 3.22* to store the current Service as a preset.

Table 3.22: Setting up a Preset Service

Step	Action	Result
1	Use the menus to set up the unit so that the required Service is current. (Refer to *Sections 3.5* and *3.6*)	This selects the Service and associated parameters for the preset process.
2	Go to Menu #1 to view the Preset menu.	This displays the menu which allows the Current Service to be stored at a chosen location (01 – 40). If there is no Current Service, the menu display reads NO STORED SERVICE.
3	Select a location to store the preset. The EDIT mode cannot be entered unless a valid Service being decoded.	Use EDIT and the arrow pushbuttons to step through the stored items. This allows a specific location to be chosen. Any vacant locations are marked by NO STORED SERVICE.
4	Press SAVE.	This stores the current Service and its associated parameters as a preset in the selected location. This adds the Service to the list displayed on page 1.

NOTE...

It is possible to store a service to a preset unless that service is being received (including all the required components such as video, audio, data, VBI, etc.

Chapter 4

Alarms

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4.1 Introduction

There are two Front Panel LEDs that indicate the status of the TT1260. These are used to indicate abnormal performance of the unit.

4.2 Location of the Alarm and Indication LEDs

The red **ALARM** LED is used to indicate an equipment fault condition, for example a missing or faulty input signal. It should be off during correct operation, although it may be lit briefly during power-up.

The green **LOCK** LED is used to indicate that the equipment is locked to a transport stream when lit, and indicates correct conditions and correct system functioning.

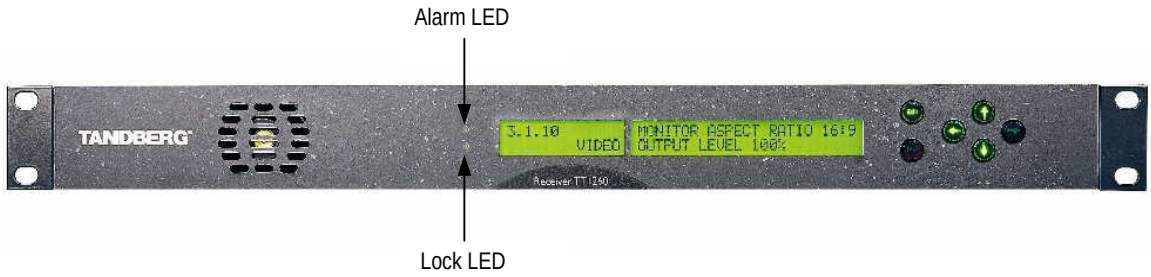

Figure 4.1: Front Panel LEDs

4.3 ALARM LED

The TT1260 supports a summary alarm signal that is active when one or more of the individual monitored alarm conditions are active. It allows masking of unwanted alarm conditions so that they do not contribute to the summary alarm. Configuration of alarms is via the Front Panel and remote control interfaces. The state of the summary alarm is reflected by the **ALARM** LED on the front panel where red represents an alarm, and off represents no alarm.

This LED provides a high-level indication of an alarm within the unit. The alarm list depends on the TT1260 model. The unit continuously monitors for the following alarm conditions during normal operation: (if not masked – see *Menu #5, Annex C, Menus*):

- No transport stream
- Video not running
- Audio 1 not running
- Audio 2 not running

It is possible to signal additional alarms depending on the transport stream input type and optional functionality in the unit.

Satellite inputs:

- Bit Error Rate (BER) above (programmable) threshold

4.4 Relays

In addition to the one summary alarm, there is an Alarm Relay Card (TT1260/HDC/ALRM) with additional six relays. The alarm relays are programmable to reflect the state of one or more of the individual monitored alarm conditions. As alarm conditions may be of very short duration (i.e. less than the time required to activate a relay) the software ensures that any alarm condition is signalled for a minimum of one second.

The relay electrical characteristics are as follows:

All relays are configured as Single Pole Change-over Relays, with all three contacts per relay available at the output connector. The contacts of each relay are fully isolated from each other, and from chassis ground.

All relays are energised in the non-alarm condition, such that an alarm is indicated upon power failure. If power returns to the unit, the alarms should not re-energise until system boot is complete, and the alarm condition of the various components has successfully been cleared.

See *Section C.8, Alarms Menu (#5)* for a complete summary of alarm status information.

> NOTE...
>
> The Alarm Relay Card (TT1260/HDC/ALRM) is a standard component in the TT1260/DIRBAS base unit.

Chapter 5

Options

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5.1 Option Card Locations

The functionality can be enhanced with the inclusion of option cards. Each card consists of a horizontally mounted PCB with rear panel connector(s). The cards are fitted into the positions indicated in *Table 5.1.*

Euroboard Slot		MCD Slot	Alarm Relay Card Connector	AC Mains Supply
Mezzanine 1	Mezzanine 2		RS-422 Data Card Connector	

Figure 5.1: Option Card Slot Locations (Rear View)

Table 5.1: Option Card Locations

Option Number	Option Card	Mezzanine 1	Mezzanine 2	MCD Slot	Euroboard Slot
3	ASI Input Card	✓			
4	QPSK Input Card	✓ (occupies both)	✓ (occupies both)		
5	8PSK/16QAM Input Card	✓ (occupies both)	✓ (occupies both)		
6	High Speed RS-422 Data Enabler Card			✓	

5.2 ASI Input Card (TT1260/HWO/ASI)

5.2.1 General

The ASI Input Card provides DVB-compliant ASI inputs for the TT1260 Decoder.

5.2.2 Rear Panel View

Figure 5.2: ASI Input Card Rear Panel

5.2.3 Connector Details

Provides a DVB-compliant copper connection.

The input supports both byte-mode and single packet burst mode and is activated through the Input Menu (#2). The specification for these connectors are given in *Section B.4.3*.

ASI IN 1/2

Table 5.2: DVB-ASI Copper Connector (2 off)

Item		Specification
Connector type		BNC 75 Ω socket
Connector designations		ASI IN 1 ASI IN 2
Cable specification		Capable of transmitting a maximum frequency of 850 MHz
Pin	Centre Shield	Signal Ground/Chassis

5.3 QPSK Input Card (TT1260/HWO/QPSK)

5.3.1 General

The QPSK Input Card supports QPSK demodulation for Satellite Receivers with two L-band inputs.

5.3.2 Rear Panel View

Figure 5.3: QPSK Input Card Rear Panel

5.3.3 Connector Details

L-band Inputs

QPSK IN 1/2

Connect the L-band output of a suitable LNB to the F-type connector either directly or via a suitable attenuator giving adequate consideration to lightning and surge protection – refer to *Section 2.3.4, Outdoor Antenna*. The active input is chosen using the Input Status Menu (#2).

In most cases an attenuator will not be required. The following list summarises the circumstances when one should be used.

When the desired input level is greater than the specified maximum permissible (-25 dBm).

When the downlead is a short length of low-loss cable and the LNB in use has a poor return loss (7 dB min).

When the Receiver is receiving one of many carriers in a multi-carrier FDM system and the level of the wanted signal is close to the specified maximum permissible.

The specification for this connector is given in *Section B.4.1, QPSK Satellite Receivers.*

Table 5.3: QPSK Satellite Receiver (L-band) Connector (2 Off)

Input		Specification
Connector type		F-type, Female
Connector designation		QPSK IN 1
		QPSK IN 2
Pin:	Centre	RF Input
	Shield	Ground/Chassis
LNB Supply		Refer to Caution box below
Impedance		75 Ω

CAUTIONS...

1. The Receiver provides dc power (refer to *Chapter 3, Operating the Equipment Locally*) via the active L-band input connector to drive an LNB (Low Noise Block Down-Converter). Do not connect equipment other than an LNB to this connector. Failure to do this may result in damage to the external equipment.
2. The F-type connector is not suitable for repeated connection and disconnection. When intended for use in this way, fit a sacrificial connector and connect to it.

Audio Outputs

AUDIO 1 / 2

A pair of 9-way female D-type connectors provide two stereo channels. Each connector carries a single channel of a stereo pair in both analogue and digital form. The output can be varied according to service and unit configuration.

Audio control is through the Service Menu (#3). The specification for this connector is given in *Annex B, Section B.5.2, Audio Outputs*.

Table 5.4: Analogue Audio Connectors

Item	Specification
Connector type	9-way, D-type, Female
Connector designations	AUDIO 1 AUDIO 2
Pinouts	Pin 1 — Digital bit-stream Pin 2 — Ground Pin 3 — Left + Pin 4 — Right + Pin 5 — Ground Pin 6 — Reserved Pin 7 — Ground Pin 8 — Left - Pin 9 — Right -
Nominal output impedance	50 Ω
Maximum data rate	3.072 Mbit/s
Output level	+18 dBm nominal clipping level. Selectable in range 12 to +24 dBm.
Load impedance	≥600 Ω balanced

5.4 8PSK/16QAM Card (TT1260/HWO/HM)

5.4.1 General

The 8PSK/16QAM Card supports QPSK, 8PSK and 16QAM demodulation for Satellite Receivers with two L-band inputs. It is a complete digital card for DVB-S, DSNG and other contribution applications and supports two L-band inputs.

It is fully DVB - S (EN 300-421) and DVB - DSNG (EN 301 210) compliant, and performs baseband down-conversion, digital demodulation and decoding of an L-band input signal.

5.4.2 Rear Panel View

Figure 5.4: 8PSK/16QAM Card Rear Panel

5.4.3 Connector Details

The active input is chosen using the Input Status Menu (#2). The specification for this connector is given in *Annex B, Section B.4.2, 8PSK/16QAM Satellite Receivers.*

QPSK/8PSK/16QAM IN 1/2

Table 5.5: 8PSK/16QAM Card Connectors

Input		Specification
Connector type		F-type, Female
Connector designation		QPSK/8PSK/16QAM IN 1
		QPSK/8PSK/16QAM IN 2
Pin:	Centre	RF Input
	Shield	Ground/Chassis
LNB Supply		Refer to Caution box below
Impedance		75 Ω

CAUTIONS...

1. The Receiver provides dc power (refer to *Chapter 3, Operating the Equipment Locally*) via the active L-band input connector to drive an LNB (Low Noise Block Down-Converter). Do not connect equipment other than an LNB to this connector. Failure to do this may result in damage to the external equipment.
2. The F-type connector is not suitable for repeated connection and disconnection. When intended for use in this way, fit a sacrificial connector and connect to it.

5.5 High Speed RS-422 Data Enabler Card (TT1260/HWO/HSDATA)

5.5.1 General

The High Speed RS-422 Data Enabler Card provides RS-422 data output when there are PIDs carrying high speed data in the incoming transport stream.

High-speed data (synchronous data) can be carried in a transport stream as private data. This is then extracted from the transport stream and output from the IRD via the RS-422 interface. Data-rates in integer multiples of 56 kbit/s and 64 kbit/s up to 2.048 Mbit/s (subject to the number and type of services in the multiplex) are output on a 9-pin D-type connector.

NOTE...

When the High Speed RS-422 Data Enabler Card (S12595) is detected on power-up the unit will recover high-speed data. If not installed the unit will recover low-speed asynchronous data. The TT1260 can recover either low speed (RS-232) data or high speed (RS-422) data but not both simultaneously. For technical specifications see *Section B.5.3, Data Outputs.*

5.5.2 Rear Panel View

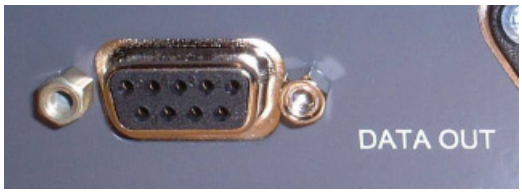
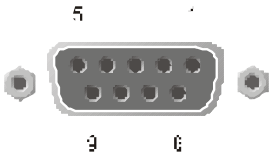


Figure 5.5: High Speed RS-422 Data Enabler Card Rear Panel

5.5.3 Connector Details

High-speed data (synchronous data) is carried in a transport stream as private data. The specification for this connector is given in *Annex B, Section B.5.3, Data Outputs*.



DATA OUT

Table 5.6: RS-422 Synchronous Data Output Specification

Item	Specification
Type:	ITU-T V.11 (RS-422) synchronous serial data
Connector designation:	DATA OUT
Connector type:	9-way, D-type, Female
Supported data rates:	Multiples of 56 kbit/s and 64 kbit/s up to 2.048 Mbit/s
Transport package alignment:	Transparent to data source. Port operates as a bit-pipe.
Configuration	DCE
Pin-outs	Pin 1 — GND Pin 2 — Data - Pin 3 — Clock + Pin 4 ---- Not Used Pin 5 — GND Pin 6 — GND Pin 7 — Data + Pin 8 — Clock - Pin 9 — Not Used

5.6 QPSK/8PSK/16QAM (TT1260/SWO/16QAM)

This option provides a software key license for TT1260/HWO/HM, enabling QPSK, 8PSK, and 16QAM.

The key is downloaded via the Ethernet or entered via the front panel System Menu (#6), (see *Annex C, Section C.9, System Menu*). When the key is downloaded, hidden functionality in the software is unlocked.

Contact TANDBERG Television Customer Services (refer to *Contact Information* on *page vii, Preliminary Pages*).

5.7 QPSK/8PSK (TT1260/SWO/8PSK)

This option provides a software key license for TT1260/HWO/HM, enabling QPSK and 8PSK.

The key is downloaded via the Ethernet or entered via the front panel System Menu (#6), (see *Annex C, Section C.9, System Menu*). When the key is downloaded, hidden functionality in the software is unlocked.

Contact TANDBERG Television Customer Services (refer to *Contact Information* on *page vii, Preliminary Pages*).

5.8 Signal Protection Conditional Access (TT1260/SWO/SP)

This option provides a software key to enable Signal Protection Conditional Access.

The key is downloaded via the Ethernet or entered via the front panel System Menu (#6), (see *Annex C, Section C.9, System Menu*). When the key is downloaded, hidden functionality in the software is unlocked.

Contact TANDBERG Television Customer Services (refer to *Contact Information* on *page vii, Preliminary Pages*).

5.9 RAS Mode-1 Conditional Access (TT1260/SWO/RAS)

This option provides a software key to enable RAS Mode-1 Conditional Access.

The key is downloaded via the Ethernet or entered via the front panel System Menu (#6), (see *Annex C, Section C.9, System Menu*). When the key is downloaded, hidden functionality in the software is unlocked.

Contact TANDBERG Television Customer Services (refer to *Contact Information* on *page vii, Preliminary Pages*).

5.10 VideoGuard Director CA/TANDBERG Director NCP (TT1260/SWO/DIR)

This option provides a software key to enable VideoGuard Director CA/TANDBERG Director NCP.

The key is downloaded via the Ethernet or entered via the front panel System Menu (#6), (see *Annex C, Section C.9, System Menu*). When the key is downloaded, hidden functionality in the software is unlocked.

Contact TANDBERG Television Customer Services (refer to *Contact Information* on *page vii, Preliminary Pages*).

5.11 BISS-1/BISS-E (TT1260/SWO/BISS)

This option provides a software key to enable BISS-1/BISS-E.

The key is downloaded via the Ethernet or entered via the front panel System Menu (#6), (see *Section C.9, System Menu*). When the key is downloaded, hidden functionality in the software is unlocked.

Contact TANDBERG Television Customer Services (refer to *Contact Information* on *page vii, Preliminary Pages*).

5.12 XLR Cable (TT1260/CABLE/XLR)

The XLR Cable can be used for each of the two 9-pins D-type audio output connectors on the TT1260. It has a 9-pin D-type audio connector on one end and three XLR connectors on the other end.

Table 5.7: XLR Cable

Connection	Outer Marking
Right Channel	BALANCED AUDIO RIGHT
Left Channel	BALANCED AUDIO LEFT
Digital	BALANCED DIGITAL AUDIO

Table 5.8: XLR Audio Connector

Item	Specification
Connector type	9-way, Female, D-type
Pin-outs	Pin 1 — Digital pin 2 + Pin 2 — Not used Pin 3 — Left Channel pin 2 + Pin 4 — Right Channel pin 2 + Pin 5 — Not used Pin 6 — Digital pin 3 - Pin 7 — Not used Pin 8 — Left Channel pin 3 - Pin 9 — Right Channel pin 3 -

Chapter 6

Preventive Maintenance and Fault-finding

Contents

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6.1 Routine Checks

6.1.1 Cooling Fan

There are no routine checks associated with this equipment other than to ensure that the unit is adequately cooled. This equipment must never be operated unless the cooling fan is working; this should be checked periodically.

CAUTION...

The fan contained within this unit is not fitted with an insect/dust filter. Pay particular attention to the environment in which it is going to be used.

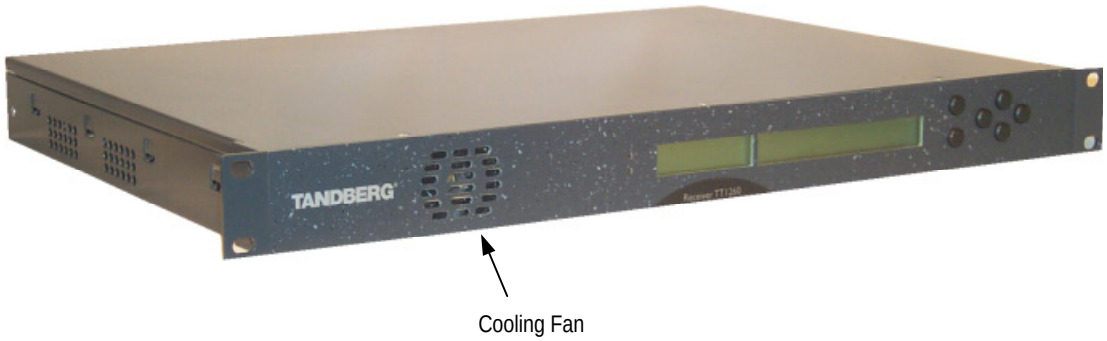

Figure 6.1: Cooling Fan Location

6.1.2 Cleaning

Unplug the equipment from the supply before cleaning. Do not use liquid or aerosol cleaners. Use a damp cloth for cleaning the exterior of the Receiver.

6.2 Servicing

6.2.1 Conditions Requiring Servicing

WARNING

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 TANDBERG TELEVISION.

The following is a list of conditions that may indicate the need for servicing:

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 has been dropped or the case has been damaged.
6. When the product exhibits a distinct change in performance.
7. If the equipment has been subject to a lightning strike or power surge.

6.2.2 Replacement Parts

When replacement parts are required, be sure only parts specified by TANDBERG Television Ltd (or having the same characteristics as the original part) have been used. Unauthorised substitutions may result in fire, electric shock or other hazards.

6.2.3 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.

6.3 Maintenance and Support Services - Warranty

The equipment is covered by a standard TANDBERG Television Ltd warranty service for a period of 12 months from delivery.

The warranty covers the following:

- All material defects in the equipment for a period of 12 months
- All parts and labour charges
- All returned items will be repaired within 30 working days from receipt at the customer care centre
- Return of the repaired item to the customer, postage paid
- Provide assistance to the customer through the Customer Help Line number (see the Customer Services information at the front of this manual)

The warranty does not cover any engineering visit(s) to the customer's premises.

6.4 Fault-finding

6.4.1 General

The information contained in this chapter is intended to isolate the unit as the faulty equipment if a system failure occurs. If the following information fails to clear the abnormal condition, please contact Customer Services using the information given in the *Preliminary Pages* of this manual.

6.4.2 Factory Default Settings

TT1260 are dispatched with the factory defaults shown in Annex F. These can be restored at any time using System Menu (#6).

6.4.3 Preliminary Investigations

1. Ensure all leads and connectors are in place and serviceable.
2. Ensure the unit is powered. If not investigate the power source. Check the fuse.
3. Ensure the red alarm LED on the front of the unit is not lit. If it is, investigate the Alarm status (see Chapter 4, Alarms).
4. Use the BER display to ensure that the Post Viterbi BER is less than 2.0 E-4 (refer to Section C.5.2). If it is not, check the input to the Receiver.

6.4.4 Remote Control

The TT1260 remote control input operates with both RS-232 and RS-485 serial data formats (Menu #6.1.2).

CAUTION...

Be sure to set the correct format and address via the front panel before attempting to use this input. The TT1260 will ignore any remote control commands if the input is not correctly set.

6.5 Changing the Equipment Fuse

CAUTION...

This product should be operated only from the type of power source indicated on the marking label. If you are not sure of the type of power supply to your home or business, consult your appliance dealer or local power company. For products intended to operate from battery power, or other sources, refer to the operating instructions.

The power supply used in this equipment is a wide-ranging, ac power supply unit designed for use in ambient air temperature conditions of 0°C to +45°C for 100-120 Vac and 220-240 Vac, 50-60 Hz (see *Annex B, Technical Specification* for details). There are no links or switches to be altered for operation from different ac supplies.

The TT1260 is designed for User Accessible Fuse Replacement.

In addition to the fuse in the supply cable plug (if appropriate) there is a fuse held in an integral fuse carrier at the ac power inlet at the rear of the TT1260.

Table 6.1: Fuse Information

Item	Specification
Fuse	Single pole, fitted in live conductor in power input filter at rear of unit.
Fuse type	5 mm x 20 mm anti-surge (T) HBC, IEC127 (sheet v)
Fuse rating	1.6 A, 250 Vac

To replace the ac power fuse perform the following:

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 ac power inlet.
2. Ease out the fuse carrier by placing a small, flat-bladed screwdriver in the notches at the sides of the carrier.

CAUTION...

When replacing the power input fuse, always ensure that a fuse of the correct type and rating is fitted. Failure to do so results in inadequate protection.

3. Replace the fuse in the carrier.
4. Insert the fuse carrier back in the ac power inlet.

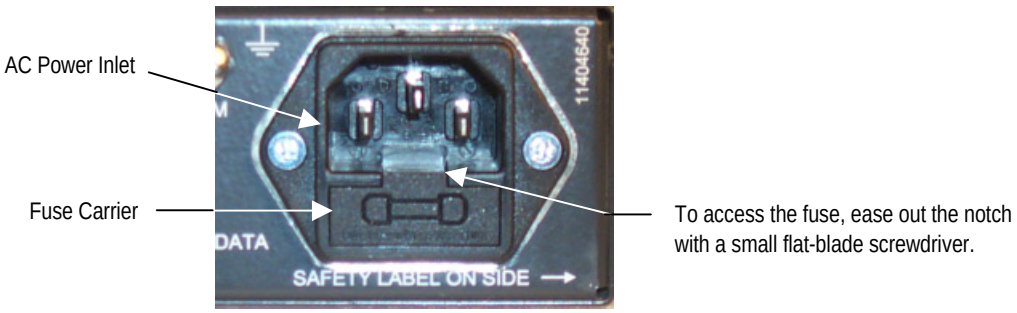

Figure 6.2: Fuse Carrier

If the replacement fuse also blows, do not continue. Disconnect the equipment and contact TANDBERG Customer Services (see *Preliminary Pages*) for advice.

6.6 Disposal

6.6.1 Moulded Plugs

If the moulded plug fitted to the mains cable supplied with this equipment is not required, use another cable. If the supplied plug is to be changed cut it off and dispose of it safely.

WARNING...

IF THE MOULDED PLUG FITTED TO THE MAINS CABLE SUPPLIED WITH THIS EQUIPMENT IS NOT REQUIRED, PLEASE CUT IT OFF AND 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.

6.6.2 Equipment

Dispose of this equipment safely at the end of its life. Local codes and/or environmental restrictions may affect its disposal. Check with your local authority.

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Annex A

Glossary

The following list covers most of the abbreviations, acronyms and terms used in TANDBERG Television Limited Manuals. All terms may not be included in this manual.

µm	Micrometre (former name - micron): a unit of length equal to one millionth (10^{-6}) of a metre.
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 on all lines at half the luminance rate.
422P@ML	422 Profile at Main Level: A subset of the MPEG-2 standard, which supports digital video storage (DVD etc.) and transmissions up to 50 Mbit/s over various mediums. Used for Contribution and Distribution applications.
5B6B	5 Binary Bits Encoded to 6 Binary Bits: Block code.
AC-3	Audio Coding algorithm number 3 (See Dolby Digital).
ACC	Authorisation Control Computer.
ADPCM	Adaptive Differential Pulse Code Modulation: An advanced PCM technique that reduces the bit-rate by coding the difference values between successive samples rather than the absolute value of each sample.
ADT	Audio, Data And Teletext.
AFC	Automatic Frequency Control.
AFS	Automation File Server.
AGC	Automatic Gain Control.
AMOL I and II	Automatic Measure of Line-ups 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 connection orientated, cell based, data transport technology designed for Broadband ISDN (B-ISDN). It provides a circuit-switched bandwidth-on-demand carrier system, with the flexibility of packet switching. It offers low end-to-end delays and (negotiable on call set-up) Quality of Service guarantees. Asynchronous refers to the sporadic nature of the data being transmitted. Cells are transmitted only when data is to be sent; therefore the time interval between cells varies according to the availability of data.
ATSC	Advanced Television Standards Committee: An organisation founded in 1983 to research and develop a digital TV standard for the U.S.A. In late 1996, the FCC adopted the ATSC standard, the digital counterpart of the NTSC standard.

B3ZS	Bipolar with Three Zero Substitution: A method of eliminating long zero strings in a transmission. It is used to ensure a sufficient number of transitions to maintain system synchronisation when the user data stream contains an insufficient number of 1s to do so. B3ZS is the North American equivalent of the European HDB3.
Backward Compatibility	Refers to hardware or software that is compatible with earlier versions.
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. The rate at which errors occur in the transmission of data bits over a link. It is generally shown as a negative exponent, (e.g. 10^{-7} means that 1 in 10,000,000 bits are in error).
BISS	Basic Interoperable Scrambling System: Non-proprietary encryption from EBU (Tech3290).
BISS-E	Basic Interoperable Scrambling System: with Encrypted keys.
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	Bi-directionally 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 (backward 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: The transmission capacity of an electronic line such as (among others) a communications network, computer bus, or broadcast link. It is expressed in bits per second, bytes per second or in Hertz (cycles per second). When expressed in Hertz, the frequency may be a greater number than the actual bits per second, because the bandwidth is the difference between the lowest and highest frequencies transmitted. High bandwidth allows fast transmission or high-volume transmission.
Byte-mode	Each byte is delivered separately in the ASI Transport Stream, with stuffing data added between the Bytes to increase the data rate to 270 Mbit/s. See DVB Document A010 rev. 1, Section B3.3, (ASI) Layer-2 Transport Protocol.
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 MPEG-2 Program Specific Information (PSI) data. Mandatory for MPEG-2 compliance if CA is in use.
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 narrow range of frequencies, part of a frequency band, for the transmission of radio and television signals without interference from other channels. In the case of OFDM, a large number of carriers spaced apart at precise frequencies are allocated to a channel.
Channel Coding	A way of encoding data in a communications channel that adds patterns of redundancy into the transmission path in order to improve the error rate. Such methods are widely used in wireless communications.
Chrominance	The colour part of a TV picture signal, relating to the hue and saturation but not to the luminance (brightness) of the signal. In a composite-coded colour system, the colour information (chrominance, often referred to as chroma) is modulated onto a high frequency carrier and added to the monochrome-format video signal carrying the luminance (Y). In a component-coded colour system, the two colour-difference signals (R-Y)(B-Y) usually referred to as C_RC_B (digital) or P_RP_B (analogue), are used to convey colour information. When C_RC_B (P_RP_B) is added to the luminance (Y), the complete picture information is conveyed as YC_RC_B (YP_RP_B).
Closed Captioning	A TV picture subtitling system used with 525-line analogue transmissions.
CODE	Create Once Distribute Everywhere.
Codec	The combination of an Encoder and a complementary Decoder located respectively at the input and output of a transmission path.

COFDM	Coded OFDM: COFDM adds forward error correction to the OFDM transmission consisting of Reed-Solomon (RS) coding followed by convolutional coding to add extra bits to the transmitted signal. This allows a large number of errors at the receive end to be corrected by convolutional (Viterbi) decoding followed by RS decoding.
Compression	Reduction in the number of bits used to represent the same information. For the purposes of a broadcast system, it is the process of reducing digital picture information by discarding redundant portions of information that are not required when reconstituting the picture to produce viewing clarity. Compression allows a higher bite-rate to be transmitted through a given bandwidth.
Compression System	Responsible for compressing and multiplexing the video / audio / data bit-streams, together with the authorisation stream. The multiplexed data stream is then ready for transmission.
C_RC_B	Digital Colour difference signals. These signals, in combination with the luminance signal (Y), define the colour and brightness of each picture element (pixel) on a TV line. *See:* Chrominance
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 ensure 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.
CVCT	Cable Virtual Channel Table (ATSC).
dB	Decibels: A ratio of one quantity to another using logarithmic scales to give results related to human aural or visual perception. dB is a ratio whereas dBm, for example, is an absolute value, quoted as a ratio to a fixed point of 0 dBm. 0 dBm is 1 mW at 1 kHz terminated in 600Ω. 0 dBmV is 1 mV terminated in 75Ω.
DCE	Data Communications Equipment: Typically a modem. It establishes, maintains and terminates a session on a network but in itself is not the source (originator) or destination (end receiving unit) of signals (e.g. a computer, see DTE). A DCE device may also convert signals to comply with the transmission path (network) format.
DCT	Discrete Cosine Transform: A technique for expressing a waveform as a weighted sum of cosines. Raw video data is not readily compressible. DCT is not in itself a compression technique but is used to process the video data so that it is compressible by an encoder. DCT processes the picture on an 8x8-pixel block basis, converting the data from an uncompressible X Y form (as displayed by an oscilloscope) to a compressible frequency domain form (as displayed by a spectrum analyser). 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.
DID	Data Identifier.
Differential Coding	Method of coding using the difference between the value of a sample and a predicted value.
DIL	Dual In Line: The most common type of package for small and medium scale integrated circuits. The pins hang vertically from the two long sides of the rectangular package, spaced at intervals of 0.1 inch.
DIN	Deutsches Institut für Normung: German Standards Institute.
Dolby Digital	Formerly AC-3. An audio coding system based on transform coding techniques and psychoacoustic principles.
Downlink	The part of the satellite communications circuit that extends from the satellite to an Earth station.
Downconvert	The process by which the frequency of a broadcast transport stream is shifted to a lower frequency range.
DPCM	Differential Pulse Code Modulation: An audio digitisation technique that codes the difference between samples rather than coding an absolute measurement at each sample point.
DSNG	Digital Satellite News-Gathering.
DSP	Digital Signal Processor.
DTE	Data circuit Terminating Equipment: A communications device that originates (is the source) or is the end receiving unit (destination) of signals on a network. It is typically a terminal or computer.
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.
DTS	Digital Theater Systems: A motion picture digital sound system.
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) medium, created by the EP-DVB group and approved by the ITU. Specifies modulation, error correction, etc. (see EN 300 421 for satellite, EN 300 429 for cable and EN 300 744 for terrestrial).

DVB SI	Digital Video Broadcasting Service Information.
DVB-PI	DVB-Professional Interfaces: TTV Lan search shows – DVB Physical Interfaces
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.
ECM	Entitlement Control Message.
EDI	Ethernet Data Input
EIA	Electronics Industries Association (USA).
EIT	Event Information Table: Equipment: A component of the DVB-Service Information (SI) stream generated within an Encoder, containing information about events or programmes such as event name, start time, duration, etc. System: EIT (Present/Following) contains the name of the current and next event. It may include an optional descriptor (synopsis) giving brief details of content. EIT (Schedule) is used to produce a full EPG. The EIT is the only DVB-SI table, which can be encrypted.
Elementary Stream	A generic term for a coded bit-stream, be it video, audio or other.
EMC	Electromagnetic Compatibility.
EMM	Entitlement Management Message.
Encryption	Encoding of a transmission to prevent access without the appropriate decryption equipment and authorisation.
EPG	Electronic Programme Guide: On-screen programme listing using thumbnail pictures and/or text.
Ethernet	The most widely used local area network (LAN) defined by the IEEE as the 802.3 standard. Transmission speeds vary according to the configuration. Ethernet uses copper or fibre-optic cables.
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: A method of catching errors in a transmission. The data is processed through an algorithm that adds extra bits and sends these with the transmitted data. The extra bits are then used at the receiving end to check the accuracy of the transmission and correct any errors.
FFT	Fast Fourier Transformation: A fast algorithm for performing a discrete Fourier transform.
FIFO	First In, First Out: A data structure or hardware buffer from which items are taken out in the same order they were put in. Also known as a shelf from the analogy with pushing items onto one end of a shelf so that they fall off the other. A FIFO is useful for buffering a stream of data between a sender and receiver that are not synchronised - i.e. they not sending and receiving at exactly the same rate.
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: A protocol used to transfer files over a TCP/IP network (Internet, UNIX, etc.). For example, after developing the HTML pages for a Web site on a local machine, they are typically uploaded to the Web server, using FTP. Unlike e-mail programs in which graphics and program files have to be attached, FTP is designed to handle binary files directly and does not add the overhead of encoding and decoding the data.
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 TANDBERG Television Encoder normally uses a 12 frame GOP; every twelfth frame is an I frame.
GUI	Graphical User Interface: The use of pictures rather than just words to represent the input and output of a program. A program with a GUI runs under a windowing system and has a screen interface capable of displaying graphics in the form of icons, drop-down menus and a movable pointer. The on-screen information is usually controlled / manipulated by a mouse or keyboard.
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.
HSYNC	Horizontal (line) SYNCs.
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, plus 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 cable, satellite and terrestrial transmission applications.
Interframe Coding	Compression coding involving consecutive frames. When consecutive frames are compared, temporal redundancy is used to remove common elements (information) and arrive at difference information. MPEG-2 uses B and P frames, but since they are individually incomplete and relate to other adjacent frames, they cannot be edited independently.
Intraframe Coding	Compression coding involving a single frame. Redundant information is removed on a per frame basis. All other frames are ignored. 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; these are independent frames and can be edited.
IP	Internet Protocol: The IP part of TCP/IP. IP implements the network layer (layer 3) of the protocol, which contains a network address and is used to route a message to a different network or sub-network. IP accepts packets from the layer 4 transport protocol (TCP or UDP), adds its own header to it and delivers a datagram to the layer 2 data link protocol. It may also break the packet into fragments to support the Maximum Transmission / Transfer Unit (MTU) of the network.
I-picture; I-frame	Intracoded Picture/Frame: A picture / frame, which is coded using purely intracoding 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, purchased at home (on impulse) using a prearranged SMS credit line.
IRD	Integrated Receiver Decoder: The Receiver with an internal MPEG 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 if CA is active, decodes the signal when provided with 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: The basic ISDN service is BRI (Basic Rate Interface), which is made up of two 64 kbit/s B channels and one 16 kbit/s D channel (2B+D). If both channels are combined into one, called bonding, the total data rate becomes 128 kbit/s and is four and a half times the bandwidth of a V.34 modem (28.8 kbit/s). The ISDN high-speed service is PRI (Primary Rate Interface). It provides 23 B channels and one 64 kbit/s D channel (23B+D), which is equivalent to the 24 channels of a T1 line. When several channels are bonded together, high data rates can be achieved. For example, it is common to bond six channels for quality videoconferencing at 384 kbit/s. In Europe, PRI includes 30 B channels and one D channel, equivalent to an E1 line.
ISO	International Standards Organisation.
ISOG	Inter-union Satellite Operations Group.
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: ISO/ITU standard for compressing still images. It has a high compression capability. Using discrete cosine transform, it provides user specified compression ratios up to around 100:1 (there is a trade-off between image quality and file size).
kbit/s	1000 bits per second.
Kbit	1024 bits, usually refers to memory capacity or allocation.
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.
Luminance	The television signal representing brightness, or the amount of light at any point in a picture. The Y in YC_RC_B.
LVDS	Low Voltage Differential Signal: LVDS is a generic multi-purpose Interface standard for high speed / low power data transmission. It was standardised in ANSI/TIA/EIA-644-1995 Standard (aka RS-644).
Macroblock	A 16x16-pixel area of the TV picture. Most processing within the MPEG domain takes place with macro blocks. These are converted to four 8x8 blocks using either frame DCT or field DCT. Four 8 x 8 blocks of luminance data and two (4:2:0 chrominance format), four (4:2:2) or eight (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.
Mbit/s	Million bits per second.
MCC	Multiplex Control Computer: A component of a System 3000 compression system. The MCC sets up the configuration for the System 3000 Multiplexers under its control. The MCC controls both the main and backup Multiplexer for each transport stream.
MCPC	Multiple Channels Per Carrier.
MEM	Multiplex Element Manager: A GUI based control system, part of the range of TANDBERG Television compression system control element products. The evolution 5000 MEM holds a model of the system hardware. Using this model, it controls the individual system elements to configure the output multiplexes from the incoming elementary streams. The MEM monitors the equipment status and controls any redundancy switching.
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 at Main Level: A subset of the MPEG-2 standard, which supports digital video storage (DVD etc.) and transmissions up to 15 Mbit/s over various mediums.
MP@HL	Main Profile at High Level: A subset of the MPEG-2 standard, which supports digital video storage (DVD etc.) and transmissions up to 80 Mbit/s over various mediums.
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. Specified in ISO/IEC 13818. The standard is split into layers and profiles defining bit-rates and picture resolutions.
MSB	Most significant bit.
Msymbol/s	(Msym/s) Mega (million) 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 psychoacoustic 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: Official name is NICAM 728. Used for digital stereo sound broadcasting in the UK employing compression techniques to deliver very near CD quality audio. 728 refers to the bit-rate in kbit/s.
NIT	Network Information Table: Part of the service information data. The NIT provides information about the physical organisation of each transport stream multiplex, and the characteristics of the network itself (such as the actual frequencies and modulation being used).

nm	Nanometre: a unit of length equal to one thousand millionth (10^{-9}) of a metre.
NTSC	National Television Systems Committee: The group, which developed analogue 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 59.97 Hz field frequency.
NVOD	Near Video On Demand: 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 (permitting random read / write access) that do not lose their information when power is removed. Stores the default configuration parameters set by the user.
OFDM	Orthogonal FDM: A modulation technique used for digital TV transmission in Europe, Japan and Australia; more spectrally efficient than FDM. In OFDM, data is distributed over a large number of carriers spaced apart at precise frequencies. The carriers are arranged with overlapping sidebands in such a way that the signals can be received without adjacent channel interference.
OPPV	Order ahead Pay Per View: An advance purchase of encrypted one-time events with an expiry date.
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 Alternating Line: A colour TV broadcasting system where the phase of the R-Y colour-difference signal is inverted on every alternate line to average out errors providing consistent colour reproduction.
PAT	Program Association Table: Part of the MPEG-2 Program Specific Information (PSI) data and is mandatory for MPEG-2 compliance. The PAT points (maps) to the PMT.
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.
PDC	Programme Delivery Control (VBI): A Teletext service allowing simple programming (i.e. VideoPlus) of VCR recording times. If the desired program is rescheduled, PDC updates the programming information in the VCR.
Pel	Picture Element: Also known as a pixel. The smallest resolvable rectangular area of an image either on a screen or stored in memory. On screen, pixels are made up of one or more dots of colour. Monochrome and grey-scale systems use one dot per pixel. For grey-scale, the pixel is energised with different intensities, creating a range from dark to light (a scale of 0-255 for an eight-bit pixel). Colour systems use a red, green and blue dot per pixel, each of which is energised to different intensities, creating a range of colours perceived as the mixture of these dots. If all three dots are dark, the result is black. If all three dots are bright, the result is white.
PES	Packetised 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 MPEG-2 / DVB standard.
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	PIX (picture) Element: The digital representation of the smallest area of a television picture capable of being delineated by the bit-stream. See Pel for more information.
pk-pk	peak to peak: Measurement of a signal or waveform from its most negative point to its most positive point.
PLL	Phase-Locked Loop. A phase-locked loop is a control system which controls the rotation of an object by comparing its rotational position (phase) with another rotating object as in the case of a sine wave or other repeating signal. This type of control system can synchronise not only the speed, but also the angular position of two waveforms that are not derived from the same source.
PMT	Program Map Table: Part of the MPEG-2 Program Specific Information (PSI) data and is mandatory for MPEG-2 compliance. Each service has a PMT, which lists the component parts (elementary streams of video, audio, etc.) for the various services 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.
Program	PC - A sequence of instructions for a computer. TV - A concept having a precise definition within ISO 13818-1 (MPEG-2). For a transport stream, the timebase 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, 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.
P_RP_B	Analogue Colour difference signals. Refer to C_RC_B for an explanation.
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 Ultraviolet 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:* SI).
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.
PTS	Presentation Time Stamp (ATSC).
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.
QSIF	Quarter Screen Image Format.
Quantise	A process of converting analogue waveforms to digital information. 8-bit quantisation as set out in ITU-R Rec. 601. uses 256 levels in the range 0 – 255 to determine the analogue waveform value at any given point. The value is then converted to a digital number for processing in the digital domain.
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.
RAS	Remote Authorization System: A TANDBERG TV proprietary public-key encryption system used to prevent unauthorized viewing of a TV programme or programmes.
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. 16 bytes of Reed-Solomon Forward Error Correction code are appended to the packet before transmission, bringing the packet length to 204 bytes. The 16 bytes are used at the receiving end to correct any errors. Up to eight corrupted bytes can be corrected.
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.
Spectral Scrambling	A process (in digital transmission) used to combine a digital signal with a pseudo-random sequence, producing a randomised digital signal that conveys the original information in a form optimised for a broadcast channel.
Scrambling	Alteration of the characteristics of a television signal in order to prevent unauthorised reception of the information in clear form.
SDI	Serial Digital Interface.
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).
STB	Set-Top Box: A box that sits on top of a television set and is the interface between the home television and the cable TV company. New technologies evolving for set-top boxes are video-on-demand, video games, educational services, database searches, and home shopping. The cable equivalent of the IRD.
STT	System Time Table (ATSC).

SFN	Single Frequency Network: The SFN technique allows large geographic areas to be served with a common transmission multiplex. All transmitters in the network are synchronously modulated with the same signal and they all radiate on the same frequency. Due to the multi-path capability of the multi-carrier transmission system (COFDM), signals from several transmitters arriving at a receiving antenna may contribute constructively to the total wanted signal. The SFN technique is not only frequency efficient but also power efficient because fades in the field strength of one transmitter may be filled by another transmitter.
SI	Service Information: Digital information describing the delivery system, content and scheduling (timing) of broadcast data streams. DVB-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]. (DVB)
Single Packet Burst Mode	A burst of ASI bytes (either 188 or 204, depending on packet length) is contiguously grouped into an MPEG-2 Transport Stream packet. Stuffing data is added between the packets to increase the data rate to 270 Mbit/s. See DVB Document A010 rev. 1, Section B3.3, (ASI) Layer-2 Transport Protocol.
Smart Card	A plastic card with a built-in microprocessor and memory used for identification, financial transactions or other authorising data transfer. When inserted into a reader, data is transferred to and from the host machine or a central computer. It is more secure than a magnetic stripe card and it can be disabled if the wrong password is entered too many times. As a financial transaction card, it can be loaded with digital money and used in the same way as cash until the balance reaches zero. The file protocol is specific to its intended application.
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. 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 then 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.
TAXI	Transparent Asynchronous Tx / Rx Interface: A proprietary high-speed data 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, communications channel carrying a number of signals, each with its own allotted time slot.
TDT	Time and Date Table: Part of the DVB 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.
TOT	Time Offset Table: This optional SI table supports the use of local offsets as well as the UTC time/date combination. The purpose of the table is to list by country the current offset from UTC and the next expected change to that offset (to track when daylight saving occurs). The offset resolution is to within 1 minute over a range of ±12 hours from UTC.
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.

TSDT	Transport Stream Descriptor Table: A component of the MPEG-2 PSI data. This table describes which type of Transport stream it is in (i.e. DVB, ATSC etc.). It may also contain other descriptors.
TSP	Transport Stream Processor.
TVCT	Terrestrial Virtual Channel Table (ATSC).
U	44.45 mm (rack height standard).
UART	Universal Asynchronous Receiver Transmitter: A device providing a serial interface for transmitting and receiving data.
UHF	Ultra High Frequency: A portion of the electromagnetic spectrum covering 300 MHz to 3000 MHz (3 GHz).
Upconvert	The process by which the frequency of a broadcast transport stream is shifted to a higher frequency range.
Uplink	The part of the communications satellite circuit that extends from the Earth to the satellite.
UPS	Uninterruptable Power Supply: A method of supplying backup power when the electrical power fails or drops to an unacceptable voltage level. Small UPS systems provide battery power for a few minutes; enough to power down the computer in an orderly manner. This is particularly important where write back cache is used. Write back cache is where modified data intended for the disk, is temporarily stored in RAM and can be lost in the event of a power failure. Sophisticated systems are tied to electrical generators that can provide power for days. UPS systems typically provide surge suppression and may provide voltage regulation.
UTC	Universal Time Co-ordinate: An internationally agreed basis for timekeeping introduced in 1972 and based on international atomic time (corresponds to Greenwich Mean Time or GMT).
VCT	Virtual Channel Table (ATSC).
VHF	Very High Frequency: A portion of the electromagnetic spectrum covering 30 MHz to 300 MHz.
VITC	Vertical Interval Time Code.
VITS	Vertical Interval Test Signal: *See:* ITS.
VPS	Video Programming System: A German precursor to PDC
WSS	Wide Screen Switching: Data used in wide-screen analogue services, which enables a receiver to select the appropriate picture display mode.
WST	World System Teletext: System B Teletext. Used in 625 line / 50 Hz television systems (ITU-R 653).
XILINX	A type of programmable Integrated Circuit.
Y (Luminance)	Defines the brightness of a particular point on a TV line. The only signal required for black and white pictures.

Annex B

Technical Specification

Contents

List of Tables

B.1 Output

B.1.1 International Television Standards

Two composite video outputs are provided at the rear panel. These carry identical video. The standard is selectable to PAL- I, B, G, D, N, M and NTSC-M (with or without pedestal).

Table B.1: International Television Standards - 625 Line Output

As indicated in Menus:	NTSC-M	NTSC-NP	PAL-M
Lines / frame	525	525	525
Fields / second	60	60	60
Interlace	2/1	2/1	2/1
Frames / second	30 (29.97)	30 (29.97)	30 (29.97)
Lines / second	15 750	15 750	15 750
Video band (MHz)	4.2	4.2	4.2
RF band (MHz)	6.0	6.0	6.0
FSC	3579545	3579545	357561149
Pedestal	7.5	0	7.5

Table B.2: International Television Standards - 525 Line Output

As indicated in Menus:	PAL B/G/I	PAL-N	PAL-N CBN
Lines / frame	625	625	625
Fields / second	50	50	50
Interlace	2/1	2/1	2/1
Frames / second	25	25	25
Lines / second	15 625	15 625	15 625
Video band (MHz)	5.0/5.5	4.2	4.2
RF band (MHz)	7.0/8.0	6.0	6.0
FSC	4433618.75	4433618.75	3582056.25
Pedestal	0	7.5	0

B.1.2 Video

Supported Video Resolutions

The TT1260 supports MP@ML and 4:2:2P@ML with video resolutions described in *Table B.3.*

Table B.3: Supported Video Resolutions

625-line, 25 frame/s	525-line, 30 (29.97) frame/s	
720 pixels x 608 active lines	720 pixels x 512 active lines	4:2:2 mode only
720 pixels x 576 active lines	720 pixels x 480 active lines	4:2:0 and 4:2:2 modes
704 pixels x 576 active lines	704 pixels x 480 active lines	
544 pixels x 576 active lines	544 pixels x 480 active lines	
480 pixels x 576 active lines	480 pixels x 480 active lines	
352 pixels x 576 active lines	352 pixels x 480 active lines	
352 pixels x 288 active lines	352 pixels x 240 active lines	

Supported Video Bit-rates

The equipment supports decoding of compressed video at rates of up to 50 Mbit/s.

Performance Figures[1]

Table B.4: Video Performance

Parameter	Performance			
Luminance bar amplitude	PAL:	700 ±20 mV	NTSC:	100 ±2 IRE
White		1000 ±30 mV		140 ±3 IRE
Sync amplitude		300 ±7 mV		40 ±1 IRE
Burst amplitude		300 ±7 mV		40 ±1 IRE
Pedestal		N/A		7.5 ±1 IRE
Luminance bar tilt	0.5%			
2T K Response	1%K			
Differential gain	1% peak to peak			
Differential phase	1° peak to peak			
Luminance non-linearity	±4%			
Signal-to-noise luminance weighted [2]	≥60 dBw			
Chrominance – luminance gain	±2%			
Chrominance – luminance delay	±10 ns			
Chrominance to AM noise ratio	-60 dBrms			
Chrominance to PM noise ratio	-55 dBrms			
Luminance freq. response	0-5 MHz: ±0.2 dB; 5.8 MHz: -2+0 dB			

[1] Measured with 1 metre RG-22 co-axial cable, 75 Ω terminated.
[2] Signal-to-noise luminance weighted: measured on an active video line with unmodulated ramp video signal.

Vertical Blanking Signals

The TT1260 range of Receivers and Decoders support the following VBI reinsertion and signalling:

- VBI streams
- VPS data and pass through
- WSS data and pass through
- 525 VITC and 625 VITC
- Vertical Interval Test Signal (VITS)
- Video Index data
- AMOL pass through
- Closed Captioning (525-line sub-titling system)
- Insertion Test Signal (ITS) Insertion

B.2 Audio Decoding and Output Stage

B.2.1 General

The TT1260 is capable of simultaneously decoding two PES streams of audio from the transport stream. Each of the Decoders is identical in operation, but act completely independently of the other, with the following exceptions:

- Both Decoders must be decoding channels that have the same sampling rate
- Both Decoders are not required to simultaneously decode the same PES stream

Each channel supports extraction of three types of coded audio from the transport stream as follows:

- MPEG-2 Audio (Musicam): ISO/IEC 13818-3
- Dolby Digital AC-3 Audio: ATSC document A/52
- Linear Audio: SMPTE 302M – 2000 with system limitations as specified in following section below
- The Receiver does not support MPEG-2 AAC Audio (ISO/IEC 13818-7) at this release.

Audio component selection is specified from the User Interface or remote interfaces. The TT1260 automatically detects the audio type of the selected audio component and apply the appropriate decoding. Where there are audio components in the selected service of the same language but different coding types, the preferred component is linear audio, followed by Dolby Digital AC-3, and followed by MPEG audio.

There is no requirement for specific selection behaviour where a service contains two or more audio components of the same coding type and language. The TT1260 is not required to support dynamic changes in the audio coding type once the initial selection has been made. Provision is made in the User Interface and remote interfaces for user override of default audio selection by language and audio coding type, or by PID.

There is no support for static default languages.

B.2.2 MPEG Audio

The TT1260 supports decoding of MPEG audio as follows:

- Compression layers: MPEG-1 layers I and II
- Sampling rates (kHz): 32, 44.1, 48
- Maximum compressed data rate: 384 Kbit/s (layer II)

B.2.3 Dolby Digital AC-3 Audio

The TT1260 is able to decode and output the primary stereo pair of a Dolby Digital AC-3 encoded audio stream. When there is data encoded on the audio surround channels, the Decoder applies downmixing, so that either a surround encoded stereo pair (LtRt downmix) or a conventional stereo pair (LoRo downmix) is available at the output.

The TT1260 is not able to decode and output all 5.1 channels individually as separate channels.

It is possible to output the compressed Dolby Digital stream from the digital audio output, allowing it to be decoded to 5.1 channels by an external Decoder.

Sampling rates (kHz): 32, 44.1, 48

Maximum compressed data rate: 640 Kbit/s

> NOTE...
> Support for Dolby Digital decoding requires approval and licensing from Dolby.

B.2.4 Linear Audio

The TT1260 is able to receive audio data in the form of linear PCM digital audio data, up to 20-bits in resolution, and makes it available for output as either analogue or digital audio.

A maximum of four audio channels can be decoded from one PES stream.

B.3 Audio Output Format

B.3.1 General

The TT1260 provides an independent stereo pair output for each audio channel. Analogue audio is always output and the following Digital audio formats can be chosen from the User Interface and remote control interfaces:

- IEC958 CON
- AES3
- Digital IEC958 compressed (Dolby Digital Digital ONLY)
- Digital Audio embedded into the Ancillary Data Space of the Serial Digital Video Output.

B.3.2 Analogue Audio

The TT1260 supports level control of the audio outputs. Independent control of each output of each stereo pair is provided via the User Interface and remote interfaces.

Audio output connector type: 2 X 9 way female D-type

Output level: +18 dBm nominal clipping level. Selectable in range 12 to +24 dBm.

Output impedance: 50 Ω (nominal).

Table B.5: Analogue Audio Performance Requirement

Parameter	Conditions	Limit
Gain	0 dBm input level	±1 dB
Frequency response	100 Hz - 15 kHz, 0 dBm input level	±0.2 dB
	20 Hz - 20 kHz, 0 dBm input level	+0.5 dB, -1 dB
Cross talk	0 dB input level, 100 Hz	-80 dB
	0 dB input level, 1 kHz	-70 dB
	0 dB input level, 10 kHz	-60 dB
Distortion	+8 dBm input level, 100 Hz	-70 dB
	+8 dBm input level, 6.3 kHz	-70 dB
Noise	RMS	-65 dB
Phase	40 Hz to 15 kHz	±2°
Lip sync delay	Depends on synchroniser configuration	±2ms

B.3.3 Digital Audio

Maximum data rate: 3.072 Mbit/s.

- EBU Tech. 3250 Specification of the digital audio interface (the AES/EBU interface), 2nd Edition 1992
- AES Recommended Practice for Digital Audio Engineering – Serial transmission format for two-channel linearly represented digital audio data (Revision of AES3-1985, ANSI S4.40-1985)[1999-02-10 printing]
- ANSI S4.40 – 1992 Recommended Practice for Digital Audio Engineering – Serial Transmission Format for Two-Channel Linearly Represented Digital Audio Data (AES 3)

B.3.4 Embedded Audio

Either or both of the stereo pairs selected for decoding by the Receiver can be routed out via the SDI video output, as AES/EBU digital audio embedded in the Ancillary Data Space, as defined in SMPTE 272M-1994. The operational level of this standard supported is SMPTE 272M –A (20-bit synchronous audio at sampling rates of 48kHz).

B.3.5 Audio Routing

The IRD supports the following routing of the stereo audio signal under control of the User Interface and remote interfaces:

- Normal stereo (left signal to left output, right signal to right output)
- Left to both (left signal to left and right outputs)

- Right to both (right signal to left and right outputs)

B.3.6 Dual Mono

Where a dual mono service is available (i.e. stream 1 and stream 2 sharing the same PID), it is possible to configure the output as follows:

- Stream 1 on both left and right channels
- Stream 2 on both left and right channels
- Stream 1 on left channel, and stream 2 on right channel

B.3.7 Lip Sync

The audio at the output remains synchronous to the decoded video by default (i.e. where both video and audio streams are available from the same service). In such circumstances the video and audio streams share the same PCR.

The lip sync error (delay from presentation of video until presentation of audio) introduced by the Receiver is in the range of ±2ms.

The lip sync delay between stereo pair 1 and 2 is ±2ms because the PTS will be generated independently for each pair.

When using frame sync the lip sync error is –10 to +30ms due to audio frame skip and repeats.

B.3.8 Supported Audio Specifications

Table B.6: Supported Audio Specifications

Specification	Description	Availability
ISO/IEC 13818-3	Generic Coding of Moving Pictures and Associated Information: (MPEG-2) Audio	All models
ATSC A-52	Digital Audio Compression Standard (Dolby Digital)	All models
SMPTE 302M-2000	Linear Audio (TANDBERG Television's interpretation of the specification)	All models

B.3.9 Supported Audio Bit-rates

Table B.7: Supported Audio Data Bit-rates (MPEG-2)

Mono kbit/s	Stereo kbit/s	Mono kbit/s	Stereo kbit/s
32	64	96	192
48	96	112	224
56	112	128	256
64	128	160	320
80	160	192	384

B.3.10 Analogue Audio Performance

Table B.8: Analogue Audio Performance

Parameter	Performance
Voltage gain adjustment	± 1 dBm
Maximum undistorted output (terminated with 600 Ω)	21 dBm
Crosstalk	50 to 100 Hz: >80 dB 100 to 15 000 Hz: >60 dB
Frequency response	50 to 16 000 Hz: ±0.5 dB
Total harmonic distortion (THD), terminated in 600 Ω	<0.5%
Signal-to-noise ratio (referenced to 1 kHz tone at +9 dBm out)	≥ 70 dB
Audio Reference Level	-9 dBm

B.3.11 Digital Audio Outputs

Digital audio outputs comply with E1A-422[3] and have a maximum data rate of 3.072 Mbit/s.

Digital audio is output on 2 x 9 Ways D-type connectors.

B.4 Internal Decoder

The TT1260 contains an internal Decoder. A packet demultiplexer selects audio, video and ancillary services from the stream received from the digital demodulator. A service filter reduces the incoming data rate (max 160 Mbit/s) to that suitable for demuxing/decryption. The Decoder supports decoding of compressed video at rates of up to and including 50 Mbit/s.

Table B.9: Maximum User Bit-rates

Modulation	FEC	R188max (Mbit/s)
QPSK	1/2	41.470588
QPSK	2/3	55.294118
QPSK	3/4	62.205882
QPSK	5/6	69.117647
QPSK	7/8	72.000000
8PSK	2/3	82.941176
8PSK	5/6	103.676471
8PSK	8/9	110.000000
16QAM	3/4	110.000000
16QAM	7/8	110.000000
ASI		160

[3] EIA-422-A-1978: Electrical characteristics of balanced voltage digital interface circuits.

B.5 Input Specifications

B.5.1 QPSK Satellite Receivers

General

Table B.10: QPSK Satellite Receiver Input Specification

Parameter	Specification
L-band input	
Safety status	SELV
Number of inputs	2
Input connector type	F-type, female 75 Ω
Input impedance	75 Ω
Return loss	> 9 dB
Transmission isolation between inputs	> 40 dB[4]
Isolation across inputs	40 dB min
Frequency	
Tuning range[5]	Fc = 950 to 2150 MHz
Tuning step	100 kHz
Carrier frequency search range	0 to ± 5 MHz
Receive spectrum sense	Normal and inverted
Power	
Input power level per carrier	-65 to –25 dBm
Total L-band input power	< -10 dBm
Oscillator power at the L-band input	< -63 dBm, F = Fc and Fc/2
Modulation	
Signal type	QPSK per EN 300 421[6]
Convolutional FEC rates	1/2, 2/3, 3/4, 5/6, 7/8
Symbol rate range	Rs = 1.0 to 45.0 MSymbol/s
Symbol rate step	1 Symbol/s
Symbol rate lock range	± 120 ppm
Bit-rate R188 range	See *Table B.9*
Eb/No ratio	See *Table B.11*
Miscellaneous	
Phase noise tolerance	SSB phase-noise power spectral density < K + 8.5*Log(Rs) Phase noise power spectral density of the form C – 20*Log(δF) δF = Frequency offset from carrier = 10 kHz Rs = Symbol-rate (Msymbol/s)
LNB power and control	See *Table B.12*

[4] Isolation to the selected input from the non-selected input obtained at the demodulator input.
[5] The displayed frequency is either L-band or SHF dependent on the LNB frequency and the SHF carrier frequency set in the satellite receiver input menu.
[6] EN 300 421: Digital broadcasting systems for television, sound and data services; Framing structure, channel coding and modulation for 11/12 GHz satellite services.

Table B.11: QPSK L-band Satellite Input — Eb/N_0 Ratio

Convolutional FEC Rate	Receive Eb/N_0 Ratio (dB min) in IF Loop for Correct MPEG-2 System
½	4.5
2/3	5.0
¾	5.5
5/6	6.0
7/8	6.4

Eb/N_0 ratio is referred to user bit-rate Ru188. See EN 300 421 specification. For more detailed specification information and advice on performance in specific applications, please contact TANDBERG Television Customer Services.

LNB Power and Control

The TT1260 range of QPSK Satellite Receivers provide LNB power and control signals through the active RF input connector. The 22 kHz tone is manually turned on and off. LNB power and controls are enabled through the Satellite Input Menu, see *Annex C, Menus*.

The TT1260 supports voltage controlled LNBs only. The LNB power circuit provides automatic protection against short circuits in the LNB or its cable. When the short circuit has been removed recovery is automatic. Switchable boost of the LNB voltage to allow for losses in long cables and manual control of 22 kHz tone insertion are provided. The LNB power characteristics is as follows:

Table B.12: LNB Power and Control

Parameter	Specification			
	Voltage (V min)	Voltage (V typ)	Voltage (V max)	Receiver Polarisation[7]
Voltage ($V_{nominal}$)	12.3	13	13.65	linear vertical/circular right
	17.3	18	18.9	linear horizontal/circular left
Current	≤ 350 mA			
Tone frequency	22 ± 2 kHz			
Tone amplitude	ON: 0.6 ±0.2 Vp-p OFF: ≤0.05 Vp-p			
Boost voltage	Supported			

[7] Receive Polarisation: As specified in EN 300 784: Satellite Earth Station and Systems (SES); Television Receive-only (TVRO) earth stations operating in the 11/12 GHz frequency bands.

B.5.2 8PSK/16QAM Satellite Receivers

Table B.13: QPSK/8PSK/16QAM Satellite Receiver Input Specification

Parameter	Specification
L-band input	
Safety status	SELV
Number of inputs	2
Input connector type	F-type, female 75 Ω
Input impedance	75 Ω
Return loss	> 7 dB[8]
Isolation between inputs	25 dB min[9]
Frequency	
Tuning range[10]	Fc = 950 to 2150 MHz
Tuning step	100 kHz
Carrier frequency search range	0 to ± 3 MHz[11]
Receive spectrum sense	Normal and inverted
Power	
Input power level per carrier	C = Co + 10*Log(Rs) + 60 dBm where C = Carrier power Co = Carrier power spectral density, -130 < Co < -105 dBm/Hz Rs = Symbol-rate (Msymbol/s)
Total L-band input power	< - 20 dBm
Modulation	
Signal type	QPSK per EN 300 421[12] QPSK, 8PSK and 16QAM per EN 301 210[13]
Convolutional FEC rates	QPSK: 1/2, 2/3, 3/4, 5/6, 7/8 8PSK: 2/3, 5/6, 8/9 16QAM: 3/4, 7/8
Symbol rate range	Rs = 1.0 to 45.0 MSymbol/s
Symbol rate step	1 Symbol/s
Symbol rate lock range	± 200 ppm
Bit-rate R188 range	See *Table B.15*
Eb/No ratio	See *Table B.14*
Miscellaneous	
LNB phase noise requirement	See *Table B.17*
Oscillator power at the L-band input	< -55 dBm, F = Fc + 479.5 MHz
LNB power and control	See *Table B.16*

[8] Selected input. The non-selected input is reflective.
[9] This specification relates to 1) the isolation across inputs (loop-through isolation) and 2) isolation from the non-selected to the selected input measured at the demodulator input.
[10] The displayed frequency is either L-band or SHF dependent on the LNB frequency and the SHF carrier frequency set in the satellite receiver input menu.
[11] Subject to minimum search range 0.1*Rs (QPSK, 16QAM), 0.05*Rs (8PSK)
[12] EN 300 421: Digital broadcasting systems for television, sound and data services; Framing structure, channel coding and modulation for 11/12 GHz satellite services.
[13] EN 301 210: Digital Video Broadcasting (DVB); Framing structure, channel coding and modulation for Digital Satellite News Gathering (DSNG) and other contribution applications by satellite.

Table B.14 shows the Eb/No requirements to ensure error free demodulation for all supported FEC rates.

Table B.14 shows the minimum and maximum possible bit-rates for all FEC rates.

Table B.14: Eb/No Requirements QPSK/8PSK/16QAM Modulator-Demodulator in IF Loop

Modulation	Eb/No Ratio (dB) for Demodulator Output BER < 1E-7	
	Rs < 20 Msymbol/s	Rs > 20 MSymbol/s
QPSK ½	3.9	3.9
QPSK 2/3	4.4	4.5
QPSK ¾	4.9	5.1
QPSK 5/6	5.4	5.8
QPSK 7/8	5.8	6.4
8PSK 2/3	6.3	6.5
8PSK 5/6	8.3	8.8
8PSK 8/9	8.8	9.8
16QAM ¾	8.4	8.6
16QAM 7/8	10.1	11.1

Eb/N_0 ratio is referred to user bit-rate R188.

Table B.15: QPSK/8PSK/16QAM Bit-rate R188 Limits (Mbit/s)

Modulation	FEC	R188min	R188max
QPSK	1/2	1.000000	41.470588
QPSK	2/3	1.228758	55.294118
QPSK	3/4	1.382353	62.205882
QPSK	5/6	1.535948	69.117647
QPSK	7/8	1.612745	72.000000
8PSK	2/3	1.843137	82.941176
8PSK	5/6	2.303922	103.676471
8PSK	8/9	2.457516	110.000000
16QAM	3/4	2.764706	110.000000
16QAM	7/8	3.225490	110.000000

16QAM / 8PSK LNB Control

The IRD supports voltage controlled LNBs only. The available voltages and current are shown in *Table B.16.* Typical LNB requirements are shown in *Table B.17.*

Table B.16: LNB Power and Control (QPSK/8PSK/16QAM)

Parameter	Specification
Voltage	13 V (Vertical) 18 V (Horizontal) On selected input (nominal voltage)
Current	350 mA maximum
Band selection	22 kHz tone

Table B.17: Typical LNB Requirements (QPSK/8PSK /16QAM)

Modulation and Symbol-rate (MSymbol/s)	All	QPSK > 5 8PSK > 22 16QAM > 6
	LNB type for the indicated modulation type and symbol-rate	
LNB type	Type A (PL-DRO)	Type B (DRO)
Frequency offset from carrier (kHz)	LNB SSB phase noise (dBc/Hz)	
1	-65	-50
10	-75	-75
100	-85	-85

B.5.3 Decoder

Table B.18: DVB-ASI Copper

Input	Specification
Connector type	BNC, Female
Input impedance	75 Ω
Data rate range	0.350 - 160 Mbit/s
Error decoding	None

B.5.4 Frame Sync Connector

The Decoder can frame lock to an external video source. The frame information is input as a composite synchronous signal, with or without active video. The user can offset the sync to the video output by ±8 lines, with a resolution of one pixel.

Lip sync error introduced by the Receiver is in the range –10ms to +30ms. This implies audio frame skip and repeat.

It is possible to connect multiple Receivers to the same reference signal. This input requires an external 75 Ω termination.

Table B.19: Frame Sync Connector

Item		Specification
Connector type		BNC, Female
Connector designation		Frame Sync
Pin:	Centre	Analogue Black and Burst Input
	Shield	Ground/Chassis
Impedance		75 Ω

B.6 Output Specifications

B.6.1 Video Outputs

Analogue Composite Video

These connectors are located on the motherboard of the TT1260 Base Unit (TT1260/DIRBAS).

Table B.20: Analogue Video Output Connectors

Item	Specification
Safety status	SELV
Connector type	2 x BNC Female socket 75 Ω
Connector designation	SDI 1 SDI 2
Video standards	PAL – I, B, G, D PAL – N Combination PAL - N PAL - M NTSC-M (with and without pedestal) (set on Video Menu, #3.1)
Composite video level	800 mV pk-pk nominal ±10%
Composite video level adjustment	0.7 to 1.3 Vpk-pk

Digital Video

These connectors are located on the motherboard of the TT1260 Base Unit (TT1260/DIRBAS).

Table B.21: Digital Video Output Connectors

Item	Specification
Safety status	SELV
Connector type	BNC, Female, 75Ω
Connector designation	CVBS 1 CVBS 2
Connector design	SDI
Output standard (UK/EEC):	ITU-R RECMN BT.656-3 Interfaces for Digital Component Video Signals in 525-Line and 625-Line Television Systems Operating at the 4:2:2 Level of Recommendation ITU-R BT.601 (Part A) Publication Date: 1995-00-00
Output standard (USA):	ANSI/SMPTE 259M Television 10-Bit 4:2:2 Component and 4 fsc Composite Digital Signals - Serial Digital Interface Level C - 270 Mbit/s, 525/625 component (Section 10.2) Date: 1997-09-25
Jitter Performance, Nominal	SMPTE Recommended Practices RP 192 –1996 Jitter Measurement Procedures in Bit-Serial Digital Interfaces

B.6.2 Audio Outputs

Analogue and Digital audio are output on two, 9-way, male, D-type connectors, located on the motherboard of the TT1260 Base Unit (TT1260/DIRBAS).

Table B.22: Analogue Audio Output Connector

Item	Specification
Safety status	SELV
Connector type	2 x 9-Way D-type
Connector designation	AUDIO 1 AUDIO 2
Output level	+18 dBm nominal clipping level. Selectable in range 12 to +24 dBm.
Nominal output impedance	50 Ω
Load impedance	≥600 Ω
Compressions layers	MPEG-2 layer 1 and 2, linear audio and Dolby Digital (AC-3)
Sampling rates	32 kHz, 44.1 kHz and 48 kHz
Output formats	Analogue, IEC958 CON, AES3 and IEC958 AC-3

B.6.3 Data Outputs

RS-232 Asynchronous (Low-speed) Data

This connector is located on the motherboard of the TT1260 Base Unit (TT1260/DIRBAS).

Table B.23: RS-232 Asynchronous (Low-speed) Data Connector

Item	Specification
Safety status	SELV
Data-rates (bit/s)	1200; 2400; 4800; 9600; 19 200; 38 400
Standards	EIA RS-232C / ITU-T BT. V.24/V.28
Line length	< 15 metres

RS-422 Synchronous (High-speed) Data

This connector is located on the optional High Speed RS-422 Data Enabler Card (TT1260/HWO/HSDATA).

Table B.24: RS-422 Synchronous (High-speed) Data Connector

Item	Specification
Safety status	SELV
Data-rates (bit/s)	Integer multiples of 56 Kbit/s and 64 Kbit/s up to 2.048 Mbit/s
Standards	EIA RS-422 / ITU-T V.11
Line length	< 1200 metres

B.6.4 Remote Control Connector

Table B.25: Control Connector

Item	Specification
Safety status	SELV
Connector type	9-way D-type, male
Connector designation	RCTRL RS-232/485
Standard	EIA RS-232C/RS-485

B.6.5 Alarm Connectors

Table B.26: Relay Alarm Output Specification

Item	Specification
Connector designation:	ALARM
Connector type:	9-way D-type female for the summary alarm relay 25-way D-type female for the Alarm Relay Card (TT1260/HWO/ALRM) with six alarm relays
Contact Configuration:	SPDT (Change-over) All volt-free contacts, fully isolated.
Contact Rating:	1A at 24 Vdc 1A at 50 Vac
Maximum Switching Current:	1A
Maximum Switching Voltage:	50Vdc/50 Vac
Maximum Switching Power:	24W/60 VA
Minimum Switching Load:	0.1 mA, 100m Vdc

Table B.27: Alarm Relay Card (TT1260/HWO/ALRM) Pin-outs

Pin	Specification
Pin 1	Relay 1 – Normally Open (Closed on Alarm)
Pin 2	Relay 1 – Normally Closed (Open on Alarm)
Pin 3	Relay 2 – Common
Pin 4	Relay 3 – Normally Open (Closed on Alarm)
Pin 5	Relay 3 – Normally Closed (Open on Alarm)
Pin 6	Relay 4 – Common
Pin 7	Relay 5 – Normally Open (Closed on Alarm)
Pin 8	Relay 5 – Normally Closed (Open on Alarm)
Pin 9	Relay 6 – Common
Pin 10	N/C
Pin 11	N/C
Pin 12	N/C
Pin 13	N/C
Pin 14	Relay 1 – Common
Pin 15	Relay 2 – Normally Open (Closed on Alarm)
Pin 16	Relay 2 – Normally Closed (Open on Alarm)
Pin 17	Relay 3 – Common
Pin 18	Relay 4 – Normally Open (Closed on Alarm)
Pin 19	Relay 4 – Normally closed (Open on Alarm)
Pin 20	Relay 5 – Common
Pin 21	Relay 6 – Normally Open (Closed on Alarm)
Pin 22	Relay 6 – Normally Closed (Open on Alarm)
Pin 23	N/C
Pin 24	N/C
Pin 25	N/C

B.7 Environmental

B.7.1 Conditions

Table B.28: Environmental Conditions

Operational	
Temperature	0°C to +45°C (+32°F to +113°F) ambient air temperature with free airflow
Humidity	0% to 95% (non-condensing)
Cooling requirements	Convection cooling/free airflow
Handling/movement	Fixed (non-mobile) use only
Storage/Transportation	
Temperature	-20°C to +70°C (-4°F to +158°F)
Humidity	0% to 95% (non-condensing)

B.7.2 Physical

Table B.29: Physical Parameters

Parameter	Performance
Height	44.3 mm
Width	442 mm (without rack fixing brackets) 482 mm (with rack fixing brackets)
Depth	350 mm (including connectors)
Rack mounting standard	1U x 19 inches (1U ≡ 44.45 mm)
Weight	Weight 4.5 - 5.0 kg depending on configuration

B.8 Power Supply

This equipment is fitted with an auto-ranging power supply. It is suitable for supply voltages of 100-120 Vac -10% +6% or 200-250 Vac -10% +6% at 50/60 ± 3 Hz nominal.

Table B.30: Power Supply Specifications

Item	Specification
Power distribution system	Type TN, and IT for Norway, ONLY (Defined in EN 60950). TN: Power distribution system having one point directly earthed, the exposed conductive parts of the installation being connected to that point by protective earth conductors. This equipment must NOT be used with other single-phase three-wire and PE, TT or IT Type Power distribution systems.
Connection to supply	Pluggable Equipment Type A (Defined in EN 60950): Equipment that 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. Correct mains polarity must always be observed. Do not use reversible plugs with this equipment.
Class of equipment	Class I and Pluggable Equipment Type A (Defined in EN 60950): electric shock protection by basic insulation and protective earth.
Rated voltage	100 – 120 Vac 200 – 250 Vac

Item	Specification
Rated frequency	60 Hz ± 3 Hz (100 – 120 Vac) 50 Hz ± 3 Hz (200 – 250 Vac)
Voltage selection	Auto-ranging
Rated current (max)	1.5 A
Input connector	CEE 22/IEC 320 3-pin male receptacle (A separate cable is used to connect the unit to the mains supply)
Fuse rated voltage	250 Vac
Fuse type	T1.6AH, 250 V, 5x20mm, IEC 60127-2 sheet 5 specifications, UL recognised.
Consumption	40W typical and 120W maximum

B.9 Compliance[14]

B.9.1 Safety

This equipment has been designed and tested to meet the requirements of the following:

EN 60950	European	Safety of information technology equipment including business equipment.
IEC 60950	International	Safety of information technology equipment including business equipment.

In addition, the product has been designed to meet the following:

UL 1950	USA	Safety of information technology equipment including business equipment.

B.9.2 EMC[15]

This equipment has been designed and tested to meet the following:

EN 55022	European	Emission Standard Limits and methods of measurement of radio frequency interference characteristics of information technology equipment – 1998 Class B.
AS/NZS 3548	Australia/ NZ	Electromagnetic Interference - Limits and Methods of Measurement of Information Technology Equipment
EN55024	European	Information technology equipment - Immunity characteristics - Limits and methods of measurement
EN 61000-3-2[16]	European	Electromagnetic Compatibility (EMC), Part 3 Limits; Section 2. Limits for harmonic current emissions (equipment input current ≤16 A per phase).
EN 61000-3-3[17]	European	Electromagnetic Compatibility (EMC), Part 3. Limits; Section 3. Limitation of voltage fluctuations and flicker in low voltage supply systems for equipment with rated current ≤ 16 A.
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.

[14] The version of the standards shown is that applicable at the time of manufacture.
[15] The EMC tests were performed with the Technical earth attached, and configured using recommended cables.
[16] AC versions only.
[17] AC versions only.

B.9.3 CE Marking

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 2002.

B.9.4 C-Tick Mark

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.

> NOTE...
> The C-Tick mark was first affixed to this product in 2002.

Annex C

Menus

Contents

List of Figures

List of Tables

C.1 LCD Menus

C.1.1 Using the Menus

Detailed description of the use of menus is given in *Chapter 3, Operating the Equipment Locally*.

C.1.2 Menu Descriptions

This annex describes the front panel LCD menus.

When the unit is first powered up, it progresses through a series of start-up pages on the LCD display.

The menu is created in a tree structure, where each branch may contain items, new branches, or both.

An item is viewed as an information string on the left side of the LCD, with an editable or selectable item on the right side, or an information string.

A path to a new sub branch is viewed as an information string on the left side of the LCD, where the string ends with a ">" character. The ">" symbolises the arrow key you have to press, to enter the submenu.

C.2 Menu Pages - Main Menu

The main menu is a pure branching menu. No items are selectable in this menu, it only allows access to other, lower level menus which are described in individual sections.

Table C.1: Main Menu Items

Display title: Main Menu	Description	Section
Presets	Enters the Presets menu.	*C.4*
Input	Enters the Input menu.	*C.5*
Service	Enters the Service menu.	*C.6*
CA	Enters the Conditional Access menu.	*C.7*
Alarms	Enters the Alarms menu.	*C.8*
System	Enters the System menu.	*C.9*

C.3 The Menu Tree

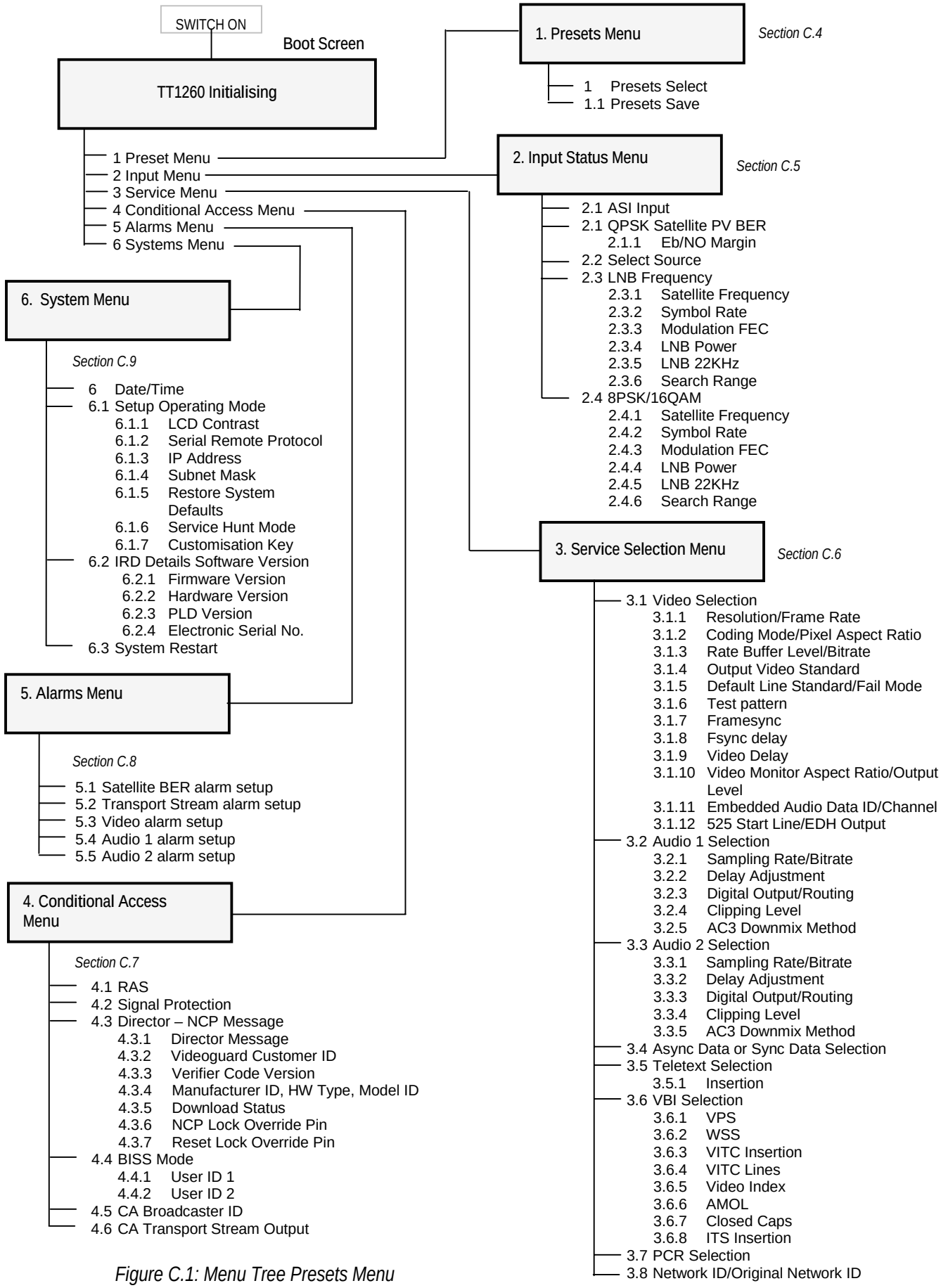

Figure C.1: Menu Tree Presets Menu

C.4 Presets Menu Items (#1)

The **Presets** menu contains up to 40 editable preset numbers in the range 01 – 40. Selecting a Service via the Presets menu automatically reconfigures the TT1260. Where a choice exists, each preset can have a selected language, network name and service provider associated with it.

Table C.2: Presets Menu Items

Display title: Presets	Description
Select #YY of 40 XXXXXXXXXXXXXXXXXXXXXXXX	Where YY is the EDITABLE preset number in the range 01 – 40; XXXXXXXXXXXXXXXXXXXXXXXX is the stored preset service name
Save XXXXXXXXXXXXXXXXXXXXXXXX as #YY of 40	Where XXXXXXXXXXXXXXXXXX is the current service name from the SDT; YY is the EDITABLE preset number in the range 01 – 40

C.5 Input Status Menu (#2)

The **Input Status** menu is the primary menu group for the TT1260.

Table C.3: Input Status Menu Items

Display title: Input	Description	Section
WWWWWWWWWW ZZZ TID XXXXX Bit-rate YYY.YY Mbit/s	WWWWWWWWWW is the transport lock status (LOCKED, NOT LOCKED) XXXXX is the transport stream ID YY.YY is the Transport stream rate (YYY.YY above 100 Mbit/s) ZZZ indicates the packet byte length of the current TS (188, 204)	
ASI	The ASI submenu allows the user to edit the ASI input source.	*C.5.1*
QPSK Satellite	The QPSK Satellite submenu accesses the QPSK parameters.	*C.5.2*
8PSK/16QAM	The 8PSK/16QAM submenu accesses the 8PSK/16QAM parameters.	*C.5.3*

C.5.1 ASI Menu

The **ASI** submenu allows the user to edit the ASI input source.

Table C.4: ASI Menu

Display title: ASI	Description
Select Source XXXX	XXXX is the editable ASI input source selection 1, 2, or AUTO

C.5.2 QPSK Satellite Menu

The **QPSK Satellite** submenu accesses the QPSK parameters.

Table C.5: QPSK Satellite Menu

Display title: QPSK Satellite	Description
Quality	
PV BER -1 -3 -5 1.0 E-8 XXXXXXXXXXXXXXX XXXXXXXX	XXXXXXXXXXXXXXX is a bar-graph indicating the current level (10 x $^{-1}$ to $^{-5}$ range)
Eb/N0 margin XXX.X dB	XXX.X is a measure of the signal to noise ratio (first X is + or -)
Select Source	
Select Source X	X is the EDITABLE input source selection 1 or 2
Source 1	
LNB Frequency XXXXX.X MHz	Sets the LNB frequency for Source 1. XXXXX.X is the LNB frequency in MHz
Satellite Frequency XXXXX.X MHz	Sets the Satellite frequency for Source 1. XXXXX.X is the Satellite frequency in MHz.
Search range XXXXX KHz	Sets the center frequency search range for Source 1. XXXXX is the search range in KHz
Symbol rate XX.XXXXXX Msymb/s	Sets the symbol rate for Source 1. XX.XXXXXX is the symbol rate in megasymbols per second
Modulation FEC XXXX XXXX	XXXX sets the modulation type (QPSK, 8PSK and 16QAM) and XXXX the FEC (1/2, 2/3, 3/4, 5/6, 7/8, 8/9) for Source 1. The FEC selection is limited to the valid values of the currently selected modulation type
LNB Power XXXXXXX At YYY	XXXXXXX sets the LNB power for Source 1 (ON, OFF, BOOSTED) "BOOSTED" provides 1V extra power over the ON setting. YYY selects the rating of the power output (18v – Horiz, 13v – Vert)
LNB 22 kHz XXXXXXXX	XXXXXXXX enables or disables LNB 22 kHz control tone for Source 1. (On, Off)
Source 2	
LNB Frequency XXXXX.X MHz	Sets the LNB freqency for Source 2. XXXXX.X is the LNB frequency in MHz
Satellite Frequency XXXXX.X MHz	Sets the Satellite frequency for Source 2. XXXXX.X is the Satellite frequency in MHz.
Search range XXXXX KHz	Sets the center frequency search range for Source 2. XXXXX is the search range in KHz
Symbol rate XX.XXXXXX Msymb/s	Sets the symbol rate for Source 2. XX.XXXXXX is the symbol rate in megasymbols per second
Modulation FEC XXXX XXXX	XXXX sets the modulation type (QPSK, 8PSK and 16QAM) and XXXX the FEC (1/2, 2/3, 3/4, 5/6, 7/8, 8/9) for Source 2. The FEC selection is limited to the valid values of the currently selected modulation type
LNB Power XXXXXXX At YYY	XXXXXXX sets the LNB power for Source 2 (ON, OFF, BOOSTED) "BOOSTED" provides 1V extra power over the ON setting. YYY selects the rating of the power output (18v – Horiz, 13v – Vert)
LNB 22 kHz XXXXXXXX	XXXXXXXX enables or disables LNB 22 kHz control tone for Source 2. (On, Off)

C.5.3 8PSK/16QAM Menu

The **8PSK/16QAM** submenu accesses the 8PSK/16QAM parameters.

Table C.6: 8PSK/16QAM Menu

Display title: 8PSK/16QAM	Description
Quality	
Eb/NO XXX.X dB	XXX.X is a measure of the signal to noise ratio (first X is + or -)
Source 1	
Modulation FEC XXXX XXXX	XXXX XXXX is the EDITABLE modulation and FEC rate QPSK 1/2 QPSK 2/3 QPSK 3/4 QPSK 6/7 QPSK 7/8 8PSK 2/3 8PSK 5/6 8PSK 8/9 8PSK Auto 16QAM 3/4 16QAM 7/8 16QAM Auto

C.6 Service Menu (#3)

The **Service** menu allows access to the currently available services. This group provides a summary of the data streams associated with the decoded service. In the case of multiple streams of the same component type, each stream can be selected independently.

After making a selection (in EDIT mode using page 1), and selecting the required component data streams (using the other pages), pressing SAVE makes it the current service. The audio, DVB Subtitles, Teletext and data modules will decode according to the default parameters set in other pages.

Table C.7: Service Menu

Display title: Service	Description	Section
Video	The Video signal status submenu contains information about the currently decoded MPEG-2 video.	*C.6.1*
Audio 1	The Audio 1 signal status submenu contains information about the audio format and quality of the currently decoded audio stream on the primary audio output.	*C.6.2*
Audio 2	The Audio 2 signal status submenu contains information about the audio format and quality of the currently decoded audio stream on the secondary audio output.	*C.6.3*
Async/Sync Data	The Async/Sync Data submenu allow status monitoring and configuration of the low and high speed data.	*C.6.4*

Display title: Service	Description	Section
Teletext	The Teletext submenu contains information about the audio format and quality of the currently decoded audio stream on the primary output.	*C.6.5*
VBI	The VBI status submenu displays the current status of the VBI components.	*C.6.6*
PCR PID	The PCR PID submenu displays the Program Clock Reference packet identifier and its status.	*C.6.7*
Network ID	The Network ID submenu displays the network ID and the Original Network ID from the current Service Description Tables.	*C.6.8*

C.6.1 Video Menu

The **Video** signal status submenu contains information about the currently decoded MPEG-2 video.

Table C.8: Video Menu

Display title: Video	Description
XX Stream PID ZZZZ YYYY	XX is the number of video streams ZZZZ is the currently selected video stream PID YYYY is the currently selected video stream status (OK, STOP, FAIL)
Resolution XXXXXXXXX Frame Rate YY.YY Hz	XXXXXXXXX is the current video resolution (eg 704 x 480) YY.YY is the current video frame rate (25Hz, 29.97 Hz)
Coding mode XXXXX Pixel aspect ratio YYY	Coding mode is the current video coding (4:2:0, 4:2:2) Pixel aspect ratio is the current video aspect ratio (4:3, 16:9)
Rate buffer level XXX% Bit-rate YY.YY Mbit/s	XXX is the current video rate buffer level fill percentage YYY.YY is current video stream bit-rate
525 line output XXXXXX 625 line output YYYYYY	XXXXXX is the EDITABLE 525 line video output coding (NTSC-M, PAL-M, NTSC-M NP) YYYYYY is the EDITABLE 625 line video output coding (PAL-I, PAL-N, PAL-N CMB)
Default line standard XXX Fail mode YYYYYYYYYYYY	XXX is the EDITABLE parameter for setting the default video line standard (625, 525) YYYYYYYYYYYY is the EDITABLE parameter for setting the response to loss of video (FREEZE FRAME, BLACK FRAME, NO SYNCS)
Test Pattern XXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXX is the editable video test pattern to be displayed: NONE, PULSE & BAR (PAL) MULTIBURST (PAL) PULSE & STEP (PAL) MAGENTA STEP & FLAT (PAL) FLAT FIELD RED (PAL) LUMINANCE RAMP (PAL) BOWTIE (PAL) 100% COLOUR BARS (PAL) MULTI PATTERN (PAL) BLACK (PAL) PULSE & BAR (NTSC) MULTIBURST (NTSC) PULSE & STEP (NTSC)

Display title: Video	Description
	MAGENTA STEP & FLAT (NTSC) FLAT FIELD RED (NTSC) LUMINANCE RAMP (NTSC) BOWTIE (NTSC) 100% COLOUR BARS (NTSC) MULTI PATTERN (NTSC) BLACK (NTSC)
Framesync XXXXXXX YYYYYYYY	XXXXXXX is the editable parameter for Framesync enable (ENABLED, DISABLED) YYYYYYYY shows the presence of a framesync input (SIGNAL NOT PRESENT, SIGNAL PRESENT, FRAME RATE MISMATCH, SIGNAL LOCKED);
Framesync PAL Offset XXXXXX Framesync NTSC Offset YYYYYY	XXXXXX is the editable PAL framesync offset range –199999 to+199999 pixels YYYYYY is the editable NTSC framesync offset range –199999 to +199999 pixels
4:2:0 Delay XX ms 4:2:2 Delay YY ms	XX is the editable parameter for delaying 4:2:0 video frames (0 to 100 ms) YY is the editable parameter for delaying 4:2:2 video frames (0 to 100 ms)
Monitor Aspect Ratio XXXX Output level YYY%	XXXX is the editable parameter for setting the video monitor aspect ratio (4:3, 16:9) YYY is the editable video output level (70 – 130%)
Embedded Audio Data ID XXX Channel YYYY	XXX is the editable embedded audio data ID (0x0 – 0xFFF) YYYY is the editable audio channel (NONE, ONE, TWO, ONE & TWO)
525 start line XX EDH YYYYYYYY	XX is the editable first active video line (22, 23) YYYYYYYY is the editable parameter for enabling EDH output (ENABLED / DISABLED)

C.6.2 Audio 1 Menu

The **Audio 1** signal status submenu contains information about the audio format and quality of the currently decoded audio stream on the primary audio output.

Table C.9: Audio 1 Menu

Display title: Audio 01	Description
XX Streams PID YYYY ZZZZ	XX is the number of Audio streams present YYYY is the currently selected audio1 PID ZZZZ is the stream status (OK, STOP, FAIL)
Sampling Rate XX.X KHz Bit-rate YYY Kbit/s	XX.X is the Audio 1 sample rate YY is the Audio 1 bit-rate
Delay Adjustment XXX.X ms	XXX.X is the Audio 1 decoding delay (range +/- 0 to 49ms)
Digital Output XXXXX Routing YYYYYY	XXXXX is the editable Audio 1 digital output format (IEC958 CON, AES3, IEC958 AC3) YYYYYY is the editable Audio 1 output routing (STEREO, MIXED TO BOTH, LEFT TO BOTH, RIGHT TO BOTH)
Clipping Level XX dB	XX is the editable Audio 1 clipping value (12 – 24 dB)
AC3 Downmix Method XXXXXXXXXXXXX	XXXXXXXXXXXXX is the editable Dolby Digital AC-3 downmix parameter (SURROUND STEREO, CONVENTIONAL STEREO)

C.6.3 Audio 2 Menu

The **Audio 2** signal status submenu contains information about the audio format and quality of the currently decoded audio stream on the secondary audio output.

Table C.10: Audio 2 Menu

Display title: Audio 02	Description
XX Streams PID YYYY ZZZZ	XX is the number of Audio streams present YYYY is the currently selected audio1 PID ZZZZ is the stream status (OK, STOP, FAIL)
Sampling Rate XX.X KHz Bit-rate YYY Kbit/s	XX.X is the Audio 2 sample rate YY is the Audio 2 bit-rate
Delay Adjustment XXX.X ms	XXX.X is the Audio 2 decoding delay (range +/- 0 to 49ms)
Digital Output XXXXX Routing YYYYYY	XXXXX is the editable Audio 2 digital output format (IEC958 CON, AES3, IEC958 AC3) YYYYYY is the editable Audio 2 output routing (STEREO, MIXED TO BOTH, LEFT TO BOTH, RIGHT TO BOTH)
Clipping Level XX dB	XX is the editable Audio 2 clipping value (12 – 24 dB)
AC3 Downmix Method XXXXXXXXXXXX	XXXXXXXXXXXX is the editable Dolby Digital AC-3 downmix parameter (SURROUND STEREO, CONVENTIONAL STEREO)

C.6.4 Async/Sync Data Menus

The **Async/Sync Data** submenu allows status monitoring and configuration of the low and high speed data.

> NOTE...
> When the High Speed RS-422 Data Enabler Card (S12595) is detected on power-up the unit will recover high-speed data. If not installed the unit will recover low speed data. *Table C.11* and *Table C.13* show both menus. The unit can recover either low-speed (RS-232) data or high speed (RS-422) data but not both simultaneously. For technical specifications see *Section B.5.3, Data Outputs.*

Table C.11: Async Data Menu (High Speed RS-422 Data Enabler Card Not Fitted)

Display title: Async Data	Description
WW Streams PID XXXX YYYYYYYYYY	WW is the number of Low speed data streams present XXXX is the currently selected LSD PID YYYYYYYYYY is the stream status (PRESENT, NOT PRESENT)
Bit-rate	XXXXX is the Asynchronous data bit-rate (Up to 38400 bits/s) YYYYYYYY is editable control (ENABLED, DISABLED) ZZZZ is the output status (OK, STOP, FAIL)

Table C.12: Sync Data Menu (High Speed RS-422 Data Enabler Card Fitted)

Display title: Sync Data	Description
WW Streams PID XXXX YYYYYYYYYYY	WW is the number of High speed data streams present XXXX is the currently selected HSD PID YYYYYYYYYYY is the stream status (PRESENT, NOT PRESENT)
Bit-rate	XXXXX is the Synchronous data bit-rate (Up to 2.048 Mbit/s) YYYYYYYY is editable control (ENABLED, DISABLED) ZZZZ is the output status (OK, STOP, FAIL)

C.6.5 Teletext Menu

The **Teletext** submenu contains information about the audio format and quality of the currently decoded audio stream on the primary output.

Table C.13: Teletext Menu

Display title: Teletext	Description
XX Streams PID YYYY ZZZZZZZZZZZZZZ	XX is the number of Teletext streams present YYYY is the currently selected teletext PID ZZZZZZZZZZZZZZ is the stream status (PRESENT NOT PRESENT)
Insertion XXXXXXXX YYYY	XXXXXX is the editable insertion status (ENABLED, DISABLED) YYYY is the output status (OK, STOP, FAIL)

C.6.6 VBI Menu

The **VBI** status submenu displays the current status of the VBI components.

Table C.14: VBI Menu

Display title: VBI	Description
VBI	
XX Streams PID YYYY	XX is the number of VBI streams present YYYY is the currently selected VBI PID ZZZZZZZZZZZ is the stream status (PRESENT, NOT PRESENT)
VPS XXXXXXXXXXX YYYYYYY ZZZZ	XXXXXXXXXXX indicates the presence of VPS data (PRESENT, NOT PRESENT) YYYYYYY is the editable parameter for enabling VPS pass through (ENABLED, DISABLED) ZZZZ indicates the status of the output (OK, STOP, FAIL)
WSS XXXXXXXXXXX YYYYYYY ZZZZ	XXXXXXXXXXX indicates the presence of WSS data (PRESENT, NOT PRESENT) YYYYYYY is the editable parameter for enabling WSS pass through (ENABLED, DISABLED) ZZZZ indicates the status of the output (OK, STOP, FAIL)
VITC Insertion YYYYYYYY ZZZZ	YYYYYYY is the editable parameter for enabling VITC pass through (ENABLED, DISABLED) ZZZZ indicates the status of the output (OK, STOP, FAIL)
525 VITC LINE WW & XX 625 VITC LINE YY & ZZ	WW is the editable parameter for specifying the first insertion line for 525 VITC XX is the editable parameter for specifying the second insertion line for 525 VITC YY is the editable parameter for specifying the first insertion line for 625 VITC ZZ is the editable parameter for specifying the second insertion line for 625 VITC

Display title: VBI	Description
Video Index XXXXXXXXXXX YYYYYYY ZZZZ	XXXXXXXXXXX indicates the presence of Video Index data (PRESENT, NOT PRESENT) YYYYYYY is the editable parameter for enabling Video Index pass through (ENABLED, DISABLED) ZZZZ indicates the status of the output (OK, STOP, FAIL)
AMOL 1 & 2 XXXXXXXXXXX YYYYYYY ZZZZ	XXXXXXXXXXX indicates the the presence of AMOL data (PRESENT, NOT PRESENT) YYYYYYY is the editable parameter for enabling AMOL pass through (ENABLED, DISABLED) ZZZZ indicates the status of the output (OK, STOP, FAIL)
Closed Captions XXXXXXXXXXX YYYYYYY ZZZZ	XXXXXXXXXXX indicates the presence of Closed Captions (PRESENT, NOT PRESENT) YYYYYYY is the editable parameter for enabling Closed Captions pass through (ENABLED, DISABLED) ZZZZ indicates the status of the output (OK, STOP, FAIL)
ITS Insertion XXXXXXXXXXXX ZZZZ	XXXXXXXXXXXX is the editable parameter for enabling ITS insertion (ENABLED (CCIR), ENABLED (FCC/UK), DISABLED) ZZZZ indicates the status of the output (OK, STOP, FAIL)

C.6.7 PCR PID Menu

The **PCR PID** submenu displays the Program Clock Reference packet identifier and its status.

Table C.15: PCR PID Menu

Display title: PCR PID	Description
PCR PID XXXX YYYYYYYYYY	XXXX is the PCR PID YYYYYYYYYY is (PRESENT, NOT PRESENT)

C.6.8 Network ID Menu

The **Network ID** submenu displays the network ID and the Original Network ID from the current Service Description Tables.

Table C.16: Network ID Menu

Display title: Network ID	Description
Network ID XXXXX Original Network ID YYYYY	XXXXX is the network ID from the current SDT (or ----- when SDT not available) YYYYY is the original network ID from the current SDT (or ----- when SDT not available)

C.7 Conditional Access Menu (#4)

The **Conditional Access** submenu contains the current status of the smart card, and also lists the effect the smart card has for the currently selected components.

Table C.17: Conditional Access Menu

Display title: CA	Description	Section
XXXXXXXXXXXXXXXXXXXXX CAS ID YYYYh	XXXXXXXXXXXXXXXXXXXXX is: CLEAR OR UNKNOWN CA RAS ENCRYPTED VIDEOGUARD ENCRYPTED SIGNAL PROTECT ENCRYPTED BISS ENCRYPTED YYYY is the current CA CAS ID (hex)	
RAS Mode	The RAS Mode submenu displays the status of the RAS mode and allows for editing of the DSNG key.	*C.7.1*
Signal Protection	The Signal Protection submenu allows editing to enable or disable signal protection.	*C.7.2*
Director	The Director submenu displays all Director status and version information and allows editing of the customer ID and local lock pins.	*C.7.3*
BISS Mode 1	The BISS Mode submenu allows editing of the control word keys for the BISS user IDs	*C.7.4*
Broadcaster ID	The Broadcaster ID submenu displays the status of the current broadcaster identification.	*C.7.5*
Transport Stream Output	The Transport Stream Output submenu allows editing of the position of the ASI output.	*C.7.6*

C.7.1 RAS Mode Menu

The **RAS Mode** submenu displays the status of the RAS mode and allows for editing of the DSNG key.

Table C.18: RAS Mode Menu

Display title: RAS	Description
RAS XXXXXXXX YYYYYYY	XXXXXXXX is the RAS mode (FIXED KEY MODE or DSNG KEY MODE) YYYYYYY is editable DSNG key (when XXXXXXXX = 7 digit DSNG key)

C.7.2 Signal Protection Menu

The **Signal Protection** submenu allows editing to enable or disable signal protection.

Table C.19: Signal Protection Menu

Display title: Signal Protection	Description
Signal Protection XXXXXXXX	XXXXXXXX is editable: ENABLED DISABLED

C.7.3 Director Menu

The **Director** submenu displays all Director status and version information and allows editing of the customer ID and local lock pins.

Table C.20: Director Menu

Display title: Director	Description
NCP Message XXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXX is a NCP command text string
Director Message XXXXXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXX can be: INSERT CARD CARD INVALID SERVICE BLOCKED INVALID PACKET CARD NOT AUTHORIZED HARDWARE FAILURE VIEWING NOT PERMITTED SERVICE BLACKED OUT SERVICE HAS EXPIRED CALL FOR SERVICE (SECURITY) NO EMPTY PPV SLOTS INSUFFICIENT CREDIT IN CARD INCORRECT CARD FOR IRD PURCHASE NOT PERMITTED USE NEW CARD END OF PURCHASE WINDOW CALL FOR SERVICE (BAD PPV PKT) CALL FOR SERVICE (SPECIAL) PURCHASE SUCCESSFUL PURCHASE FAILED INCOMPATIBLE CARD
Videoguard Customer ID XXXXXXXX	XXXXXXXX is the editable customer ID (DIRECTOR, SKY NEW ZEALAND, CUSTOMER 02.....CUSTOMER 15)
Verifier Code Version XXXXh	XXXX is the verifier software version (hex)
Manuf ID XXh HW Type Yyh Model ID ZZh	XX is the Manufacturer ID (hex) YY is the hardware type (hex) ZZ is the model ID (hex)
Download Status XXX XX XX-XX XXX	XXX XX XX-XX XXX is the Director download status
NCP Lock Override Pin XXXX	XXXX is the editable Director local lockout PIN
Reset Lock Override Pin XXXXXXXXXXXXX	XXXXXXXXXXXXX is the editable Director local lockout reset PIN

C.7.4 BISS Mode 1 Menu

The **BISS Mode** submenu allows editing of the control word keys for the BISS user IDs.

Table C.21: BISS Mode 1 Menu

Display title: BISS	Description
Mode YYYYYYYYYY Key XXXXXXXXXXXXXXXX	YYYYYYYYYY is the BISS mode, 1, E FIXED, E TTV, E USER ONE, E USER TWO XXXXXXXXXXXXXXXX is the editable 48 or 64-bit control word key for BISS modes
User ID One XXXXXXXXXXXXXX	XXXXXXXXXXXXXX is the editable 56-bit control word for BISS E user ID one
User ID Two XXXXXXXXXXXXXX	XXXXXXXXXXXXXX is the editable 56-bit control word for BISS E user ID two

C.7.5 Broadcaster ID Menu

The **Broadcaster ID** submenu displays the status of the current broadcaster identification.

Table C.22: Broadcaster ID Menu

Display title: Broadcast ID	Description
Provider Lock Broadcast ID YYYYYYY	YYYYYYY is the status of the current broadcaster ID (KNOWN, UNKNOWN, or ------ if no broadcaster ID data available)

C.7.6 Transport Stream Output Menu

The **Transport Stream Output** submenu allows editing of the position of the ASI output.

Table C.23: Transport Stream Output Menu

Display title: Transport Stream Output	Description
Transport Stream Output XXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXX is editable position of the ASI output (ENCRYPTED (ie input transport stream), PARTIALLY DECRYPTED (ie post TTV & RAS), DECRYPTED (ie post TTV, RAS, Common Interface BISS, DIRECTOR))

C.8 Alarms Menu (#5)

The **Alarms** menu provides a summary of the alarm status.

Table C.24: Alarms Menu

Display title: Alarms	Description	Section
Satellite BER Alarm Setup	Satellite BER alarm and relay settings.	*C.8.1*
Transport Stream Alarm Setup	Transport Stream alarm and relay settings.	*C.8.2*
Video Alarm Setup	Video alarm and relay settings.	*C.8.3*
Audio 1 Alarm Setup	Audio 1 alarm and relay settings.	*C.8.4*
Audio 2 Alarm Setup	Audio 2 alarm and relay settings.	*C.8.5*

C.8.1 Satellite BER Alarm Setup Menu

Table C.25: Satellite BER Alarm Setup Menu

Display title: ALARMS	Description
VVVV WWWW UUU XXXXX YYYYYY ZZZZZZ	VVVV is BER, or NONE WWWW is LOCK XXXXX is VIDEO YYYYYY is AUDIO1 ZZZZZZZ is AUDIO2 UUU is MER
If BER exceeds X.X E-X YYYYYYYYYYYYY	X.X E-X is editable 9.9 E-1 to 1.0 E-8 YYYYYYYYYYYYY is editable: NO ALARM SET ALARM ONLY SET ALARM AND RELAY 1 SET ALARM AND RELAY 2 SET ALARM AND RELAY 3 SET ALARM AND RELAY 4 SET ALARM AND RELAY 5 SET ALARM AND RELAY 6 SET RELAY 1 ONLY SET RELAY 2 ONLY SET RELAY 3 ONLY SET RELAY 4 ONLY SET RELAY 5 ONLY SET RELAY 6 ONLY

C.8.2 Transport Stream Alarm Setup Menu

Table C.26: Transport Stream Alarm Setup Menu

Display title: Alarms	Description
IF NO TRANSPORT STREAM	YYYYYYYYYYYYYY is editable:
YYYYYYYYYYYYYY	NO ALARM
	SET ALARM ONLY
	SET ALARM AND RELAY 1
	SET ALARM AND RELAY 2
	SET ALARM AND RELAY 3
	SET ALARM AND RELAY 4
	SET ALARM AND RELAY 5
	SET ALARM AND RELAY 6
	SET RELAY 1 ONLY
	SET RELAY 2 ONLY
	SET RELAY 3 ONLY
	SET RELAY 4 ONLY
	SET RELAY 5 ONLY
	SET RELAY 6 ONLY

C.8.3 Video Alarm Setup Menu

Table C.27: Video Alarm Setup Menu

Display title:	Description
IF VIDEO NOT RUNNING	YYYYYYYYYYYYYY is editable:
YYYYYYYYYYYYYY	NO ALARM
	SET ALARM ONLY
	SET ALARM AND RELAY 1
	SET ALARM AND RELAY 2
	SET ALARM AND RELAY 3
	SET ALARM AND RELAY 4
	SET ALARM AND RELAY 5
	SET ALARM AND RELAY 6
	SET RELAY 1 ONLY
	SET RELAY 2 ONLY
	SET RELAY 3 ONLY
	SET RELAY 4 ONLY
	SET RELAY 5 ONLY
	SET RELAY 6 ONLY

C.8.4 Audio 1 Alarm Setup Menu

Table C.28: Audio 1 Alarm Setup Menu

Display title:	Description
IF AUDIO 01 NOT RUNNING	YYYYYYYYYYYYYY is editable:
YYYYYYYYYYYYYY	NO ALARM
	SET ALARM ONLY
	SET ALARM AND RELAY 1
	SET ALARM AND RELAY 2
	SET ALARM AND RELAY 3
	SET ALARM AND RELAY 4
	SET ALARM AND RELAY 5
	SET ALARM AND RELAY 6
	SET RELAY 1 ONLY
	SET RELAY 2 ONLY
	SET RELAY 3 ONLY
	SET RELAY 4 ONLY
	SET RELAY 5 ONLY
	SET RELAY 6 ONLY

C.8.5 Audio 2 Alarm Setup Menu

Table C.29: Audio 2 Alarm Setup Menu

Display title:	Description
IF AUDIO 02 NOT RUNNING	YYYYYYYYYYYYYY is editable:
YYYYYYYYYYYYYY	NO ALARM
	SET ALARM ONLY
	SET ALARM AND RELAY 1
	SET ALARM AND RELAY 2
	SET ALARM AND RELAY 3
	SET ALARM AND RELAY 4
	SET ALARM AND RELAY 5
	SET ALARM AND RELAY 6
	SET RELAY 1 ONLY
	SET RELAY 2 ONLY
	SET RELAY 3 ONLY
	SET RELAY 4 ONLY
	SET RELAY 5 ONLY
	SET RELAY 6 ONLY

C.9 System Menu (#6)

Table C.30: System Menu

Display title: System	Description	Section
Setup	The Setup submenu allows the user to edit the operating mode, LCD contrast, serial remote protocol, IP address, subnet mask, service hunt mode, and the customisation key.	*C.9.1*
IRD Details	The IRD Details submenu diplays the software, firmware, hardware, PLD version and electronic serial number of the IRD.	*C.9.2*
System Restart	The System Restart submenu allows the user to restart the unit.	*C.9.3*

C.9.1 Setup Menu

The **Setup** submenu allows the user to edit the operating mode, LCD contrast, serial remote protocol, IP address, subnet mask, service hunt mode, and the customisation key.

Table C.31: Setup Menu

Display title: Setup	Description
Date: XX/XX/XXXX Time: YY:YY:YY	XX/XX/XXXX is the system date from the TDT YY:YY:YY is the system time from the TDT
Operating Mode XXXXXXXXXXXXX	XXXXXXXXXXXXX is editable: FRONT PANEL SERIAL REMOTE DIRECTOR NCP
LCD Contrast XXXXXX	XXXXXX is editable in the range: LOW MEDIUM HIGH
Serial Remote Protocol XXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXX is editable: RS232 TTV, RS232 ALTEIA AT ADDR YYY, RS485 ALTEIA AT ADDR YYY where YYY is IRD address from 000 to 999.
IP Address XX.XX.XX.XX.XX.XX	XX.XX.XX.XX.XX.XX is the editable IP address
Subnet Mask XX.XX.XX.XX.XX.XX	XX.XX.XX.XX.XX.XX is the editable subnet mask
Restore System Defaults	Restores system defaults.
Service Hunt Mode XXXXXXXX	XXXXXXXX is the editable parameter for setting automatic service selection (ENABLED, DISABLED)
Customisation Key XXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXX is the editable parameter for entering customisation keys

C.9.2 IRD Details Menu

The **IRD Details** submenu diplays the software, firmware, hardware, PLD version and electronic serial number of the IRD.

Table C.32: IRD Details Menu

Display title: IRD Details	Description
Software Version XX.XX.XX	XX.XX.XX is the software version number
Firmware Version XX.XX	XX.XX is the firmware version number
Hardware Version XXXX	XXXX is the hardware version number
PLD Version XXXX	XXXX is the PLD version number
Electronic Serial Number XXXXX	XXXXX is the unit serial number

C.9.3 System Restart Menu

The **System Restart** submenu allows the user to perform a software restart without having to remove and insert the power cable.

Table C.33: System Restart Menu

Display title: System Restart	Description
Restart Activate	Software restart. Press Edit to cancel and Save to activate.

Annex D

Using the TT1260 with the TANDBERG Director System

Contents

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D.1 Configuring the TT1260 for Use With Director

D.1.1 Getting Started

You must have VideoGuard CA, a Director Smart Card and be tuned to a Director stream.

> CAUTION
>
> Do not repeatedly insert and remove the Director Smart Card.

1. Insert the Director Smart Card before tuning to the service.
2. Check that the unit has VideoGuard installed (Menu #4.3).
3. Set the Receiver to **DIRECTOR NCP** mode (Menu #6.1).
4. Check that the unit is authorised for de-scrambling the selected service (Menu #4 CA should read **VIDEOGUARD ENCRYPTED**.)

> NOTES...
>
> 1. The CA system is unrecognised if the service is shown as CLEAR (that is, unscrambled).
> 2. In OVER-AIR mode, menu items can not be edited. The Receiver should be moved to LOCAL control for editing.

D.1.2 Using the TT1260 in the Over-air Mode

This section describes the behaviour of the TT1260 when it is controlled over-air using the Receiver Control part of the Director PC GUI.

It is assumed that the Receiver is entitled to receive Director commands. Consult the Director Control PC GUI manual for more information.

The following commands are supported:

- Display On-screen Display (OSD) Messages
- Store Carrier Data
- Set Power-up Channel
- Force Carrier Retune
- Force Service Selection
- Set Emergency Channel
- Set Relays
- Local Lockout
- Abort NCP Command

D.2 Response to Over-air Commands

D.2.1 General

This section describes the Receiver's response to over-air commands.

D.2.2 Display On-screen Display (OSD) Messages

Displays a text string on the LCD front panel. The display is forced to Menu #4.3, NCP MESSAGE. The message is displayed for a set time or until cleared from the head-end.

> NOTE...
> The viewing Monitor does NOT display messages; all user interaction is via the front panel.

D.2.3 Store Carrier Data

Stores a particular service as a preset channel. Subsequently, the head-end can force a service selection from this preset (see *Section D.2.6, Force Service Selection*). Director presets are different to those set up in LOCAL ONLY mode (see Menu #1 Presets). They are not visible to the user on the front panel LCD.

D.2.4 Set Power-up Channel

Sets the Receiver power-up service. If the Emergency Channel has not been set, it is set to this service. If neither the *Emergency* nor *Power-up Channel* have been set, the TT1260 will be in an indeterminate state at power-up.

> NOTE...
> This is different to the situation in LOCAL ONLY mode, which chooses the service it last received.

D.2.5 Force Carrier Retune

Forces the Receiver to retune to a different frequency and/or service. This could be a service on a different feed (e.g. LNB input 2) or a service previously set up using the *Store Carrier Data* command.
Timeouts allow the Receiver to revert to the original service after the time has expired. If the command fails, the *Emergency* channel is used. Enter a timeout of not less than 15 secs (except 0 to permanently switch to the new service) to give the Receiver time to re-tune.

This command fails if the LNBs are not set up realistically (which may happen if the source is changed).

Take care when retuning to services on different LNB inputs. Force Service Selection is more efficient if the required service is on the same frequency and LNB input.

D.2.6 Force Service Selection

Forces the Receiver to decode a different service or stored channel (which may require a retune). The command is generally used to hop between services. The Director system has to be informed of the frequency, FEC-rate and symbol-rate for each stream. This is set-up using the Multiplex Element Manager (MEM). (The Director User Interface and the Director core require restarting to register changes that have been set in the MEM.)

D.2.7 Set Emergency Channel

Sets the service to use in the event of a selection failure. Is activated after a specified time has elapsed. If not set, the Power-up Channel is assumed. Setting the Emergency Channel allows a failure situation to be recovered.

D.2.8 Set Relays

Switches the general-purpose relays. This command does not affect the summary alarm relay.

D.2.9 Local Lockout

Locks out the LOCAL CONTROL mode but status information can still be viewed. All Director commands are functional. The Receiver can be unlocked locally using a PIN number or over-air using Allow Local Access.

D.2.10 Abort NCP Command

Aborts commands that have been sent but not executed. When a command is received which has an expired execute time, it is acted on immediately.

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Annex E

Language Abbreviations

The TT1260 supports the following languages. These are shown in alphabetical order.

NO	LANGUAGE	ABBREVIATION
5	ARABIC	ARA
	BASA	BAS
14	BENGALI	BEN
135	CHINESE	CHI
19	CZECH	CZE
21	DANISH	DAN
82	DUTCH	DUT
25	ENGLISH	ENG
31	FINNISH	FIN
34	FRENCH	FRE
22	GERMAN	GER
24	GREEK	GRK
40	GUJARATI	GUJ
52	HEBREW	HEB
42	HINDI	HIN
44	HUNGARIAN	HUN
50	ICELANDIC	ICE
49	INDONESIAN	IND

NO	LANGUAGE	ABBREVIATION
36	IRISH	IRI
51	ITALIAN	ITA
53	JAPANESE	JAP
55	JAVANESE	JAV
61	KOREAN	KOR
	MALAY	MAY
83	NORWEGIAN	NOR
90	PORTUGESE	POR
94	ROMANIAN	ROM
95	RUSSIAN	RUS
27	SPANISH	SPA
112	SWEDISH	SWE
117	THAI	THA
123	TURKISH	TUR
128	URDU	URD
130	VIETNAMESE	VIE

The following non-ISO languages are supported:

LANGUAGE	ABBREVIATION
MAIN	ONE
AUX	TWO
INTERNATIONAL SOUND	INT
AUDIO 1	AAA
AUDIO 2	AAB
AUDIO 3	AAC
AUDIO 4	AAD
AUDIO 5	AAE
AUDIO 6	AAF
AUDIO 7	AAG
AUDIO 8	AAH
AUDIO 9	AAI
AUDIO 10	AAJ
AUDIO 11	AAK
AUDIO 12	AAL
AUDIO 13	AAM
AUDIO 14	AAN
AUDIO 15	AAO
AUDIO 16	AAP

The non-ISO languages allow tagging of audio without reference to specific languages. The system can then transmit two languages (Main and Auxiliary) which could be any type of audio.

> NOTE...
>
> The non-ISO languages need to be user defined in the MEM or Mobile Contribution Encoder for them to be available.

For language codes not supported by the TT1260, the Receiver will list undefined as the language descriptor. This does not affect the way the audio is selected.

Annex F

Factory Defaults

Units are shipped with the following factory default parameters. These can be restored at any time using the System Menu. All other parameters are unaffected by restoring the factory defaults.

Menu	Page	Description	Default
#2 Input ASI	2.2	SOURCE	AUTO
#2 Input QPSK/8PSK/16 QAM	2.4	SOURCE	1
	2.3	LNB FREQUENCY	10750.0 MHz
	2.3.1	SATELLITE FREQUENCY	12168.0 MHz
	2.3.2	SEARCH RANGE	3000 kHz (5000 kHz)
	2.3.3	SYMBOL RATE	27.5Msym/s
	2.3.4	MODULATION FEC	QPSK auto
	2.3.5	LNB POWER	OFF
	2.3.6	LNB 22 kHz	Disabled
#3 Service	3.1.4	525LINE OUTPUT	NTSC-M
	3.1.4	625 LINE OUTPUT	PAL B/G/I
	3.1.5	DEFAULT LINE STANDARD	625
	3.1.5	FAIL MODE	FREEZE FRAME
	3.1.6	TEST PATTERN	NONE
	3.1.7	FRAME SYNC	DISABLED
	3.1.8	FSYNC PAL OFFSET	+0000
	3.1.8	FSYNC NTSC OFFSET	+0000
	3.1.9	4:2:0 DELAY	040ms
	3.1.9	4:2:2 DELAY	040ms
	3.1.10	MONITOR ASPECT RATIO	16:9
	3.1.10	OUTPUT LEVEL	100%
	3.1.11	EMBEDDED AUDIO DID	2FFH
	3.1.12	525 START LINE	23
	3.1.12	EDH	ENABLED
	3.2.2	DELAY ADJUSTMENT	+0.0ms
	3.2.3	DIGITAL OUTPUT	IEC958 CON

Menu	Page	Description	Default
	3.2.3	ROUTING	STEREO
	3.2.4	CLIPPING LEVEL	18dB
	3.2.5	AC3 DOWNMIX METHOD	SURROUND STEREO
	3.4	ASYNC DATA (High Speed RS-422 Data Enabler Card Not Fitted)	ENABLED
	3.4	SYNC DATA (High Speed RS-422 Data Enabler Card Fitted)	ENABLED
	3.5	TELETEXT	ENABLED
	3.6.1	VPS	ENABLED
	3.6.2	WSS	ENABLED
	3.6.3	VITC INSERTION	ENABLED
	3.6.4	VITC 525 LINE	14 and 16
	3.6.4	VITC 625 LINE	19 and 21
	3.6.5	VIDEO INDEX	ENABLED
	3.6.6	AMOL 1and2	ENABLED
	3.6.7	CLOSED CAPTION	ENABLED
	3.6.8	ITS INSERTION (CCIR)	ENABLED
	3.7	PCR PID	
#4 Conditional Access	4.1	RAS	DSNG MODE
	4.1	RAS KEY	UNAFFECTED
	4.2	SIGNAL PROTECTION	DISABLED
	4.3.1	DIRECTOR	UNAFFECTED
	4.4	BISS	MODE 1
	4.4	BISS KEY	UNAFFECTED
	4.5	PROVIDER LOCK	UNAFFECTED
	4.6	TS OUTPUT	ENCRYPTED
#5 Alarm	5.2	IF NO TRANSPORT STREAM	NO ALARM
	5.3	IF VIDEO NOT RUNNING	NO ALARM
	5.4	IF AUDIO 1 NOT RUNNING	NO ALARM
	5.5	IF AUDIO 2 NOT RUNNING	NO ALARM
#6 Setup	6.1	OPERATING MODE	FRONT PANEL
	6.1.1	LCD CONTRAST	MEDIUM
	6.1.2	SERIAL REMOTE CONTROL	RS 232 TTV
	6.1.3	IP ADDRESS	155.155.155.201
	6.1.4	SUBNET MASK	255.255.255.000
	6.1.6	SERVICE HUNT MODE	ENABLED
	6.1.7	CUSTOMISATION KEY	UNAFFECTED
	6.2	SW VERSION/ FW VERSION/ HW VERSION/ PLD VERSION/ ELECTRONIC SERIAL NUMBER	UNAFFECTED

Annex G

Quick Reference Guide

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G.1 Setting Up the Input

G.1.1 Satellite Receiver

Table G.1 steps through the setting up the Satellite Receiver using Menu #2 Input, and the QPSK 1 and 2 inputs. The transmission parameters must be known before starting.

Table G.1: Tuning the Satellite Receiver

Step	Action
1	Connect the cable to the QPSK 1 input.
2	Power up the unit and navigate to Menu # 2 Input.
3	Press the Right pushbutton to access Menu # 2.1, then press Edit.
4	Use the Up and Down pushbuttons to SELECT SOURCE 1, then press Edit.
5	Navigate to Source 1, LNB FREQUENCY (Menu # 2.3), then press Edit. Enter the desired LNB frequency in MHz, then press Save.
6	Navigate to Source 1, SATELLITE FREQUENCY (Menu # 2.3.1) then press Edit. Enter the desired Satellite frequency in MHz, then press Save.
7	Navigate to Source 1, SYMBOL RATE (Menu # 2.3.2) then press Edit. Enter the symbol rate in megasymbols, then press Save.
8	Navigate to Source 1, MODULATION FEC (menu # 2.3.3) then press Edit. Select the desired modulation form and FEC rate, then press Save.
9	Navigate to Source 1, LNB POWER (menu # 2.3.4) then press Edit. Select the LNB power setting and select the desired voltage level, then press Save.
10	Navigate to Source 1, LNB 22 kHz (menu # 2.3.5) then press Edit. Select to enable or disable 22 kHz tone, then press Save.
11	Navigate to Source 1, SEARCH RANGE (Menu # 2.3.6) then press Edit. Enter the search range for the centre frequency in kHz, then press Save.
12	Return to Input Menu # 2.1, it should display the current status. If status is NOT LOCKED, verify that the cable is properly connected and that all values have been entered correctly.
13	To configure QPSK Input 2, connect the cable to the QPSK 2 input, then repeat steps 4 to 11. However, use the Source 2 menus for the input configuration.

G.1.2 Decoder

Table G.2 steps through the setting up the Decoder using Menu #2 Input, and the ASI 1 and 2 inputs. The transmission parameters must be known before starting.

Table G.2: Setting-up the Decoder

Step	Action
1	Connect the ASI cable to either of the ASI inputs, ASI 1 or ASI 2.
2	Power up the unit and navigate to Menu # 2 Input.
3	Press the Right pushbutton to access Menu # 2.1, then press Edit.
4	Use the Up and Down pushbuttons to select the correct source. If only one of the inputs has an active connection, the input can be left at AUTO. Press Save.
5	Verify the connection status in the Input Menu # 2.

G.2 Service Configuration

G.2.1 Setting Up a Service

Each transport stream may contain many Services. Menu #3 allows a Service to be chosen as current and the parameters of its components to be specified.

Table G.3: Setting Up a Service

Step	Action
1	Go to Menu # 3.1 Service, then press Edit.
2	Use the Up and Down pushbuttons to select the desired source, then press Save.
3	Navigate to Menu # 3.2, Audio 1.
4	Verify that the correct audio component is selected. If not, press Edit, select the correct component, then press Save. If the desired component is not present it is possible to select the last available component in the list and enter a PID and type for the component.
5	Repeat step 4 for the following: Audio 2 (Menu # 3.3), Async/Sync Data (Menu # 3.4), Teletext (Menu # 3.5), VBI (Menu # 3.6) and PCR (Menu # 3.7). Several of these menus may contain sub menus, further affecting the presentations of the components.

G.2.2 Setting Up the Service Hunt Mode

Menu #6.1.6 allows the enabling or disabling of the Service Hunt mode. When this mode is enabled, the unit will search for the first available service when a new lock is gained. When this mode is disabled, the unit will stick to the previously configured service ID, and wait for this ID to contain a service. If this ID is not present, a service has to be chosen manually. Follow the steps in *Table G.4* to enable or disable service hunt.

Table G.4: Selecting a Power-up Service

Step	Action
1	Navigate to Menu # 6.1.6, SERVICE HUNT MODE.
2	Press Edit.
3	Use the Up and Down pushbuttons to choose between ENABLED or DISABLED.
4	Press Save.

G.2.3 Setting up a Preset Service

Follow the steps in *Table G.5* to store the current Service as a preset.

Table G.5: Setting up a Preset Service

Step	Action
1	Set up a service as explained in *Section G.2.1, Setting Up a Service.*
2	Navigate to Menu # 1.1, PRESETS.
3	Press Edit.
4	Up and Down pushbuttons to select the slot to store the service.
5	Press Save.

G.2.4 Loading a Preset Service

Follow the steps in *Table G.6* to select a preset service.

Table G.6: Loading a Stored Preset Service

Step	Action
1	Navigate to Menu # 1, PRESETS.
2	Press Edit.
3	Up and Down pushbuttons to select the desired preset.
4	Press Save.
5	The input and service parameters are restored from the preset, and the Decoder should display the preset service if available on the current input.

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PROFORMA INVOICE

INVOICE NO:
DATE:
YOUR REF:
OUR REF:

SENDER :	
CONSIGNEE: TANDBERG TELEVISION ASA PHILIP PEDERSENS VEI 20 N-1366 LYSAKER NORWAY	**SHIPPED PER:** TNT (Account 237067)
DELIVERY ADDRESS: TANDBERG TELEVISION REPAIR C/O HADELANDPRODUKTER AS MOHAGEN N-2770 JAREN NORWAY	**TERMS OF PAYMENT:** N/C, RETURN FOR SERVICE/REPAIR **TERMS OF DELIVERY:** EX WORKS

GOODS FOR SERVICE/REPAIR WITH NO COMMERCIAL VALUE.
WILL BE RETURNED BACK TO *(FILL IN YOUR COUNTRY)* **AFTER REPAIR.**

CUSTOMS VALUE ONLY: *(FILL IN CURRENCY AND VALUE)*

QTY.	DESCRIPTION	UNIT PRICE	TOTAL PRICE

TOTAL CUSTOMS VALUE

==========

PACKING LIST

COLLI	(FILL IN DESCRIPTION ON GOODS)	**KG**

COUNTRY OF ORIGIN: NORWAY

SIGNATURE:.....

(PLEASE PRINT YOUR NAME) (PLEASE WRITE THE COMPANY NAME)

TANDBERG Television

Repair/service Order Form

(Non Norwegian Customers)

Delivery is to be done by **TNT.**
TANDBERG Television's TNT account is 237067.

The unit(s) must be shipped using **TANDBERG Television AS** as receiver address, and **HAPRO AS** as delivery address.

Receiver Address:	**Delivery Address:**
TANDBERG Television AS Att: CS_Logistics Philip Pedersens Vei 20 N-1366 Lysaker Norway	Tandberg Television Repair c/o HAPRO AS Mohagen N-2770 Jaren Norway

Service reference No.: (One number for each unit)

RAN #:

	Customer Return addr.:	**Customer Invoice addr.:**
Company :		
Addr.:		
City/Town:		
State/ Country		
Contact or ref.:		
Phone/Fax		

Unit type : _____	**Serial No.:** _____
Fault description :	

NB! **This form must be completed fully in detail.**

Enclose with the unit :
- 1 copy of this form.
- 1 visible label on each package with the RAN reference number

Copy to TANDBERG Television att.: CS_Loistics, by fax (+47 67116201) :
- 1 copy of this form
- 1 copy of Proforma Invoice