VISLINK

LINK

PRODUCT MANUAL

Lynx Receiver L2174, L2074, L2170

1 CONTENTS

1 Contents 2
2 Products Covered 3
2.1 Manual Issue 3
2.2 Firmware Version 3
2.3 Support 3
3 Safety and Compliance 4
3.1 CE Declaration of Conformity 5
4 Introduction 6
4.1 L2174 Internal Architecture 6
5 Specification 7
5.1 Demodulation 7
5.2 Decoding 7
5.3 Inputs & Outputs 8
5.4 Physical 8
6 Input / Output Connections 9
6.1 RF1-4 inputs (L2174, L2074) 9
6.2 ASI IN 9
6.3 Frame lock input (L2174, L2170) 10
6.4 Video Outputs (L2174, L2170) 10
6.5 ASI out 10
6.6 Ctrl/Data 10
6.7 Audio 1 11
6.8 Audio 2 11
6.9 Camera Control/Alarm 12
6.10 Ethernet – Control 12
6.11 Ethernet – Video over IP 12
7 Controls 12
7.1 Selection keys 12
7.2 Menu scroll keys 13
7.3 Hot Keys 13
7.4 LEDs 13
7.5 USB port 13
8 Operator Menus 13
9 Main Display 16
9.1 Demodulator Menus (L2174, L2074) 16
9.2 Decoder Menus (L2174, L2170) 17
9.3 Stream Management Menu 18
9.4 System Menu 19
9.5 Camera Control (L2174 only) 20
9.6 Web Browser Operation 21
10 Receiver Set-up 23
10.1 Self Test 23
10.2 Demodulation Options 23
10.3 Down Converter Type 25
10.4 Decoder 26
10.5 Deinterleaving 26
10.6 Video over IP 27
10.7 Decryption 27
10.8 Independent and Customised Down Convertor operation 27
11 Licences and Upgrades 27
11.1 Licensing 27
11.2 Firmware Upgrades 28

2 PRODUCTS COVERED

Part No.	Product Description	Details
L2174	Lynx Diversity Receiver	UHF input 70-860MHz
L2170	Lynx Decoder	ASI Input only
L2074	Lynx Diversity Demodulator	UHF input 70-860MHz

2.1 Manual Issue

Issue	Date	Comments
1	November 2010	First Issue
1.1	December 2010	Minor formatting change
1.2	December 2010	Updated for V0009 release
2.0	September 2011	Updated for V0014 release including L2170 & L2074
2.1	November 2011	Minor corrections
2.2	January 2012	IP sections added
2.3	May 2012	Decryption added
2.4	December 2012	Multibandwidth LMS-T added
2.5	April 2014	Data connector part number corrected

2.2 Firmware Version

This manual is based upon Firmware version *V1024*

Please see the website for details of latest firmware revision

2.3 Support

For more information, or for service / support please contact:

Worldwide – Advent (SATCOM) Link (Wireless Cameras)

UKsupport@vislink.com +44 (0) 1442 431410

Americas - Advent (SATCOM) Link (Wireless Cameras) MRC (Microwave)

USsupport@vislink.com +1 978 671 5929 or 888 777 9221

Asia Pacific - Advent (SATCOM) Link (Wireless Cameras) MRC (Microwave)

APACsupport@vislink.com +65 8189 3040

3 SAFETY AND COMPLIANCE

Any mains power equipment must be earthed.

Connection and disconnection from the Mains supply is achieved through a detachable mains cord. This must be of a suitable rating and cross-sectional area, and be approved to the relevant national standards. The cord or its plug must be easily accessible to allow disconnection.

SERVICE PERSONNEL - CAUTION

DOUBLE POLE/NEUTRAL FUSING

Replacement fuses must be of identical ratings to the original parts fitted, i.e. **T5A H250**

Operate the equipment within environmental limits and ensure as much ventilation as possible (normally Temp 0°C - 50°C <99% humidity).

Only authorised personnel should open the product and any repair or warranty will be invalidated if the seals are broken.

The equipment has been designed to be CE compliant and Technical files are available on request.

3.1 CE Declaration of Conformity

Declaration of Conformity

RADIO & TELECOMMUNICATIONS TERMINAL EQUIPMENT DIRECTIVE 1999/5/EC

Issue 1 **Date 02 November 2010**

Equipment Covered:

Lynx Receivers L2174, L2170 & L2074

This equipment complies with the essential requirements of the above directive, as applied by the following harmonised standards:

ETSI EN 301 489-1	EMC standard for radio equipment and services; Part 1: Common technical requirements
ETSI EN 301 489-28	EMC standard for radio equipment and services; Part 2: Specific conditions for wireless digital video links
ETSI EN 302 064	Harmonised EN for Wireless Video Links (WVL) operating in the 1,3 GHz to 50 GHz frequency band
EN60950	Safety of Information Technology equipment

Manufacturer/Agent

Vislink International Ltd.
Vislink House
Maylands Avenue
Hemel Hempstead
Herts
HP2 7DE
United Kingdom

Certified by

H. Sadheura

Vislink International Ltd.

4 INTRODUCTION

The Lynx Receiver range are highly flexible, high performance products based on compact DVB-T and LMS-T demodulators using VISLINK's Maximum Ratio Combining diversity algorithm, and a combined HD/SD decoder.

The ultra low delay MPEG2 SD/HD Decoder has been speed optimised to operate with the Link Research Ltd family of MPEG2 Encoders, which utilise field encoding. This range of decoders will not support frame decoding. A licensable upgrade will allow support for B-Frame or 'Generic' MPEG2 Decoding that will support frame decoding, but at higher delay.

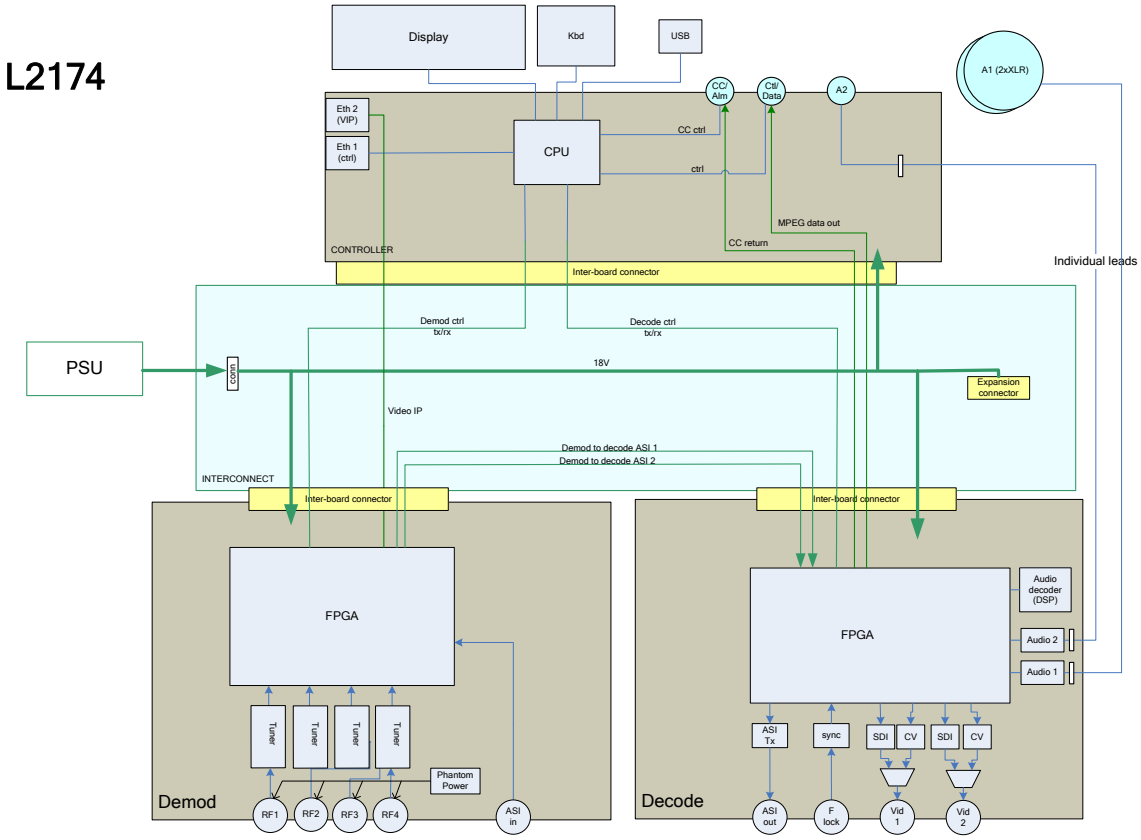
The Decoder can also be licensed to support H.264 decoding. This will be available in different levels from Main Profile 4:2:0 8 bit, up to High Profile 4:2:2 10 bit.

The product range is based on three hardware variants: Demodulator-only (L2074), Decoder-only (L2170) and Demodulator-Decoder (L2174). All other variants are licensable and therefore allow for field upgrades by changing the license to enable extra features as required. Please contact VISLINK for details.

This document has been written primarily for the complete L2174 Receiver. Where there are major differences for the L2170 and L2074 variants they will be indicated, however some minor differences may not always be documented.

4.1 L2174 Internal Architecture

The L2174 is based on 3 main hardware components: Demodulator card, Decoder board and Controller board. The L2074 & L2170 products do not have the Decoder and Demodulator boards fitted (respectively). Please note that upgrading one of these to a full L2174 requires the unit to be returned to VISLINK.



As shown in the block diagram above, the Demodulator board generates an ASI stream from the RF inputs and/or the external ASI, then passes this to the Decoder board to generate the Video and Audio outputs. In addition, the Decoder extracts embedded (or 'wayside') RS232 data if it is present in the transmission, as well as return data from a VISLINK Camera Control System. There are 2 ASI connections between the boards to allow extra flexibility in how the unit is configured (see later).

Video-over-IP functionality is all performed in the Demodulator card in the L2174 and L2074; the external Ethernet connection is routed to this card and any ASI routing is performed between the two boards as required. The L2170 uses the Decoder card for IP functionality.

5 SPECIFICATION

5.1 Demodulation

Modes supported (some are dependent on licences):

DVB-T:

- 6/7/8MHz bandwidth
- QPSK/16QAM/64QAM
- FEC 1/2, 2/3, 3/4, 5/6, 7/8
- Guard Interval 1/32, 1/16, 1/8, 1/4

LMS-T:

- Single and Dual Pedestals of 3, 4, 5, 6, 7, 8, 10 & 12MHz bandwidths
- QPSK/16QAM
- FEC 2/3
- Guard Interval 1/8, 1/16

General:

- Receiver performance meets or exceeds ES 202 239 in DVB-T mode (typical sensitivity -93dBm @DVB-T QPSK 1/2)

5.2 Decoding

Video Formats supported:

SD: 625i50; 525i59

HD: 720p50; 720p59; 720p60; 1080i50; 1080i59; 1080i60; 1080p23; 1080p24; 1080p25; 1080p29; 1080p30; 1080psf23; 1080psf24; 1080psf25; 1080psf29; 1080psf30

HD Horizontal Resolution support (1080 line): 1920, 1440*, 1280*, 960*

HD Horizontal Resolution support (720 line): 1280, 640*

SD Horizontal Resolution support (576/480 line): 720, 704*, 640*, 540*, 528*, 480*, 360*, 352*

** Not supported in Low Delay mode*

(other resolutions will work but artefacts may be observed)

Chroma Format : 420 / 422

Bit Depth : 8bit (MPEG2); 8/9/10 bit (H.264)

Maximum Bit Rate : 80Mbit (MPEG2)

Audio Formats supported :

MPEG-1 Layer 1 20-bit 48kHz

MPEG-1 Layer 2 20-bit 48kHz

SMPTE 302M 20-bit 2 channel 48hHz 8ms frame

5.3 Inputs & Outputs

Summary (details in section 6):

- 4 x UHF input 70MHz to 860MHz, combined using Maximal Ratio Combining (MRC). *Not L2170.*
- 1 x ASI input (complies with ISO/IEC 13818-2 – 188byte mode)
- 1 x Frame lock input (Black/Burst or Trilevel). *Not L2074*
- 2 x Video outputs (CVBS/SD/HDSDI). *Not L2074*
- 1 x ASI output (complies with ISO/IEC 13818-2 – 188byte mode). *2 outputs on L2074*
- 2 Audio channel outputs (analogue or digital). *Not active in L2074*
- Data channel output. *Not active in L2074*
- Video over IP connection (Ethernet RJ45)
- IP control connection (Ethernet RJ45)
- L1255 Camera Control Transmitter connection. *Not active in L2074*

5.4 Physical

***CAUTION**: the side ventilation grilles must be kept clear to allow adequate airflow.*

Size

Height 44mm, Width 210mm, Depth 375mm - including rear panel connectors

Small form 1U, ½ width 19" rack mount

Weight

~1.2kg

Operating temperature range

Ambient 0ºC to +50ºC

Power

AC input option 90 VAC to 264 VAC 50Hz to 60Hz; max current 1A(rms)

DC input option 9 VDC to 36 VDC (-ve chassis earth); max current 10A

70Watts excluding the downconverters requirements.

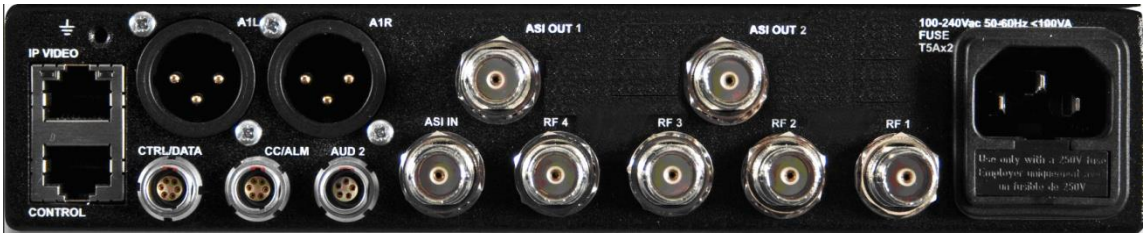
90Watts max allowing for downconverters and cables.

(***L2170*** - 45W; ***L2074*** - *30*W, not including downconverters)

6 INPUT / OUTPUT CONNECTIONS

L2174

L2074



L2170

6.1 RF1-4 inputs (L2174, L2074)

75Ω BNC type chassis connector

(if only 2 inputs licensed, inputs 3 & 4 are non-operational)

Note:- When operating in Dual Pedestal LMS-T(D) **RF 1 & 2** are used for connection to the two down convertors. Demodulator settings for 1 & 2 should also be used to configure the appropriate RF inputs.

- UHF input 70MHz to 860MHz.
- Receiver performance meets or exceeds ES 202 239 in DVB-T mode (typical sensitivity -93dBm @DVB-T QPSK 1/2)
- Max input (damage level): 2W (CW)

For configuration please refer to 9.1 Demodulator Menu

Note:-

These inputs can have +20VDC output (set in Unit/LNB Power) to power the external down converter; limited to 400mA per connector, short circuit protected.

In Triax mode, inputs 1 & 2 are used in Single mode; in Dual mode the second system is added to inputs 3 & 4.

6.2 ASI IN

75Ω BNC chassis mounted socket. Complies with ISO/IEC 13818-2 – 188byte mode.

ASI input to the Decoder, Packet diversity block, ASI output connector, or Video-IP block.

6.3 Frame lock input (L2174, L2170)

75Ω BNC chassis mounted socket

Can be used to lock decoder output for both SD & HD video.

SD Mode :- Composite Black and Burst input for timing reference.

HD Mode:- Supports HD tri-level sync reference input.

Delay increased by 0 – 40ms.

For configuration please refer to 9.2.4.1

6.4 Video Outputs (L2174, L2170)

75Ω BNC chassis mounted socket.

Output #1 and #2. Two independent outputs for HD or SD output of SDI video; or when operating in SD mode these outputs can be configured to provide analogue CVBS output.

CVBS:	PAL/NTSC, 1Vp-p
SDI:	ITU-R BT.656 / ANSI/ SMPTE 259M @ 270Mb/s.
HDSDI:	SMPTE 292M @1.485Gbps

For configuration please see 9.2.2

For Video formats supported see section 5.

6.5 ASI out

75Ω BNC chassis mounted socket. Complies with ISO/IEC 13818-2 – 188byte mode.

ASI output from the Demodulator, Diversity or ASI input for decoding by an external decoder or chaining to another L2174.

On the L2074, there are 2 separate ASI outputs, which can be configured separately.

For configuration please see 9.3.1

6.6 Ctrl/Data

Chassis Socket Connector :- LEMO EEF0B306CLV

Mating Cable Plug :- LEMO FGF0B306CLAD52Z

The six pin connector provides the RS232 input/output of the User Data and also for serial Remote Control of the transmitter unit by Troll Remote Site Controllers

LEMO Pin	Function
Pin 1	Tx Data (output)
Pin 2	Rx Data (input)
Pin 3	0v
Pin 4	Tx Control (output)
Pin 5	Rx Control (input)
Pin 6	0v

6.7 Audio 1

Not active in L2074

Two 3way XLR Male Chassis mounted plugs

XLR Conn	Function - Analogue	Function – Digital (A1R only)
Pin 1	Audio Gnd	Audio Gnd
Pin 2	Live	AES +
Pin 3	Return	AES -

These connectors are switched to provide either analogue or AES-EBU (digital) audio outputs. In Digital mode, the Left channel is muted and the Right channel carries the digital data

For configuration see 9.2.3

Note:- Permanent damage can occur to the audio output amplifiers if a connection is made to an audio input that has Phantom power applied.

Internal protection is provided on the audio outputs but damage may still occur and this will not be covered by warranty.

Analogue Mode:

- 48kHz sampling
- Clip level 18dB
- THD < 0.1%
- 20Hz to 18kHz ±0.25dB
- Crosstalk >60dB minimum
- Signal to noise ratio >66dB RMS

Digital Mode:

- AES3 (110 Ω)
- 2 channels to 3Mbps

6.8 Audio 2

Not active in L2074

Connector type LEMO EEG0B305CLV

Lemo Conn	Function - Analogue	Function – Digital
Pin 1	Left Line + (Line)	
Pin 2	Left Line - (Return)	
Pin 3	GND	GND
Pin 4	Right Line + (Line)	AES +
Pin 5	Right Line - (Return)	AES -

This connector is switched to provide either analogue or AES-EBU (digital) audio output. In Digital mode, the Left channel is muted and the Right channel carries the digital data

For configuration see 9.2.3

Note:- Permanent damage can occur to the audio output amplifiers if a connection is made to an audio input that has Phantom power applied.

Internal protection is provided on the audio outputs but damage may still occur and this will not be covered by warranty.

Specification as Audio 1

6.9 Camera Control/Alarm

Connector - LEMO 6pin socket EEF.0B.306.CLL

'Lemo' Type	Function
Pin 1	0v
Pin 2	CCU control Rx (input)
Pin 3	CCU control Tx (output)
Pin 4	Status output (open drain)
Pin 5	Reserved for future use
Pin 6	Camera Return Data Tx (output)

The serial data from the camera is returned via the L1500 transmitter as part of the MPEG transport stream in a similar way as the RS232 'User data' . It is then extracted from the transport stream by the decoder and passed back to the L1255 Data transmitter via this Camera Control connector ('Camera Return Data Tx').

For configuration see 9.5. Camera Control is only supported in the L2174.

The Status output is an open-drain output that by default is pulled low when an alarm is detected. It is also possible to drive it manually via the menus (see 9.4.3) or web page. Max Voltage 20V; Max Current 1A.

6.10 Ethernet – Control

Standard 10/100 Ethernet connection for control of the unit using Web Browser (HTTP) and Network Management (SNMP).

A copy of the unit's SNMP MIB (Management Information Base) can be downloaded from this port. Enter the following URL into a web browser (assuming the IP address is the default value of 192.168.0.90): http://192.168.0.90/common/L2174-MIB.txt . This should always be used as the reference for any SNMP application, to ensure that the version relevant to the current code release is being used.

6.11 Ethernet – Video over IP

Standard 10/100/1000 Ethernet connection for streaming encapsulated Transport Streams into and out of the unit. Only UDP encapsulation is supported. For more details see sections 9.3.3 & 10.6

NB This input is completely separate from the Control Ethernet connection and cannot be used for web or SNMP control

7 CONTROLS

7.1 Selection keys

The **MENU** key allows rapid entry to main operating menu screen.

Pressing while in main screen returns to top of previous menu tree accessed.

The **ESCAPE** key takes the user up a level when navigating around the menus. Additionally allows 'escape' from an entry operation without committing to the value being adjusted.

7.2 Menu scroll keys

UP / DOWN, LEFT / RIGHT arrow keys select an option displayed in the window and navigate around the menu tree.

The **ENTER** key initially selects an option or a choice of selection; by using the **UP / DOWN, LEFT / RIGHT** arrow keys to change the parameter, pressing **ENTER** key commits the change. Pressing **ESCAPE** will abort the change.

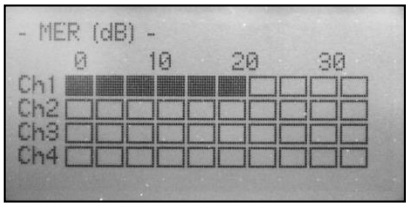
The upper line, in smaller font, of the LCD shows the parameters available by means of a 'prompt', access to the next menu level, or a summary of the status of the menu option.

Some menus will display 'MORE>' at the bottom; selecting this will bring up another screen of parameters. Pressing **ESCAPE** in this instance will take you back to the previous menu, not up a level.

7.3 Hot Keys

STATUS key – Pressing this key brings the user directly to the ALARMS menu screen. If there is more than one active alarm (as indicated in the top right corner), pressing the Left and Right arrow keys will cycle through them. On L2174 and L2074:

- Pressing it a second time will bring up a display showing the current receive signal strength on each of the 4 RF channels.
- Pressing it a 3rd time will bring up a display showing the current MER (Modulation Error Ratio) of each of the 4 RF channels (see example screen below)



- Subsequent presses cycle through the 3 screens above.
- To exit press **ESCAPE** or **MENU**

MODE key – Pressing this key toggles the front panel between control of the Local unit, or a Remote unit. Initially the only remote device that can be controlled is the L1255 Camera Control transmitter.

7.4 LEDs

STATUS – This LED is Green for normal operation, and illuminates Amber or Red when an error has occurred. It will be Red for unit-critical errors that require immediate attention (e.g. hardware fault), and Amber for other errors (e.g. no RF lock). The type of error is listed under the ALARMS menu option.

POWER- Green LED when illuminated indicates power is applied to the unit.

LOCAL/REMOTE – These LEDs indicate whether the front panel is controlling the Local unit or a Remote device, as set by the **MODE** key.

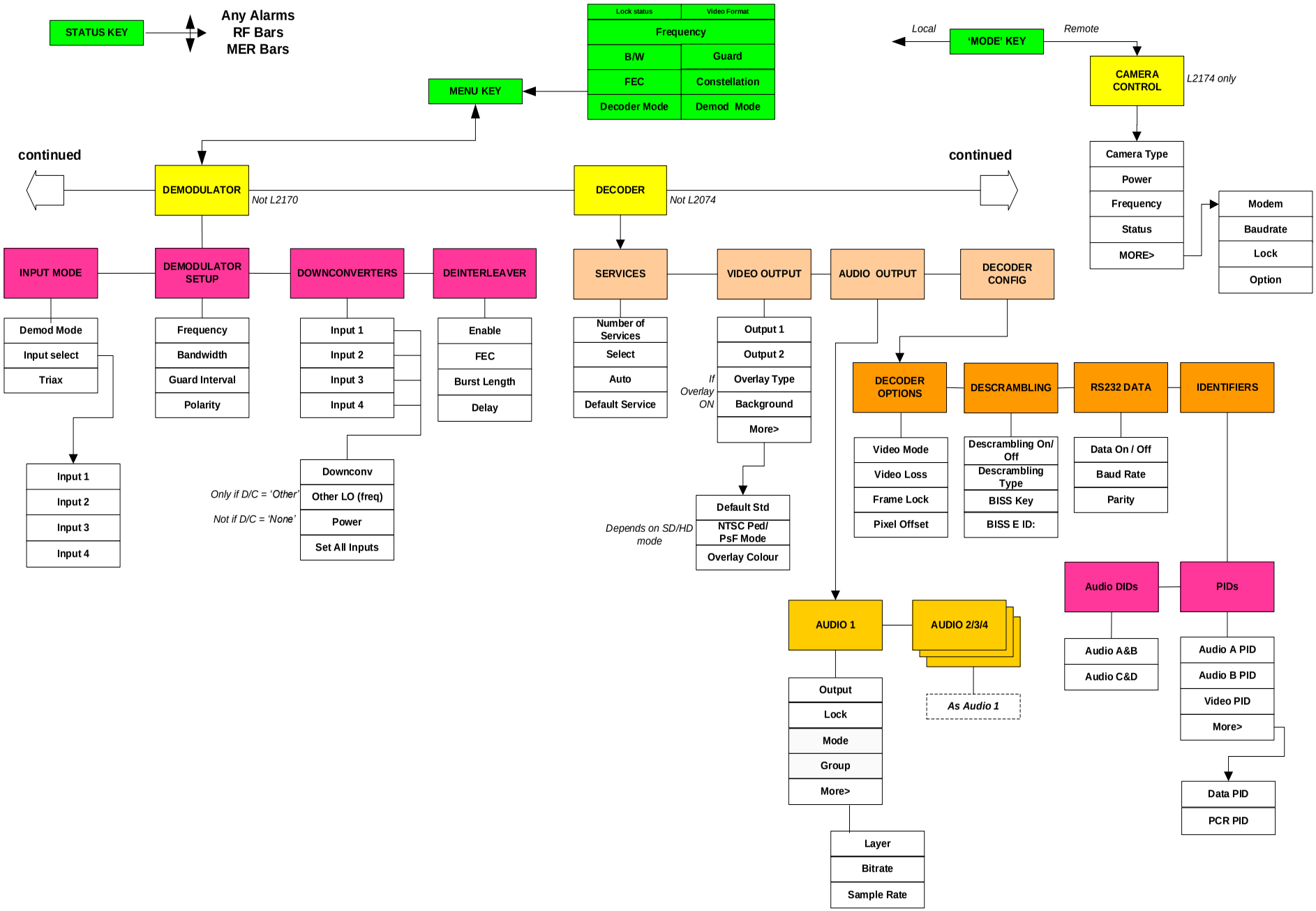
7.5 USB port

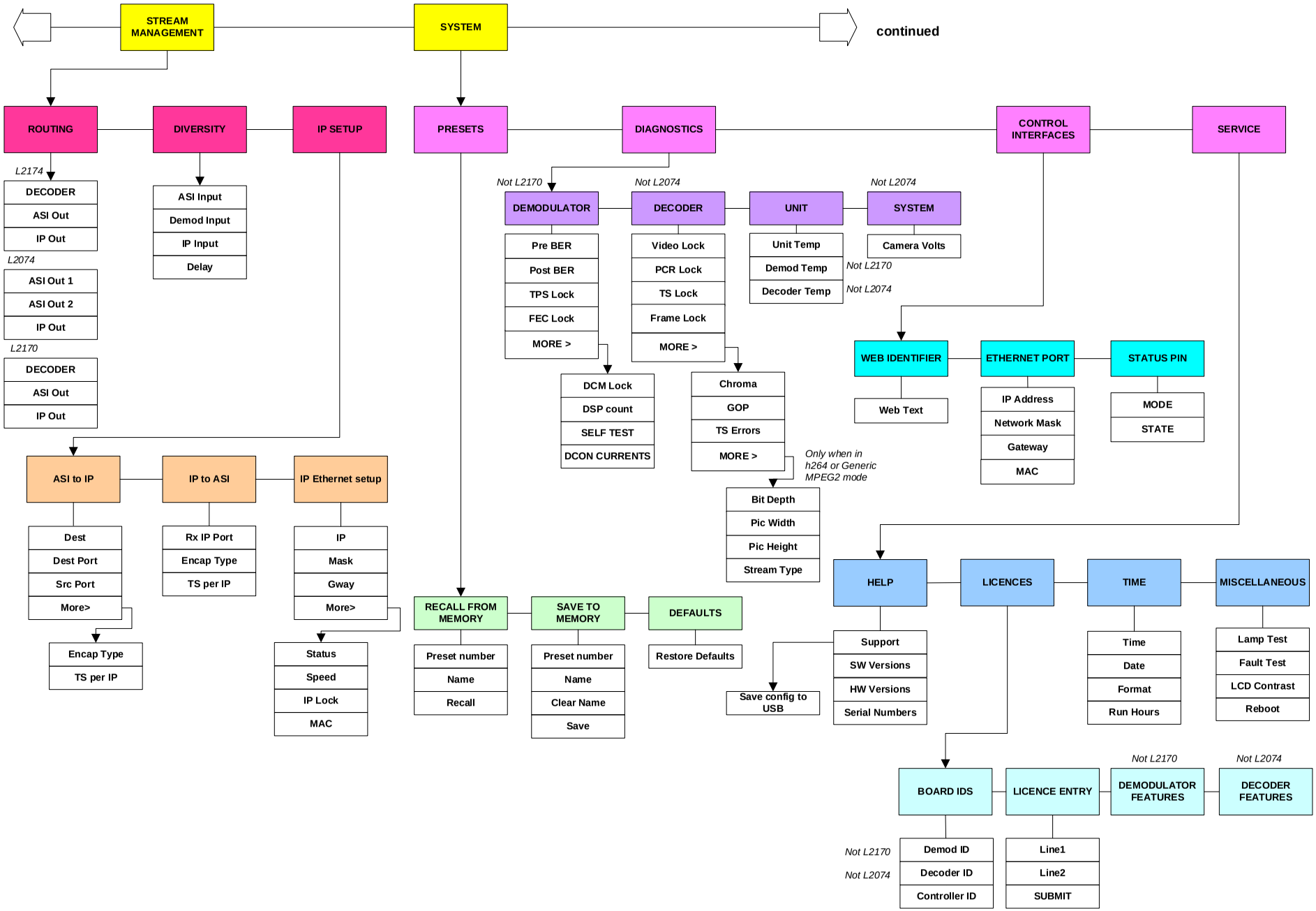
This allows a USB memory stick to be inserted for code updates. It cannot be used for remote control of the unit.

8 OPERATOR MENUS

The following diagrams show the menu structure in the unit (note that this is subject to change with software upgrades). This section gives an overview of each function in the menus. Where a menu is different depending on the variant, this is shown.

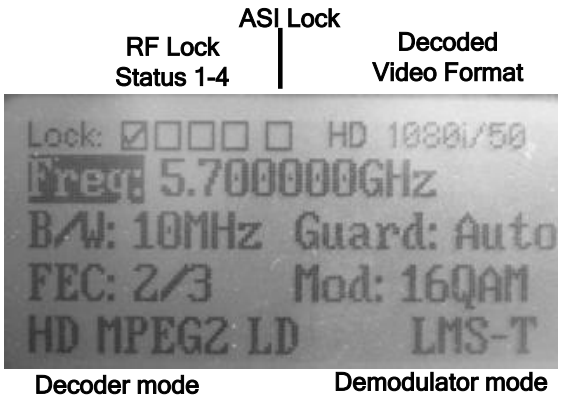
Some features of the L2174 are licensed options; therefore some options will not be selectable depending on the status of the unit. Please contact Vislink giving details of the unit's electronic serial number to confirm.


STATUS KEY
Any Alarms
RF Bars
MER Bars
Lock status
Video Format
Frequency
B/W
Guard
FEC
Constellation
Decoder Mode
Demod Mode
MENU KEY
Local
'MODE' KEY
Remote
CAMERA CONTROL
L2174 only
Camera Type
Power
Frequency
Status
MORE>
Modem
Baudrate
Lock
Option
continued
DEMODULATOR
Not L2170
DECODER
Not L2074
continued
INPUT MODE
DEMODULATOR SETUP
DOWNCONVERTERS
DEINTERLEAVER
SERVICES
VIDEO OUTPUT
AUDIO OUTPUT
DECODER CONFIG
Demod Mode
Input select
Triax
Input 1
Input 2
Input 3
Input 4
Frequency
Bandwidth
Guard Interval
Polarity
Input 1
Input 2
Input 3
Input 4
Only if D/C = 'Other'
Not if D/C = 'None'
Downconv
Other LO (freq)
Power
Set All Inputs
Enable
FEC
Burst Length
Delay
Number of Services
Select
Auto
Default Service
If Overlay ON
Output 1
Output 2
Overlay Type
Background
More>
Depends on SD/HD mode
Default Std
NTSC Ped/ PsF Mode
Overlay Colour
DECODER OPTIONS
DESCRAMBLING
RS232 DATA
IDENTIFIERS
Video Mode
Video Loss
Frame Lock
Pixel Offset
Descrambling On/ Off
Descrambling Type
BISS Key
BISS E ID:
Data On / Off
Baud Rate
Parity
AUDIO 1
AUDIO 2/3/4
As Audio 1
Output
Lock
Mode
Group
More>
Layer
Bitrate
Sample Rate
Audio DIDs
PIDs
Audio A&B
Audio C&D
Audio A PID
Audio B PID
Video PID
More>
Data PID
PCR PID


STREAM MANAGEMENT
SYSTEM
continued
ROUTING
DIVERSITY
IP SETUP
PRESETS
DIAGNOSTICS
CONTROL INTERFACES
SERVICE
L2174
DECODER
ASI Out
IP Out
L2074
ASI Out 1
ASI Out 2
IP Out
L2170
DECODER
ASI Out
IP Out
ASI Input
Demod Input
IP Input
Delay
Not L2170
DEMODULATOR
Pre BER
Post BER
TPS Lock
FEC Lock
MORE >
Not L2074
DECODER
Video Lock
PCR Lock
TS Lock
Frame Lock
MORE >
Not L2074
UNIT
Unit Temp
Demod Temp
Decoder Temp
Not L2170
Not L2074
SYSTEM
Camera Volts
DCM Lock
DSP count
SELF TEST
DCON CURRENTS
Chroma
GOP
TS Errors
MORE >
Only when in h264 or Generic MPEG2 mode
Bit Depth
Pic Width
Pic Height
Stream Type
WEB IDENTIFIER
Web Text
ETHERNET PORT
IP Address
Network Mask
Gateway
MAC
STATUS PIN
MODE
STATE
ASI to IP
Dest
Dest Port
Src Port
More>
Encap Type
TS per IP
IP to ASI
Rx IP Port
Encap Type
TS per IP
IP Ethernet setup
IP
Mask
Gway
More>
Status
Speed
IP Lock
MAC
RECALL FROM MEMORY
Preset number
Name
Recall
SAVE TO MEMORY
Preset number
Name
Clear Name
Save
DEFAULTS
Restore Defaults
Save config to USB
HELP
Support
SW Versions
HW Versions
Serial Numbers
LICENCES
TIME
Time
Date
Format
Run Hours
MISCELLANEOUS
Lamp Test
Fault Test
LCD Contrast
Reboot
BOARD IDS
Not L2170
Not L2074
Demod ID
Decoder ID
Controller ID
LICENCE ENTRY
Line1
Line2
SUBMIT
Not L2170
DEMODULATOR FEATURES
Not L2074
DECODER FEATURES

9 MAIN DISPLAY

This displays, at a glance, the current frequency selection and modulation parameters. The top line also displays the lock status of the individual RF and ASI inputs (✓ = locked), and the video format detected by the decoder. The bottom line displays the currently selected Decoder and Demodulator Modes.



Example Home screen (when locked)

Pressing the **MENU** key will take the operator to the main setup menus; pressing **MENU** again at any point returns to this display.

If any parameter has not yet been initialised (e.g. shortly after power-up), then it will display as dashes ("---").

The L2074 Main display is identical, except the Video Format is not displayed.

The L2170 Main display shows the Service selection menu (see section 9.2.1), plus the ASI lock status and Video Format.

9.1 Demodulator Menus (L2174, L2074)

9.1.1 Input Mode

Allows the operator to select the required Modulation scheme being used (DVB-T, LMS-T(S), LMST(D)).

When the unit is first switched on, and when switching modulation modes, the unit performs a self test routine on the RF front end. This causes a slight delay (15-30s) before the demodulator will lock. For more details see section 10.2

Individual inputs can be turned on and off as required. Note that in Dual Pedestal LMS-T(D) mode, only Inputs 1 & 2 are active.

The Receiver supports the Link Remote Triax System (L1273/4), which allows downconverters to be sited remotely (up to 1km from the receiver). This can be set to Single or Dual mode; in Single mode, 2 downconverters are mounted remotely, and the triax system is connected to RF1 and RF2 on the Receiver. The other 2 inputs can be connected directly to downconverters. In Dual mode, two triax systems are connected, to RF 1/2 and RF3/4 respectively. This feature defaults to Off.

9.1.2 Demodulator Setup

Operator can configure Frequency, Bandwidth, Guard Interval and Polarity. Apart from Frequency, all have 'Auto' modes, which allows the Demodulator to detect the correct configuration from the received signal. Note that in LMST(D) mode, the bandwidth shown is the combined width of the 2 pedestals.

If a frequency is entered that is outside the range of the currently selected downconverter, then an 'Invalid Frequency' alarm will occur, and reception will not be possible,

9.1.3 Downconverters

For each RF input, select the downconverter type, and turn on power to the downconverter. All current Vislink downconverters are listed, or the Local Oscillator (LO) frequency of any unlisted downconverter may be entered by selecting OTHER. To enter the incoming UHF frequency directly, select NONE. When NONE is selected, downconverter power is disabled.

To change all RF inputs to the same downconverter settings at the same time, SET ALL INPUTS should be set to ON; to set them individually, turn this setting OFF.

Note that the Receiver frequency will not change according to the downconverter type, unlike previous Link products. This greatly simplifies setting up the unit to work with multiple downconverter types, and also when switching between downconverters that cover the required frequency range.

9.1.4 Deinterleaving

The Lynx Receiver has a licensable deinterleaving option, to match the interleaving option in the L1500 transmitter. This option adds an extra layer of error correction to the ASI data steam that allows long breaks in RF reception to be corrected. In the transmitter, the user can select the amount of FEC used and the duration of RF break that can be corrected. When Enabled, the Receiver automatically detects these settings and adjusts the deinterleaving appropriately. The settings are displayed for information but cannot be altered. Adding interleaving to an ASI stream reduces the ASI bit rate available for video/audio etc. and adds a delay to the signal. The additional delay is shown in the menu. For more details see section 10.5.

9.2 Decoder Menus (L2174, L2170)

9.2.1 Services

Number of Services: Displays the number of services in a particular incoming multiplex.

SERVICE: In Auto mode, displays the currently selected service. In Manual mode, allows the decoded service to be selected as follows:

Press ENTER on this menu item followed by UP/ DOWN arrow keys; the service "**NAME**" of each service available in the incoming multiplex will be displayed on the line below. When the desired service is shown press ENTER. This will then be decoded in to video / audio outputs *provided* the signal is of the correct format (SD/HD), and is not scrambled or a valid descrambling key has been entered.

Once selected, this service name will become the "preferred" (or Default) service, such that on power / signal interruption this particular service will be the only one that is decoded, on restoration of power / signal. If the preferred service name appears in a particular multiplex, this is the one that will be decoded unless another is chosen.

If the Default service name is not present then no service will be decoded. **NB** This means that if the service name is altered in the encoder, then decoding will stop.

If a service has not been given a name (some encoders default to this mode), then the decoder will create a name of the format "Prog00001", which will allow it to be selected.

Auto: When ON will always select the first service in the multiplex. Once a service has been selected in this way, it will remain selected even if other services are added to the multiplex. Auto mode defaults to ON.

Default: Displays the current Default service name. It is only valid, and can only be edited, when Auto Mode is Off.

9.2.2 Video Output

Output 1/2: Select the output mode of the two rear panel connectors. In HD mode this is fixed to SDI; for SD it can be switched between SDI and CV (Composite Video).
In both modes a Status overlay can be added to the video output which gives an at-a-glance update on the status of the link.

Overlay Type: This is only displayed if the overlay is turned on. There are 2 types, Basic and Service. In Basic mode, the following information is displayed: Frequency, Guard Interval, Mode, Constellation, FEC, Camera Volts (when used with a Link L1500 Wireless Camera Transmitter). In Service mode, just the selected service name and

the Camera Volts are displayed. In both modes there is also a bar across the screen that represents the MER from the best RF input.

Background: This is only displayed if the overlay is turned on. This allows the opacity of background of the overlay to be varied from Off (transparent) to 100% (opaque).

Default Std: This selects the format of the output video when no video is present on power-on. If video lock is subsequently achieved and then lost, the format of the locked video is used.

NTSC Ped: Selects whether Pedestal is inserted on the NTSC output (SD only).

PsF Mode: Tells the decoder whether to interpret the incoming video as segmented frame or interlaced video (HD only).

9.2.3 Audio Output

Audio A/B: **S**elects the output format on the rear panel: Analogue or AES digital (output on Right channel only). Also displays status information from the decoded audio.

9.2.4 Decoder Config

9.2.4.1 Decoder Options

Video Mode: Select between the available Decoding modes

Video Loss: Select behaviour on loss of video – display blue screen or freeze display

Frame Lock: Select between SD Black&Burst and HD tri-level sync (HD mode only) on the rear panel input, or disable this function.

Pixel Offset: If Frame Lock enabled, enter the offset required in pixels.

9.2.4.2 Descrambling

Select Descrambling mode (if licensed) and enter key(s)

9.2.4.3 RS232 Data

Enable extraction of embedded data from the MPEG stream. Displays the detected baud rate and parity. Displays dashes if no data detected.

9.2.4.4 Identifiers

Audio DIDs: Selects into which SDI Group the two Audio channels will be embedded.

PIDs: The PIDs detected in the currently selected service are displayed.

9.3 Stream Management Menu

These menus control aspects of the transport stream handling in the unit not directly related to the Demodulator or Decoder, including Video over IP.

9.3.1 Routing

Select the source of the Transport Stream used for each output. Depending on model and options these can be Demodulator, Diversity, ASI or IP. Note that IP In cannot be used as a source for IP Out. IP Out is the only output that can be turned Off.

9.3.2 Diversity

If the Packet Diversity licence is enabled, then this selects which of the 3 inputs are used for the Diversity function. At present only the ASI and Demodulator inputs can be used, so no settings can be changed. In future the IP input will also be selectable.

9.3.3 IP Setup

For more information on Video over IP setup see section 10.6

9.3.3.1 ASI to IP

Dest: Enter the IP address of the destination device.

Dest Port: Enter the UDP port to be used on the destination device.

Src Port: Enter the UDP port on this device to send the stream from.

Pixel Offset: If Frame Lock enabled, enter the offset required in pixels.

Encap Type: Currently only UDP is supported.

TS per IP: Enter the number of ASI packets to be encapsulated in each IP packet.

9.3.3.2 IP to ASI

Rx IP port: Enter the UDP port on this device to be used to receive the stream.

Encap Type: Currently only UDP is supported.

TS per IP: Displays the number of ASI packets encapsulated in each IP packet (read only).

9.3.3.3 IP Ethernet Setup

IP: Enter the IP address on this device to be used to receive the stream.

Mask: Enter the Subnet Mask to be used for IP in and out

Gway: Enter the default Gateway (router) IP address.

Status: Displays status of the Ethernet link used for IP video

Speed: Displays link speed of the Ethernet link used for IP video

IP Lock: Shows whether the IP in block is receiving a valid transport stream

MAC: Ethernet MAC address of the IP video port.

9.4 System Menu

9.4.1 Presets

Up to 16 preset configurations can be saved in the unit.

Save To Memory: Specify the number of the preset to be saved. It is possible to enter a name for the preset if desired. Change SAVE to YES and press ENTER to save the preset.

Recall From Memory: Specify the number of the preset to recall; if a name has been assigned this will be displayed. Change RECALL to YES and press ENTER to load the preset.

Defaults: To restore the unit to factory defaults, change RESTORE DEFAULTS to YES and press ENTER.

NB. Performing a Restore Defaults will clear all stored Presets

9.4.2 Diagnostics

Detailed information on the performance of the unit can be displayed by function:

Demodulator: pre- & post-Viterbi errors; TPS & FEC Lock, Downconverter currents & SELF TEST results.

Decoder: Video Lock, TS lock, Frame Lock, Chroma & GOP formats. In h.264 and Generic MPEG2 modes, also displays picture format information

Unit: Temperatures

System: Camera volts (when used with a Link L1500 wireless camera transmitter)

9.4.3 Control Interfaces

Configure external control interfaces:

Web Identifier: Set a text string to be displayed on the unit's web page. This helps to identify which unit is being controlled when working with multiple units.

Ethernet port: Set the IP parameters for the Ethernet control port. **NB** This is not related to the Video IP port (see section 9.3.3

Status pin: The Status pin in the CC/ALM connector (see section 6.9) is an open-drain output that connects to Ground when active. By default this is when an Alarm occurs; it is possible to select whether it is active high or low. It can also be driven manually using this menu, however.

9.4.4 Service

9.4.4.1 HELP

These menus display information useful when contacting Vislink Service, in particular the versions of the various modules in the unit. There is also an option to dump the unit's current configuration to a USB memory stick. This file (*configuration.txt*) can be emailed to customer support in order to assist with any problems.

9.4.4.2 Licenses

Enter licence codes and display which features are licensed in the unit. See section 11.1 for more details

9.4.4.3 Time

Set unit Time and Date, and display the accumulated run-time of the unit in hours.

9.4.4.4 Miscellaneous

Test the front panel LEDs, adjust the contrast of the display, and initiate a unit Restart.

9.5 Camera Control (L2174 only)

This menu allows the operator to remotely control an L1255 Data Transmitter, if one is connected to the rear panel CC/ALM connector. It is accessed by pressing the MODE key to change the unit to REMOTE mode. If an L1255 data transmitter is connected then the Camera Control option will be available.

Camera Type: Select the camera type to be used, from:
Philips, Sony, Ikegami, Sony CamC, Generic, Panasonic, Sony DXC, Thomson, Hitachi
(This list correct at time of writing, but is subject to change – contact Vislink Support for the latest list of supported cameras).

Power: Set UHF transmit power (0.1W to 2.0W)

Frequency: Set UHF transmit frequency 410-490MHz. Dependent on the version of L1255 connected.

Status: Confirms communication status of L1255 CCU unit and, in the case of the L1255-4149, shows the firmware version.

Modem **Internal:** Uses internal modem and local RF power output

External: Disables local RF output and allows CC serial data to be transmitted down RS485 path to remotely situated L1255 Modem unit

Baudrate: Indicator of input baud rate. If set to 115200, it means that there is no return data being sent back from the camera. When correctly working should display 9600 or 38400

Lock Indicates the receiver is locked to a remote WCT.

CCU Options Setting the left-most character to '1' enables the status LED on the L1255 front panel to indicate data transmission. Setting the left-most character to '2' enables the LED to indicate the presence of return data from the camera.

9.6 Web Browser Operation

The Lynx receiver has a 10/100M Ethernet port on it (see 6.10) that can be connected to any standard Ethernet network. It will work with either a normal or crossover cable. In order to use the Web browser interface to control the unit, the following IP (Internet Protocol) parameters need to be set to match your network: IP address, Network Mask and Gateway address. These numbers will be available from your network administrator. The default values are as follows:

IP address:	192.168.000.090
Network Mask:	255.255.255.000
Gateway:	192.168.000.001

These values can be changed in the SYSTEM > CONTROL INTERFACES > ETHERNET PORT menu (see 9.4.3).

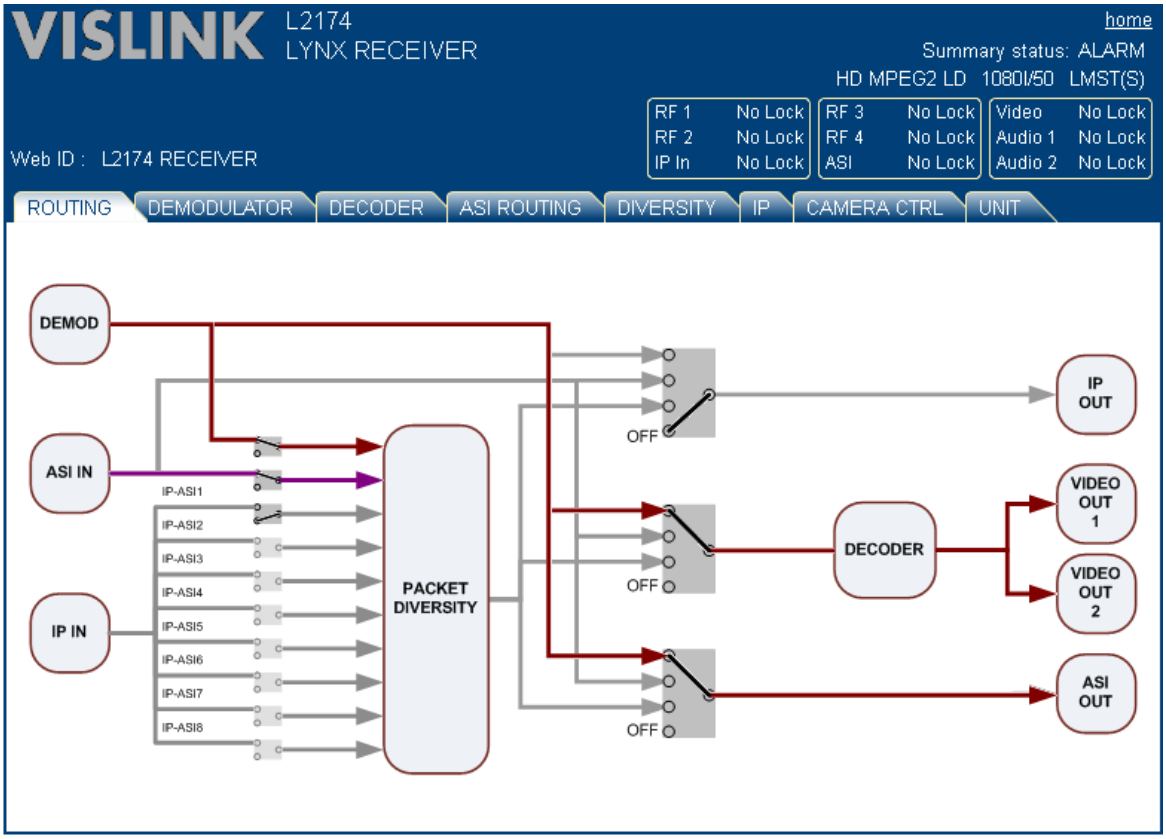
Once the IP address has been set up, open one of the supported Web browsers* and enter the unit's IP address in the address field. A welcome page will appear, giving you instructions on how to configure your browser to allow it to work with the unit. You can then continue to the main pages.

*Currently supported browsers are Internet Explorer 7 and above; Mozilla Firefox 3 and above

9.6.1 Routing Page

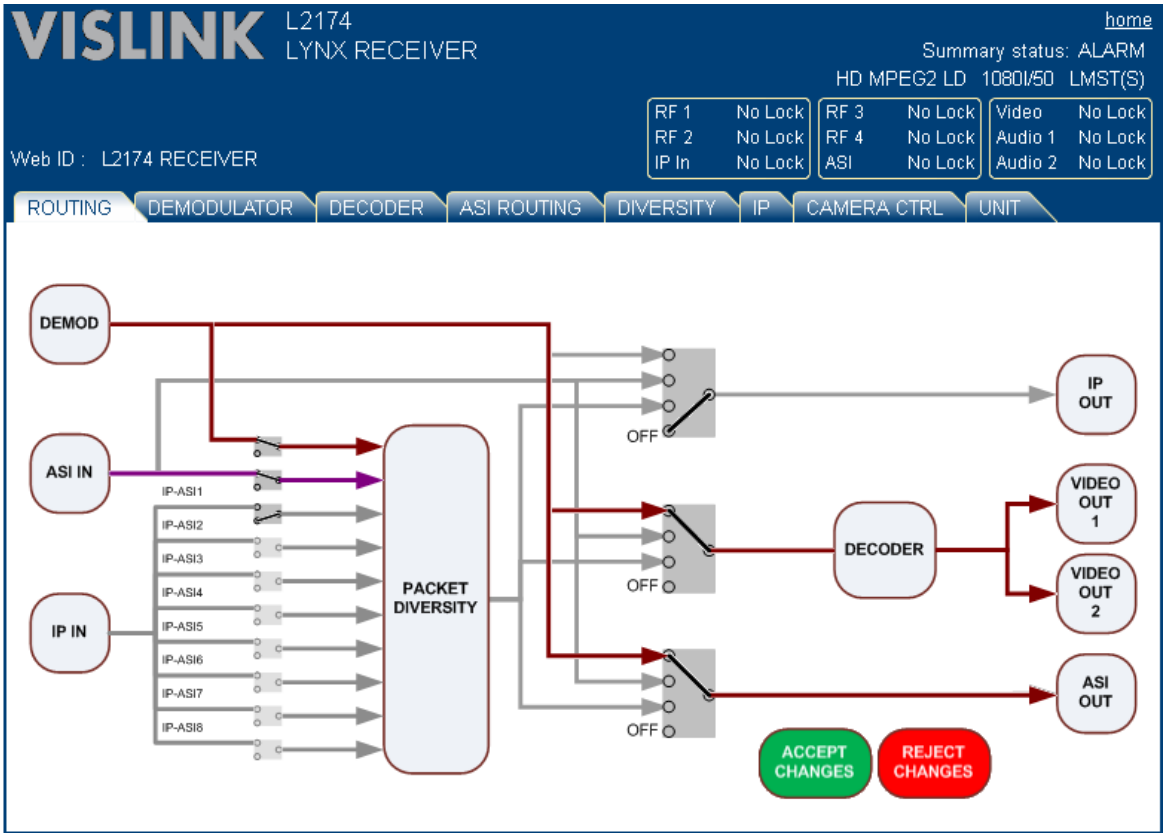
The first tab displayed is the 'Routing' diagram. This presents an easy-to-follow block diagram of the unit, and allows the operator to quickly reconfigure the paths the incoming Transport Streams take through the unit.

The diagram below shows the routing page in its default configuration. It shows that the output of the Demodulator is routed to the Decoder and the ASI Out connector, and the IP streaming output is Off.



If a box is 'greyed' then that indicates that the feature is not licensed. If a box changes colour when the mouse 'hovers' over it, then clicking will take the operator to the relevant page to configure that function. The switches change state when clicked, and will cycle through the available options. *V0015 code will only perform Packet Diversity between the ASI and RF ports, therefore the input switches are fixed as shown.*

If any changes are made then two new boxes appear: Accept Changes and Cancel Changes:



The unit's routing configuration will not change until the Accept button is clicked. Note that the paths change colour to assist in following the different routes through the unit.

9.6.2 Configuration Pages

The other tabs on the web interface allow the unit to be configured in the same way as the front panel menus. All parameters on the pages are the same as in the front panel menus, so please refer to the relevant entry in section 8 for further explanation. T he demodulator page is shown below as an example:

10 RECEIVER SET-UP

The main functions that require configuration at the receiver are :-

- Demodulation scheme in operation; DVB-T, LMS-T or ASI input – See 10.2
- Type of down converter and operating frequency – See 10.3
- Decoder – See 10.4

Other commonly used setup procedures and functions within the L2174 are :-

- Interleaving –See 10.5
- Decryption – See 10.6
- Independent Down Convertor operation – See 10.8

10.1 Self Test

In order to enhance usability the Lynx receiver performs a thorough self test on all RF inputs every time the unit is turned on, or when the modulation mode is changed. The tests check the power supplies, clocks and all critical components in the RF input circuitry, to give confidence to the user that the hardware is performing as expected. Results of the self test can be viewed in the SYSTEM→DIAGNOSTICS→DEMODULATOR→MORE→SELF TEST menu, or on the SELF TEST tab on the web page.

The self test takes 15-30s to run, during which time demodulation is disabled.

10.2 Demodulation Options

The demodulator in the receiver can operate in three main operating modes:-

1) DVB-T

2) Single Pedestal LMS-T(S) (if licensed)

3) Dual Pedestal LMS-T(D) (if licensed)

These are selected in the Demodulator → Input Mode Menu. The LMS-T pedestal bandwidth is selected in the Demodulator → Demod Setup → Bandwidth menu. Note that in LMST(D) mode, the bandwidth shown is the combined width of the 2 pedestals.

The LMST pedestal widths available are 3, 4, 5, 6, 7, 8, 10 & 12MHz. In Dual pedestal mode the effective width is therefore double that. This means that in some channel widths the system could be used in single or dual mode (e.g. 1 x 10MHz or 2 x 5MHz). The overall throughput will be the same, but this allows the RF performance to be optimised for particular operating environments.

NB There is a short delay (approx 10s) after switching modes before the unit is fully reconfigured.

10.2.1 DVB-T Operation

The following sequence defines the changes and sequence required when changing to DVB-T operation :-

Step	Menu	Option	Setting
1	Demodulator → Input Mode	Demod Mode	DVB-T
2	Demodulator → Demod Setup	Bandwidth	Auto
3	Demodulator → Demod Setup	Guard	Auto
4	Demodulator → Demod Setup	Polarity	Auto
5	Demodulator → Demod Setup	Frequency	As Required

The Table below defines the corresponding gross bit rates for DVB-T operation. This includes video, audio, data and other transport stream data tables.

Bitrates (Mbit/s) for a DVB-T system in 8 MHz channels					
Modulation	Code Rate	Guard Interval			
		1/4	1/8	1/16	1/32
QPSK	1/2	4.976	5.529	5.855	6.032
	2/3	6.635	7.373	7.806	8.043
	3/4	7.465	8.294	8.782	9.048
	5/6	8.294	9.216	9.758	10.053
	7/8	8.709	9.676	10.246	10.556
16-QAM	1/2	9.953	11.059	11.709	12.064
	2/3	13.271	14.745	15.612	16.086
	3/4	14.929	16.588	17.564	18.096
	5/6	16.588	18.431	19.516	20.107
	7/8	17.418	19.353	20.491	21.112
64-QAM	1/2	14.929	16.588	17.564	18.096
	2/3	19.906	22.118	23.419	24.128
	3/4	22.394	24.882	26.346	27.144
	5/6	24.882	27.647	29.273	30.16
	7/8	26.126	29.029	30.737	31.668

10.2.2 LMS-T Operation

The following sequence defines the changes and sequence required when changing to LMS-T operation :-

Step	Menu	Option	Setting
1	Demodulator → Input Mode	Demod Mode	LMS-T (S) or (D)
2	Demodulator → Demod Setup	Bandwidth	3 - 12MHz (S) or 6 – 24MHz (D)
3	Demodulator → Demod Setup	Guard	Auto
4	Demodulator → Demod Setup	Polarity	Auto
5	Demodulator → Demod Setup	Frequency	As Required

The Table below defines the corresponding gross bit rates for LMS-T operation at the two most common bandwidths (Single or Dual pedestal):

Bitrates (Mbit/s) for a LMS-T system					
Channels		**10MHz**		**20MHz**	
Modulation	**Code Rate**	**Guard Interval**			
		1/8	**1/16**	**1/8**	**1/16**
QPSK	2/3	9.2	9.7	18.4	19.5
16QAM	2/3	18.4	19.5	36.8	39

10.3 Down Converter Type

The following sequence defines the changes and sequence required when selecting the required down converter and receiver RF frequency:-

Step	Menu	Option	Setting
1	Demodulator → Downconverters→ Channel 1	Set All Inputs	Yes
2		Downconverter	Select Type
3		Power	On
4	Home Display *	Frequency	Select RF frequency

The demodulator will automatically detect code rate, if configured as in section 10.2

The received demodulation settings will then be displayed on the Home Display.

10.4 Decoder

The Decoder can be operated in different modes, which need to be set by the operator (it will not automatically switch modes). These are:

- MPEG2 (SD & HD)
- Low Delay MPEG2 Standard Definition
- Low Delay MPEG2 High Definition
- H.264 (SD & HD)

It can be switched to decode a transport stream either from the demodulator output, the Packet Diversity output, an external source from the rear panel ASI In socket, or the IP to Transport Stream block (if licensed).

In Auto Service mode, the first available service in the transport stream will be decoded.

Step	Menu	Option	Setting
1	Decoder → Decoder Config → Decoder Options	Video Mode	*Required Mode*
2	Decoder → Services	Auto Service	On
3	Stream Management →Routing	Diversity	On/Off
4	"	Mode	Basic
5	"	Source	Demodulator*/ Diversity*/ External ASI/ IP

* Only one of 'Demodulator' or 'Diversity' will be displayed, depending on whether Diversity is On or Off

10.5 Deinterleaving

Please see 4.1 for a functional block diagram of the L2174 receiver.

The interleaver settings on the encoder define the required FEC (1/2 – 14/15) and also the required Burst duration.

If the deinterleaver is 'On' no other parameters need to be set, as the deinterleaver will automatically extract the FEC and 'burst' settings from the received stream.

The resultant 'Interleave Delay' and 'Interleave Burst' are then also displayed on the L2174.

These parameters are a function of the Interleave FEC, Interleave Burst correction settings in the encoder and also the ASI bitrate.

The 'Delay' is a function of the Interleave FEC value and Burst duration set on the transmitter interleaver.

Delay = Burst * Denom; where Denom is the FEC denominator.

For example :- Burst setting of 1000ms and FEC of 3/4 will result in a delay of 4000ms.

The following table illustrates the limits in Burst length for the L2174 receivers at typical ASI bit rates. All figures are approximate.

Mode	Modulation	Modulation FEC	ASI Bit Rate (Mb/s)	Approx Burst Limit(s)
DVB-T	**QPSK**	**1/2**	**6**	**8.1**
DVB-T	**QPSK**	**3/4**	**9**	**5.4**
DVB-T	**16QAM**	**1/2**	**12**	**4.0**
DVB-T	**16QAM**	**3/4**	**18**	**2.7**
DVB-T	**64QAM**	**1/2**	**18**	**2.7**
DVB-T	**64QAM**	**3/4**	**27**	**1.8**
LMS-T (10M)	**QPSK**	**2/3**	**9**	**5.3**
LMS-T (10M)	**16QAM**	**2/3**	**18**	**2.6**
LMS-T (20M)	**QPSK**	**2/3**	**18**	**2.6**
LMS-T (20M)	**16QAM**	**2/3**	**37**	**1.3**

Note:-

Due to the large buffers involved in the interleaving process, significant time may be required after any adjustments are made before a 'stable' picture is decoded.

10.6 Video over IP

The L2174 family can encapsulate an ASI stream into an IP (Internet Protocol) stream, for transport over Ethernet infrastructure. It can also receive such streams and recover the ASI stream from within it. This uses UDP (User Datagram Protocol), which is a basic IP protocol with no error protection and which does not guarantee delivery or packet order. As a result, this should only be used on direct (point-to-point) links, or over well-controlled networks, where such traffic can be guaranteed to reach its destination. It is not suitable for uncontrolled networks such as the global Internet.

To send video over IP between two units with a direct Ethernet connection, the following steps are necessary:

1. In the receiving device, set the **IP address** of the IP block (or leave as default), under **IP Video Setup.** The Mask and Gateway are only necessary if the traffic is going to pass over a network.
2. In the receiving device, set the **IP Port** to the required value (or leave as default).
3. In the sending device, set the **Destination IP Address** (under **ASI to IP**) to the value set in step 1.
4. In the sending device, set the D**estination Port** to the value set in step 2.
5. In the sending device, set the source of the IP block as required (either Demodulator or ASI Input).
6. In the receiving device, set the destination of the IP block as required (either Decoder or ASI output).

On the receiving device, status can be monitored on the **IP Video Setup** page. The steps above are similar when using other devices at either end of the link. If a network is being used then ensure that all the IP addresses on the network are unique, and that they all have the same subnet mask.

10.7 Decryption

The L2174 can provide various decryption options dependent upon the licence options for the unit.

First the required decryption algorithm is selected and the appropriate key must then be entered either from the front panel or via Link Control software running on a PC. For the AES keys these must be entered in two (AES128) or four (AES256) 8 byte segments.

The BISS-1, BISS-E and AES+ decryption will only decode an encrypted stream; EBS and AES will decode non encrypted (clear) streams and also the appropriately encrypted streams.

10.8 Independent and Customised Down Convertor operation

This option allows for the use of third party down convertors with the L217x receiver.

The user must first select "Other" down convertor type in the Demod➔Downconverter menu; then select the required LO frequency and polarity. These can be set individually for each of the RF inputs. These can then be stored as any one of the Config memories to be re-loaded as required.

11 LICENCES AND UPGRADES

11.1 Licensing

In common with many Vislink products, features can be added to the Lynx range of receivers by purchasing additional licences from your local representative. There are 2 sets of licenses in this product, one for Demodulator features, and one for Decoder features. The features currently licensed in the unit can be seen in the SYSTEM > SERVICE > LICENCES > DEMOD/DECODER FEATURES menus (or the UNIT > DEMOD/DECODER tabs on the web page).

Before ordering your licence, you will need to provide the serial numbers of the boards in the unit. These can be found in the SYSTEM > SERVICE > LICENCES > BOARD IDS menu on the Front Panel, or the UNIT > LICENCES tab of the web page. The latter is the recommended method as the numbers can easily be cut and pasted into an email or letter.

The licence code is a 28-character string, of which there may be 2 (if there are new features on both boards). It is recommended that the web browser is used to enter the numbers into the unit, as they can be cut and pasted directly. They can be entered on the front panel as two 14-character strings, however this is very time-consuming. Check that the new feature(s) are shown on the 'licensed features' menus; if not, check that you have entered the text string(s) correctly.

11.2 Firmware Upgrades

Vislink equipment is designed to allow for firmware upgrades providing new features and continual improvements during the life of the product. Please consult the Vislink website, or your local customer services representative, for details of the latest firmware releases.

NB From December 2012 onwards, new L2174 units were fitted with a new processor platform. This has no effect on the end user, other than an improved startup time. It is important to note, however, that it is not possible to run old versions of code on these units. Versions that are compatible with both new and old hardware have the number V**1**xxx; any that start V**0**xxx will not be accepted by new units. The platform type is displayed on the Versions menu/tab: IMX27 is the new platform, ETRAX is the old one.

The unit is upgraded via the front panel USB port. The required file can be downloaded from the website and copied onto a suitable USB memory stick after first deleting any previous builds from the memory stick (there should be no other files in the root directory of the memory stick).

- First remove the power from the unit. Also remove the Ethernet cable (if connected).
- Insert the USB memory stick and apply power to the unit. The upgrade process will then start automatically; the front panel will indicate the status of the upgrade process.
- A complete upgrade will take approximately 20-30 minutes.

Power should not be removed whilst the upgrade is in process or your unit may be rendered inoperable.

When completed, remove the USB stick and cycle the power to the unit. Immediately perform a Restore Defaults (see 9.4.1) before continuing with setting up the unit. **NB. Performing a Restore Defaults will clear all stored Presets.**

Sometimes it may be necessary to clear the Cache in your web browser following an upgrade, otherwise the web pages may not display correctly. The method of doing this varies between browsers, but for Internet Explorer and Mozilla Firefox, pressing *Control-Shift-Delete* will bring up the required menu. Select either *Temporary Internet Files* or *Cache* to be cleared.

A log of the upgrade is available on the USB stick in the file *logfile.txt*. This file is best viewed with 'Wordpad', rather than 'Notepad' (on Windows systems).